No. 850,819. PATENTED APR. 16, 1907.

F. H. M. DAVIS.

RATCHET MONKEY WRENCH.

APPLICATION FILED FEB. 15, 1906.

Fig. 1

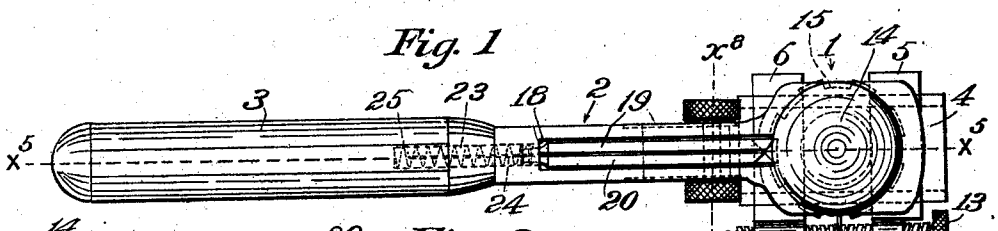


Fig. 2

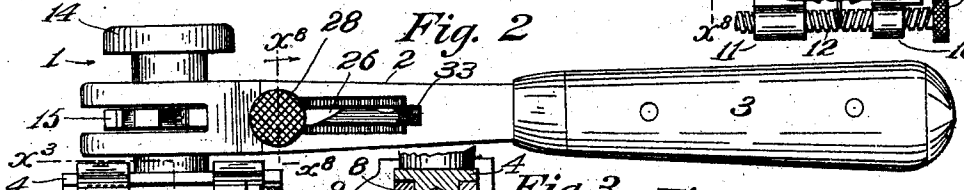


Fig. 3

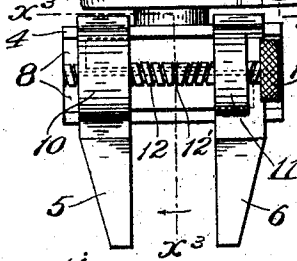


Fig. 4

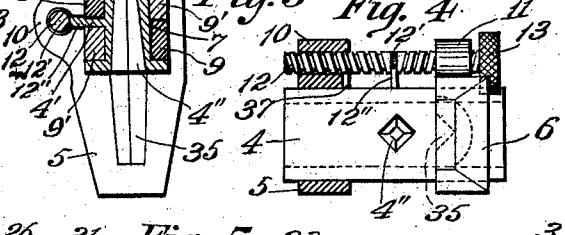


Fig. 5

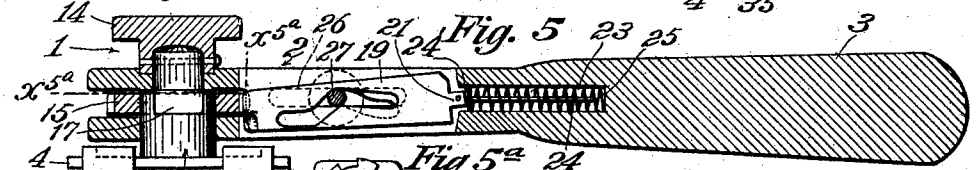


Fig. 5a

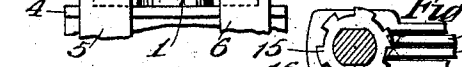


Fig. 6

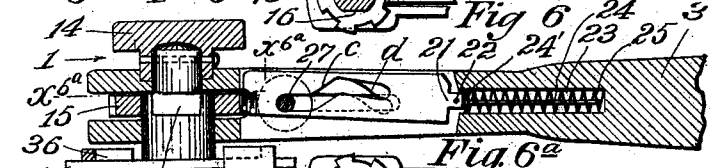


Fig. 6a

Fig. 7

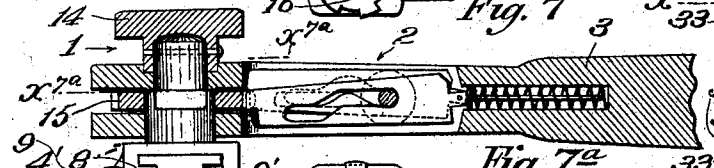


Fig. 7a

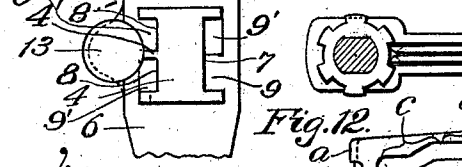


Fig. 8

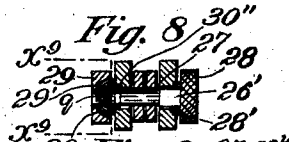


Fig. 9

Fig. 10

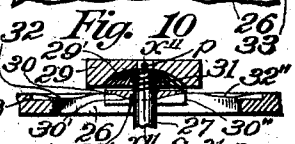


Fig. 11

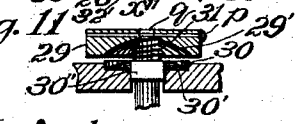


Fig. 12.

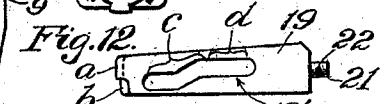
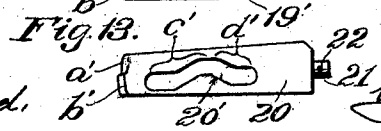


Fig. 13.



Witnesses:-

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J. Townsend.

Inventor

Fred H. M. Davis

by James R. Townsend

his Atty

UNITED STATES PATENT OFFICE.

FRED H. M. DAVIS, OF LOS ANGELES, CALIFORNIA.

RATCHET MONKEY-WRENCH.

No. 850,819. Specification of Letters Patent. Patented April 16, 1907.

Application filed February 15, 1906. Serial No. 301,215.

To all whom it may concern:

Be it known that I, FRED H. M. DAVIS, a citizen of the United States, residing at the city of Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Ratchet Monkey-Wrench, of which the following is a specification.

It is of the objects of this invention to provide a simple, compact, and convenient wrench combining in one appliance the functions of an ordinary monkey-wrench and the advantageous features of a ratchet-wrench, also to provide a reversible ratchet-wrench that may be used for screwing bolts or nuts into place or unscrewing the same, also to provide improved adjusting means for the jaws of the wrench.

My improved ratchet-wrench is especially adapted to turn bolts and nuts located in places inconvenient of access, either on account of there being a limited space above the object to be turned or at the side thereof.

Further objects and advantages may appear in the following detailed description, taken in connection with the accompanying drawings illustrative of the invention, in which—

Figure 1 is a plan view of the wrench. Fig. 2 is a side elevation thereof. Fig. 3 is a fragmental vertical section on line x^3 x^3 of Fig. 2, showing one of the jaws and parts adjacent thereto. Fig. 4 is a bottom plan of the jaws of the wrench and means for adjusting said jaws at different distances apart, one of the jaws being sectioned. Fig. 5 is a longitudinal section of the wrench on line x^5 x^5 of Fig. 1, the lower portion of the jaws being broken away to contract the view. In this view the jaws are not sectioned and the ratchet-operating means is shown adjusted to rotate the jaws in a clockwise direction. Fig. 5^a is a fragmental plan section on line x^{5a} x^{5a} of Fig. 5, showing the toothed jaw-rotating wheel, the position of the pawls with relation to said wheel being the same as in Fig. 5. Fig. 6 is similar to Fig. 5, except that the pawls are shown in position to rotate the jaws in the anticlockwise direction and one of the jaws is sectioned. In this figure a portion of the handle and jaws is broken away to contract the view. Fig. 6^a is a fragmental plan section on line x^{6a} x^{6a} of Fig. 6, showing the pawls in position corresponding to that of Fig. 6. Fig. 7 is similar to Fig. 6, except that the pawls are shown in position to lock the jaws against rotation relative to the body portion of the wrench and the jaw-carrying cross-piece is turned half-way around and left unsectioned. Fig. 7^a is a fragmental plan section on line x^{7a} x^{7a} of Fig. 7, the pawls being shown in the same position as in said Fig. 7. Fig. 8 is a vertical section of the pawls and adjusting-pin therefor on line x^8 x^8 of Figs. 1 and 2, the right-hand head of the pin being left unsectioned. Fig. 9 is an enlarged fragmental section on line x^9 x^9 of Fig. 8. Fig. 10 is a section on line x^{10} x^{10} of Fig. 9. Fig. 11 is a section on line x^{11} x^{11} of Fig. 10. Fig. 12 is a side elevation of one of the pawls. Fig. 13 is a side elevation of the other pawl.

My improved wrench includes a rotary jaw-carrying head mounted on a support or shank 2, furnished with a handle 3. Said head 1 carries a cross-piece 4, on which is mounted the jaws 5 and 6. The head 1 is provided with a broad way 7 on one side and two narrower ways 8 on the other side.

9 designates arms, one projecting from each of the jaws 5 and 6, said arms being slidable in the narrow ways 8. Similar jaws 9′ are provided on the other side of cross-piece 4 in way 7. The jaws 9′ are separated by a bead 4′, while the arms 9′ fill the entire width of way 7, as shown in Fig. 3. The four arms 9 and 9′ are each substantially the same in length, each extending far enough from the jaw to which it is attached to remain within the other jaw when the jaws are spread apart, so as to be located near the ends of cross-piece 4, diagonally opposite arms belonging to the same jaw. Means are provided for adjusting the jaws at different distances apart. For this purpose each jaw is provided with a boss 10 or 11, having a screw-threaded bore.

12 designates a screw having reversely-threaded portions and engaging the threaded bores of the bosses 10 and 11. Said screw is provided with an operating-head 13.

12′ designates an annular groove located at the middle of screw 12 between the right and left threads thereof.

12″ designates a tooth projecting outwardly from bead 4′, said tooth being shaped to fit into groove 12′, as best shown in Fig. 4.

13 designates a milled head for rotating screw 12.

The jaw-carrying head 1 is provided with a toothed portion consisting of a wheel 15, which may be secured to the head by any suitable means. In the construction shown

the wheel 15 is provided with two oppositely-disposed internal ribs 16, engaging cuts 17 in the head proper.

Reference is now made to the means for rotating the carrying-head 1.

The shank 2 is provided with a vertical slot 18, in which pawls 19 and 20 swing in a plane at right angles to the plane of rotation of tooth-wheel 15. Said pawls 19 and 20 are each provided with an extension 21 and are arranged as a coöperative pair, being pivoted together (but not to the shank) by pivot 22, extending through said extension 2. Said pawls 19 and 20 are arranged to reciprocate longitudinally toward and from wheel 15, as well as to swing at right angles to said wheel. Extensions 21 at all times remain within socket 23, which extends into the handle of the wrench from the end of the slot 18.

24 is a plunger reciprocating in socket 23 and provided with head 24′, yieldingly held against extension 21 by a spring 25.

Pawls 19 and 20 are respectively provided with slots 19′ and 20′, and shank 2 is provided with a slot 26 at each side intersecting slot 18.

27 is a pin passing through slots 26 in the shank and slots 19′ and 20′ in the pawls.

Slots 26 in the shank of the wrench are straight and oppositely disposed to each other throughout their entire length, while slots 19′ and 20′ are crooked—that is to say, are provided with portions extending in different directions and do not coincide with each other or to slots 26. Therefore, when pin 27 is moved from one end to the other of slots 26, pawls 19 and 20 swing with relation to the shank and are also caused to assume different pivotal positions with relation to each other. This movement causes the tooth-engaging end of the pawls 19 and 20, considered together, to occupy three positions with relation to the wheel 15, as shown in Figs. 5, 6, 7, 5^a, 6^a, and 7^a. On account of the reverse inclination of bevels a, b, a', and b' at the tooth-engaging ends of the pawls the adjustment just described causes the pawls 19 and 20 to rotate wheel 15 in reverse directions or to hold the same stationary, as will hereinafter be more fully described.

Means will now be described for yieldingly holding pin 27 stationary at three different points along the length of the shank-slot 26 and of the pawl-slots 19′ and 20′, thereby to retain pawls in the three positions above referred to.

Pin 27 is provided with heads 28 and 29, head 29 being retained on said pin 27 by a pin p, which extends through a perforation in a contracted extension q, projecting from pin 27. Head 28 has an inwardly-projecting rise or low-tapering lug 28′ on each side of pin 27, said pin being squared at 26′ to maintain lugs 28′ over the unslotted portion of the shank. Pin 27 is provided on the opposite side of the shank with a collar 30, having raised portions or lugs 30′, which correspond to and coöperate with lugs 28′. In order to hold lugs 30′ over the unslotted portion of the shank, collar 30 is provided with an internal bead or elongated boss 30″, which slides along and fits into one of the grooves 26.

Head 29 is preferably provided with an internal recess 29′, in which is housed a spiral spring 31, surrounding pin 27 and pressing collar 30 against the adjacent side of the shank 2, said spring at the same time reacting against head 29, and thereby drawing projections 28′ against the other side of the shank.

Three oppositely-disposed depressions or scallops 32 are ranged along each side of each slot 26, as indicated in Fig. 10. Each of the four coöperating set of depressions at the end of the slots 26 nearest the handle of the wrench are designated as 32″. Each of the four depressions which are located near the center of slots 26 are designated as 32′. Each set of depressions 32, 32′, and 32″ is positioned to coöperate in yieldingly holding pin 27 stationary in three positions along the length of slots 26 by reason of lugs 28′ and 30′ entering said depressions under the pressure of spring 31 as pin 27 is slid along slots 26.

Referring to pawls 19 and 20, as shown in Figs. 12 and 13, bevel a occupies the upper half of the tooth-engaging end of pawl 19. Bevel b is reversely inclined to the bevel a and occupies the lower half of the tooth-engaging end of said pawl 19. Bevel a' occupies the upper half of the tooth-engaging end of pawl 20, and bevel b' occupies the lower half of the same end of said pawl, being reversely inclined to bevel a'. Furthermore, when the pawls are swung into the position in which one is directly behind the other, as shown in Figs. 5, 5^a, 6, and 6^a, bevel a of pawl 19 forms a continuation of the bevel a' of pawl 20, and the bevel b' of pawl 20 forms a continuation of the bevel b of pawl 19. Therefore in the position shown in Figs. 5 and 5^a pawls 19 and 20 coöperate to turn wheel 15 continuously in a clockwise direction, said pawls moving toward and from socket 23 to allow bevel a and a' to slide over the teeth of said wheel 15. In the position shown in Figs. 6 and 6^a bevel b and b' slide over teeth of wheel in a reverse manner. In the position shown in Figs. 7 and 7^a the beveled points a and b' incline oppositely from each other and enter the space between the teeth of the wheel 15, thereby effectually locking said wheel against rotating in either direction, adapting the device to be used like an ordinary monkey-wrench. These three different positions of the pawls with relation to each other and to the teeth of the wheel 15 result from the relative arrangement of the slots 26 in the shank of the wrench and slots 19′ and 20′ in the pawls. A portion c of slot

19′ of pawl 19 is of the same shape as the portion *c′* of slot 20′ of pawl 20. Therefore when pin 27 is moved along portions *c* and *c′* of the respective slots 19′ and 20′ there is no change in the position of the pawls with relation to each other, although said pawls swing with relation to shank 2. When, however, pin 27 is moved along the slotted portions designated *d* and *d′*, there is no relative movement between pawl 19 and the shank of the wrench, but there is an upward or downward movement of pawl 20, both with relation to pawl 19 and the shank of the wrench.

33 designates seats, one at each end of slot 26 on one side of the wrench, to provide room for the elongated boss 30″, with which collar 30 is furnished to prevent said collar from rotating on pin 27. Said seats 33 allow the collar to move far enough along slot 26 so that pin 27 may move to each end of said slot.

The wrench is adapted to hold a bit or similar tool. For this purpose cross-piece 4 may be provided at the center of the lower side thereof with a rectangular upwardly-tapering socket 4″, each jaw 5 and 6 having a groove or seat 35 extending from cross-piece 4 downwardly along the mid-length of each jaw nearly to the lower end thereof. From the arrangement of socket 4″ and grooves 35 it will be seen that the head of a bit may be placed within socket 4″ and the jaws clamped against said bit at each side thereof to hold the same at right angles securely against turning with relation to the cross-piece 4 and the head of the wrench. Jaws 5 and 6 are cut away at 36 to provide room for the circular head 1, as best shown in Fig. 6. A recess 37 is also provided in each jaw, as shown in Fig. 4, to provide room for tooth 12″ when the jaws are brought nearly into contact.

The object of providing a pair of pawls for operating the ratchet-wheel 15 instead of a single pawl for this purpose is to economize space. This space-economizing effect is illustrated by Figs. 7 and 7ª. If a single pawl were provided with the two reversely-beveled end portions required to rotate the wheel 15 in reverse directions and also a third portion adapted to lock the wheel against rotation, in such case said pawl would need to be one and one-half times as wide as either of the pawls 19 or 20, and therefore when the tooth-engaging portion of the pawl nearest one side thereof was in engagement with wheel 15 the opposite edge of the pawl would project above or below slot 26, which would be an objectionable construction inasmuch as it is desirable that the wheel-operating device be fully protected from external displacement without making the shank of the wrench unnecessarily large.

I claim as my invention—

1. A support, a head provided with teeth for rotation thereof, a pair of longitudinally reciprocatory pawls each having oppositely-inclined tooth-engaging ends, and means for moving said pawls into and out of a position in which an inclination at the end of one pawl forms a continuation of an inclination at the end of the other pawl.

2. A support, a rotary head provided with teeth, a pair of pawls adapted to rotate said head in reverse directions, said pawls being pivoted together at the end farthest from the rotary head, a plunger engaging both of said pawls at said end, and a spring acting on said plunger to force said pawls toward said head.

3. A rotary head provided with teeth, a pair of pawls adapted to rotate said head in reverse directions, said pawls being each provided with an extension at the end farthest from said head, a support on which said head and pawls are mounted, said support having a socket into which the extensions of the pawls project, and a spring-pressed plunger operating in said socket to press said pawls toward said head.

4. In a ratchet-wrench, a head provided with teeth for rotation thereof, and a pair of pawls adapted to swing edgewise and simultaneously occupy the space between adjacent teeth for locking said head against rotation in either direction.

5. A head provided with teeth for rotation thereof and a pair of pawls pivoted to swing at right angles to the plane of rotation of said head, said pawls each having reversely-inclined end portions adapted to rotate said head in reverse directions.

6. A head provided with teeth for rotation thereof, a pair of pawls which has reversely-inclined tooth-engaging portions to rotate said head in reverse directions, said pawls being movable longitudinally away from said head, and means for yieldingly holding said pawls in engagement with said teeth.

7. In a ratchet-wrench, a slotted pawl having a tooth-engaging end different portions of which are adapted to rotate the jaws of the wrench in reverse directions, a slotted support, and means movable lengthwise of the slots in the pawl and support to change the position of the tooth-engaging end of the pawl.

8. In a ratchet-wrench, a slotted pawl having a tooth-engaging end different portions of which are adapted to rotate the jaws of the wrench in reverse directions, a slotted support, and a pin movable lengthwise of the slots in the pawl and support to change the position of the tooth-engaging end of the pawl.

9. In a ratchet-wrench, a pawl having a slot extending in different directions, a support having a straight slot and means in said slots movable lengthwise thereof for the purpose specified.

10. In a ratchet-wrench, a pawl having a slot extending in different directions, a support having a straight slot and a pin in said slots movable lengthwise thereof for the purpose specified.

11. In a ratchet-wrench, a slotted support, two slotted pawls movable with relation to each other and to said support, the slot in each pawl extending in different directions, and means movable longitudinally along the slot in the support for the purpose specified.

12. In a ratchet-wrench, a slotted support, two slotted pawls movable with relation to each other and to said support, the slot in each pawl extending in different directions, and a pin movable transversely to itself and longitudinally along the slot in the support for the purpose specified.

13. In a ratchet-wrench, two slotted pawls, the slot in one pawl extending in different directions, a pin movable transversely to itself and longitudinally along said slots to move said pawls relatively to each other, and means for yieldingly holding said pin stationary.

14. In a ratchet-wrench, a support provided with depressions, pawls carried by said support, the slot in one pawl extending in different directions, a pin movable along the slots in the support and pawls, and means for yieldingly holding said pin stationary, said means including a part moving with said pin into and out of depressions in one of said members.

15. In a ratchet-wrench a support provided with depressions, two slotted pawls carried by said support, the slot in one pawl extending in different directions, a pin movable along the slots in the support and pawls, and means for yieldingly holding said pin stationary, said means including a part moving with said pin at each end thereof into and out of depressions in said support.

16. A ratchet-wrench provided with a slotted pawl; a support having slots and depressions adjacent said slots, and a pawl-adjusting device slidable along said slots, said device including a pin extending through said slots, a spring, and a part at each end of said pin movable into said depressions by said spring.

17. A ratchet-wrench provided with a jaw-actuating wheel, a slotted pawl engaging said wheel and pivoted to swing at right angles to the plane thereof, a support provided with a recess in which said pawl swings and oppositely-disposed slots leading into each side of said recess there being depressions in the shank adjacent each of said slots, a pawl-adjusting pin extending through said oppositely-disposed slots and the slot in said pawl, said pin having an inwardly-extending lug fixed to one end thereof adapted to engage the depressions at one side of the shank, the other end of the pin being provided with a head and a collar under said head, said collar having lugs adapted to engage the depressions at that side of the shank, and a spring between said head and said collar.

18. In a wrench, a jaw-carrying member provided with opposite longitudinal ways, a pair of jaws slidable along said member and having jaws lying within said ways, each of said jaws embracing and holding in place an arm carried by the other jaw, and means for sliding said jaws along said member.

19. In a ratchet-wrench, a support having intersecting slots, a toothed wheel carried by said support, a pivoted pawl in one of said slots engaging said wheel, and means movable along the other slot to adjust pivotally the position of said pawl.

20. In a ratchet-wrench, a support having intersecting slots, a toothed wheel carried by said support, a slotted pawl pivotally mounted in one of said slots in engagement with said wheel, and a pin movable along the other slot of the support and extending through the slot in the pawl.

21. A ratchet-wrench provided with a pair of pawls pivoted together at one end, each pawl having a slot extending lengthwise thereof, and means extending through said slots and slidable therealong to vary the pivotal position of said pawls relative to each other.

22. In a ratchet-wrench a support provided with a socket, a toothed wheel, a pair of pawls each provided at the rear end with an extension engaging said socket, said pawls being pivoted together by a pivot extending through said extension, means for swinging said pawls relatively to each other, and a spring in said socket for holding said pawls in engagement with said wheel.

In testimony whereof I have hereunto set my hand, at Los Angeles, California, this 8th day of February, 1906.

FRED H. M. DAVIS.

In presence of—
JAMES R. TOWNSEND,
ALBERT H. MERRILL.