

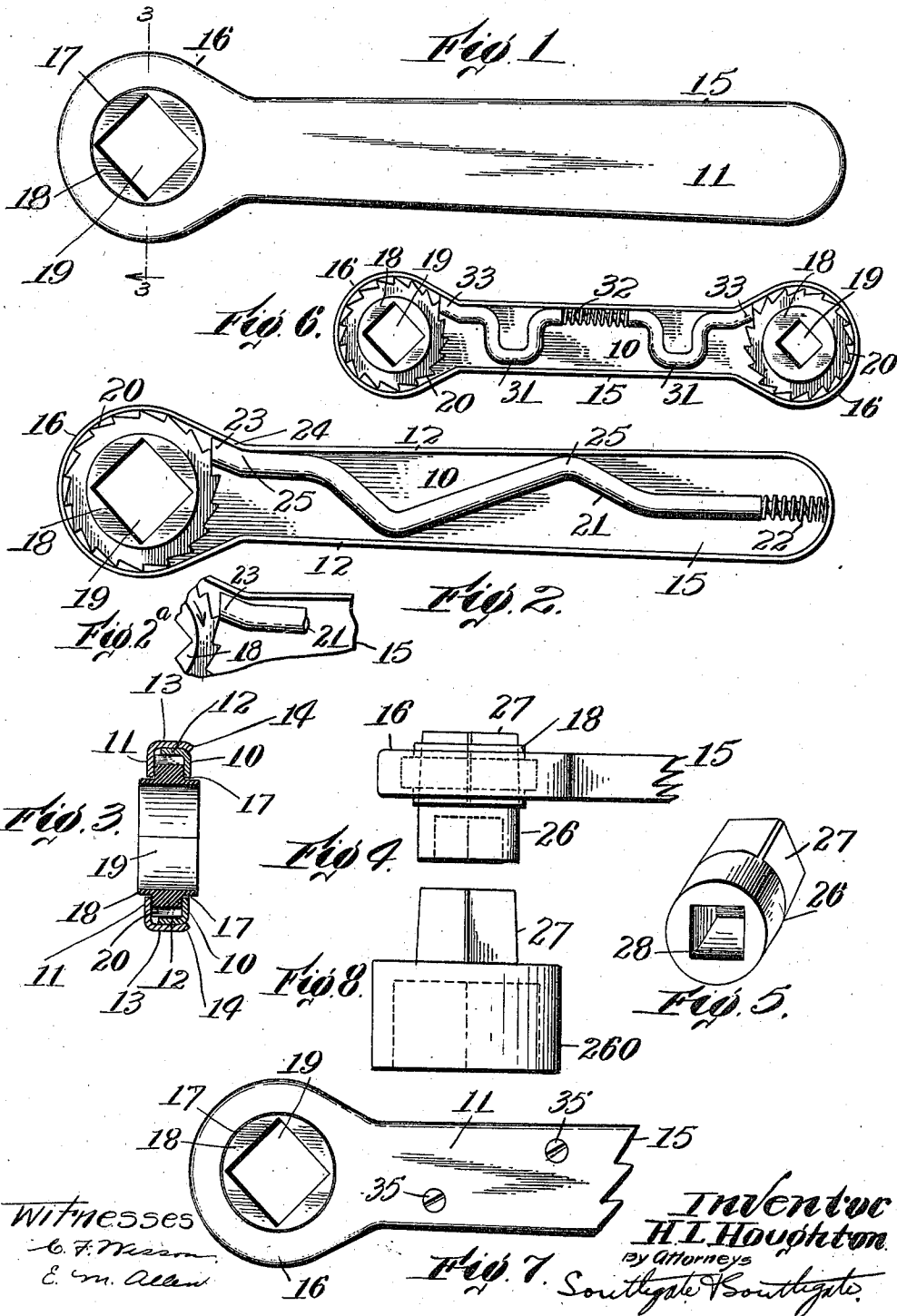
H. L. HOUGHTON.

RATCHET TOOL.

APPLICATION FILED MAY 15, 1907. RENEWED MAR. 5, 1908.

963,895.

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UNITED STATES PATENT OFFICE.

HERBERT L. HOUGHTON, OF WORCESTER, MASSACHUSETTS.

RATCHET-TOOL.

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Specification of Letters Patent.

Patented July 12, 1910.

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To all whom it may concern:

Be it known that I, HERBERT L. HOUGHTON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Ratchet-Tool, of which the following is a specification.

This invention relates to ratchet tools and the like.

The principal object of the invention is to provide a strong and durable construction which will be simple and inexpensive to manufacture and will have no parts that will get out of order easily in use; also to make provision for a positive action between the ratchet wheel and its pawl at all times, even when the surfaces thereof are greatly worn, thus greatly prolonging the usefulness and life of the implement, to provide means whereby when the handle is turned in one direction the pawl of the wrench will positively be locked against further outward motion, and when it is turned in the other it will be released instantly, and to provide an improved form of sheet metal casing or handle of such construction that it can be made inexpensively, and so assembled that it will effectively prevent the entrance of dust and metallic particles between the parts, especially when the casing is worn or strained in use.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which,

Figure 1 is a plan of a wrench constructed in accordance with this invention. Fig. 2 is a plan of the same with the upper half of the casing removed. Fig. 2^a is a similar fragmentary view showing the parts in another position. Fig. 3 is a sectional view on the line 3—3 of Fig. 1. Fig. 4 is a side elevation of the same showing a removable head applied thereto. Fig. 5 is a perspective view of said head. Fig. 6 is a view similar to Fig. 2 showing another form in which the invention can be carried out. Fig. 7 is a plan showing a modification, and Fig. 8 is a side elevation of a movable head of a different size from that shown in Fig. 4.

As shown in the first three figures, the casing of the tool is preferably formed in a most simple manner by means of two pieces of sheet metal 10 and 11. These pieces are of similar shape being formed in dies or in any other convenient manner. The piece 10

constitutes one side of the casing or handle of the tool and its edge is turned up to form a flange 12 so that it is of box-like form. The piece 11 forms the other side or cover and is similarly turned up to form an outside flange 13 which telescopically fits over the flange 12 and can be permanently secured thereto, as by turning up its edge 14 to lock the parts in position. The continuous flange 13 fitting outside the flange 12 as shown, so that one of the pieces of sheet metal is contained substantially within the flange of the other, constitutes a long joint which is not likely to become separated or opened in use, because any ordinary damage to the implement would result in separating the joint along the plane thereof and not transverse to it. Even if it does become somewhat disarranged in use, there is not the danger of the admission of metal filings and the like that there would be in a casing with butt joints. This advantage is present even when the turned-up edge 14 is replaced by some other fastening device. This casing is preferably of such shape as to form a handle 15 which is hollow and has an enlarged portion 16 at one or both ends as desired. This enlarged portion is provided with opposite perforations 17 constituting bearings for a rotatable head 18 which may project through the casing if desired. This rotatable head is provided with a socket 19 or other means for receiving or fitting a tool or device to be operated, as a bolt-head, nut or the like. If it is desired to fit a socket, the construction will of course be reversed and a projection will be provided instead of a socket, and when I mention the socket I wish to be understood as including such equivalents.

The rotatable head is provided with ratchet teeth 20. Located in and guided by the walls of the hollow handle is a longitudinally movable member 21 preferably pressed toward the sprocket teeth, as by means of a spring 22, shown as bearing against the end of the handle. This longitudinally movable member is guided in the casing so as to move along the same, but it has a side play to allow a lateral movement. It is provided with an end or nose 23 which is shaped to engage the ratchet teeth and to constitute a pawl for operating them. It is to be observed that this pawl is shown as projecting outwardly into the enlarged head of the casing beyond the wall which guides

it to move longitudinally. This is done so that means may be provided for positively locking the pawl against backward movement when it is in engagement with the forward edge of one of the teeth of the ratchet wheel. The means which is shown in the drawings for locking the pawl in this way consists of a wall 24 at the neck of the enlarged head, angularly or slantingly disposed with respect to the direction of motion of the pawl. This is shown as formed on the same angle as the contacting face of the pawl, and as constituting a part of the wall of the casing itself. The effect of this construction is that when the ratchet wrench is used, the tendency of the hub or ratchet wheel to turn in the casing or housing draws the nose of the pawl or detent into the wedge-shaped opening between the ratchet wheel and the inclined wall 24, whereby said pawl acts as a wedge or cam to lock the wheel firmly to the body. When the pawl has been carried against the side of the wall 24 the pawl must first move laterally before it can move longitudinally to disengage it from the teeth, and no matter how worn the teeth are, the pawl locks the ratchet wheel so that it is impossible to move it. The sliding member 21 is shown as provided with surfaces 25 on its opposite sides which engage the parallel inner walls of the casing to guide it in its longitudinal motion.

In this construction it will be seen that the operation of the ratchet is as follows:— When the handle is turned in a direction to move the pawl freely over the teeth as indicated in Fig. 2^a, the teeth carry the pawl away from the surface 24 and thus allow it to move longitudinally and ratchet over the teeth. When, however, the handle is moved in the other direction, the edges of the teeth of the ratchet wheel clamp the end of the pawl between themselves and the surface 24, or other means which is provided in that position for engaging the offset rear side of the pawl. This positively locks the pawl so that even if the teeth of the ratchet wheel or the operating edge of the pawl should be worn down to such an extent that only rounded protuberances are left, the device will operate perfectly, because the pressure of even a rounded tooth against the end of the pawl will simply force the pawl toward the surface 24 and lock it there, and it can have absolutely no tendency to push it back toward the spring. It will be seen that this is a great advantage over those constructions in which the pawl is mounted on a straight slide working in straight guideways, because in such cases the rounded edges of the teeth after the same are worn in use have a wedging action to force back the pawl toward the spring, consequently when they are partly worn away the useful-

ness of the tool may be destroyed. The present invention effectively prevents such action as this.

In order that the same wrench may be employed for a large number of sizes of nuts and bolts, a removable head 26 or 260 may be used. This head is provided with a projection 27 of the same shape as the socket 19 and of tapering form so that it may be driven into the socket and held therein by friction. This head is provided with a socket 28 of a different size or with a projection as the case may be.

The removable head may be used with any of the forms in which the invention may be embodied. Its socket is preferably larger than that of the wrench itself, as is indicated in Fig. 8.

In the form shown in Fig. 6, the casing is shown as having an enlarged portion and rotatable head at each end. In this case a pair of movable members 31 is provided each being normally pressed toward the ratchet teeth by means of a spring 32 which holds them apart. Each of these members is provided with a pawl 33 like the pawl 23 and they operate in the same way.

In some cases I prefer to construct the wrench in such a way that the two members 10 and 11 of the casing can be removed readily from each other. In this case the inwardly extending projection or edge 14 is omitted and the two members of the casing are secured together by means of screws 35 or the like as indicated in Fig. 7, these screws being located in any convenient positions. Some of these features of the invention can be applied to a cast casing.

While I have illustrated and described certain forms in which I at present prefer to embody the invention and while I have shown it as applied to a wrench, I am aware that many modifications may be made therein by any person skilled in the art and that most of the features may be applied to any ratchet tool or the like without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular form and application shown, but

What I do claim is:—

1. A ratchet wrench having a handle consisting of two stamped out sheet metal parts secured together, and having a substantially uniform longitudinal passage there-through, a rotatable head having bearings in both of said parts and having ratchet teeth, said head being provided with a socket for receiving a nut, bolt-head, or the like, and a member longitudinally movable along said passage in the handle and provided with a pawl for engaging and operating said ratchet teeth, said member being smaller than said passage and having bends extending substantially in contact with the oppo-

site sides thereof, whereby the member is guided in said passage and has comparatively small bearing points upon its opposite walls.

5 2. A ratchet tool having a handle provided with a longitudinal passage, a rotatable head having ratchet teeth, a bent member having portions adapted to engage the opposite walls of said passage, whereby said member may be guided to move longitudinally in the passage, said member being provided with a pawl for engaging and operating the ratchet teeth, and a spring for operating said member.

15 3. A ratchet tool having a casing provided with an enlarged portion having an inclined wall, a rotary head having ratchet teeth located in said enlarged portion, and a sliding pawl having its rear surface parallel with the inclined wall and movable away from the wall by the ratchet teeth.

20 4. In a ratchet tool, the combination of a casing provided with an enlarged portion having an inclined wall, a rotary head having ratchet teeth located in said enlarged portion, and a longitudinally movable member on the casing having a pawl on the end thereof for engaging the ratchet teeth, said pawl having a surface substantially parallel with the said inclined surface and adapted to engage the same and also being laterally movable, whereby when the head rotates, the teeth thereof will move said pawl away from said slanting wall.

25 5. A ratchet tool provided with a socket of a general circular form having a surface extending directly therefrom at one side, a rotatable head in the socket having ratchet teeth, and a longitudinally movable member wedging between said surface and the ratchet teeth, said movable member also being laterally movable, whereby it is moved by the rotation of the head in one direction laterally away from said surface while it is moved directly away from the teeth.

30 6. In a ratchet tool, the combination of a sheet metal casing formed in two parts, one part being turned up at the edge and overlapping the other, said casing having bearings at its opposite ends, two rotatable heads, one mounted in each of said bearings, said heads having ratchet teeth and being provided with sockets, a pair of movable members located in and guided to move longitudinally in the handle portion of said casing, each of said members having an end constituting a pawl for the teeth of one of said heads, and a spring in the casing for normally forcing said members against the ratchet teeth.

35 7. A wrench comprising a casing formed of two pieces of sheet metal, each of said pieces being turned upwardly at its edges to form a flange, one of the flanges fitting outside the other and turned in at its outer

edge to lock the pieces together, a rotatable head having bearings in said casing, and means for controlling the rotation of said head.

8. A wrench comprising a casing formed of two pieces of sheet metal, each of said pieces having a flange extending from its edges, one of said flanges fitting inside the other, whereby one of said pieces of sheet metal is contained substantially within the flange of the other, and means for securing said pieces of sheet metal together.

9. In a ratchet tool, the combination of a body having a socket therein, a rotary ratchet wheel in the socket, and a movable member in position to engage the teeth of the ratchet wheel, said body having a surface between which and said teeth the movable member extends, said surface constituting a positive lock against any motion of the movable member away from the ratchet wheel when force is applied to rotate the body in one direction, and said surface being so located with respect to the ratchet wheel that when the body is turned in the opposite direction the movable member will be caused by the ratchet teeth to move transversely away from said surface during the time when it moves back from the ratchet teeth to prevent any binding.

10. As an article of manufacture, a ratchet tool comprising a ratchet wheel, a movable device for engaging the respective teeth thereof movable away from the wheel, said wheel being rotatable relatively to said device, and a casing inclosing said wheel and device and having means thereon for positively locking said device against motion away from the center of the wheel when motion of the wheel relative to the casing in one direction is attempted, and for instantly releasing said device from all restraint and binding action when the opposite movement is started, said means being operative even when the teeth and movable device are worn down so as to have no angular operative edges, said device being laterally movable away from said means.

11. In a ratchet tool, the combination of a body having a socket therein, a rotary ratchet wheel in the socket and a movable member in position to engage the teeth of the ratchet wheel, said body having a surface between which and said teeth the movable member extends with a wedging action, said surface constituting a positive lock for the movable member against rotary motion of the body about the socket in one direction and against any motion of the movable member away from the ratchet wheel when force is applied to rotate the body in one direction, independently of the shape of the ratchet teeth and of the portion of the movable member which engages them, and said surface being so located with respect to the

ratchet wheel that when the body is turned in the opposite direction the movable member will be caused by the ratchet teeth to move transversely away from said surface during the time when it moves back from the ratchet teeth.

12. In a ratchet tool, the combination of a casing, a ratchet wheel in said casing, a movable pawl for engaging the teeth thereof, and means whereby when the tool is turned in one direction about the wheel the pawl will be positively locked directly between a tooth thereof and the adjacent wall of the casing, the pawl being simultaneously both longitudinally and laterally movable, whereby on a reverse motion a tooth of the wheel will cause the pawl to move sidewise to disengage it from said wall.

13. In a ratchet tool, the combination of a body having a socket and a handle, a rotary ratchet wheel in said socket, a movable member engaging the teeth of said wheel at one side of the center of the handle and simultaneously movable both longitudinally of the handle and laterally, the teeth of the ratchet wheel constituting means for simultaneously moving said member away from the wheel and toward the center of the handle when the handle is turned about the ratchet wheel in one direction, said body having means for positively preventing said movable member from moving away from the ratchet wheel when a force is applied to move the handle about the ratchet wheel in the other direction.

14. In a ratchet tool, the combination of a body having a socket and a handle, a rotary ratchet wheel in said socket, a movable member engaging the teeth of said wheel simultaneously movable both longitudinally of the handle and laterally, the teeth of the ratchet wheel constituting means for simultaneously moving said member away from the wheel and toward the center of the handle when the handle is turned about the

ratchet wheel in one direction, said body having means for positively preventing said movable member from moving away from the ratchet wheel when a force is applied to move the handle about the ratchet wheel in the other direction, said means comprising a surface between which and the center of the handle the movable member extends.

15. A ratchet wrench comprising a handle member pressed into the form of a box, a die and detents operatively mounted in the box, and a cover applied to the box and in which the box fits friction tight to complete the casing for inclosing the die and detents.

16. In a wrench, a handle comprising two flat sides, and flanges extending from the edges of the two flat sides, one flange fitting within the other to form a housing.

17. In a wrench, a handle comprising two flat sides, continuous flanges extending from the edges of the two flat sides, one flange telescoping within the other to form a die-seat and housing for the operative parts.

18. In a ratchet wrench, the combination with a body and a ratchet hub rotatably mounted therein, said body having an inclined wall forming with the ratchet hub a wedge-shaped space, of a pawl or dog within the body, said pawl having a nose to occupy said wedge-shaped space, said pawl being movable away from said inclined wall by said ratchet hub when said hub is turned in one direction and being moved against said wall and into said wedge-shaped space when said ratchet hub is moved in the opposite direction thereby to positively lock the hub to the wrench body.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

HERBERT L. HOUGHTON.

Witnesses:

ALBERT E. FAY,
E. M. ALLEN.