(No Model.)

# J. MATTAN.

## WRENCH.

No. 446,143. Patented Feb. 10, 1891.

Fig. 1.

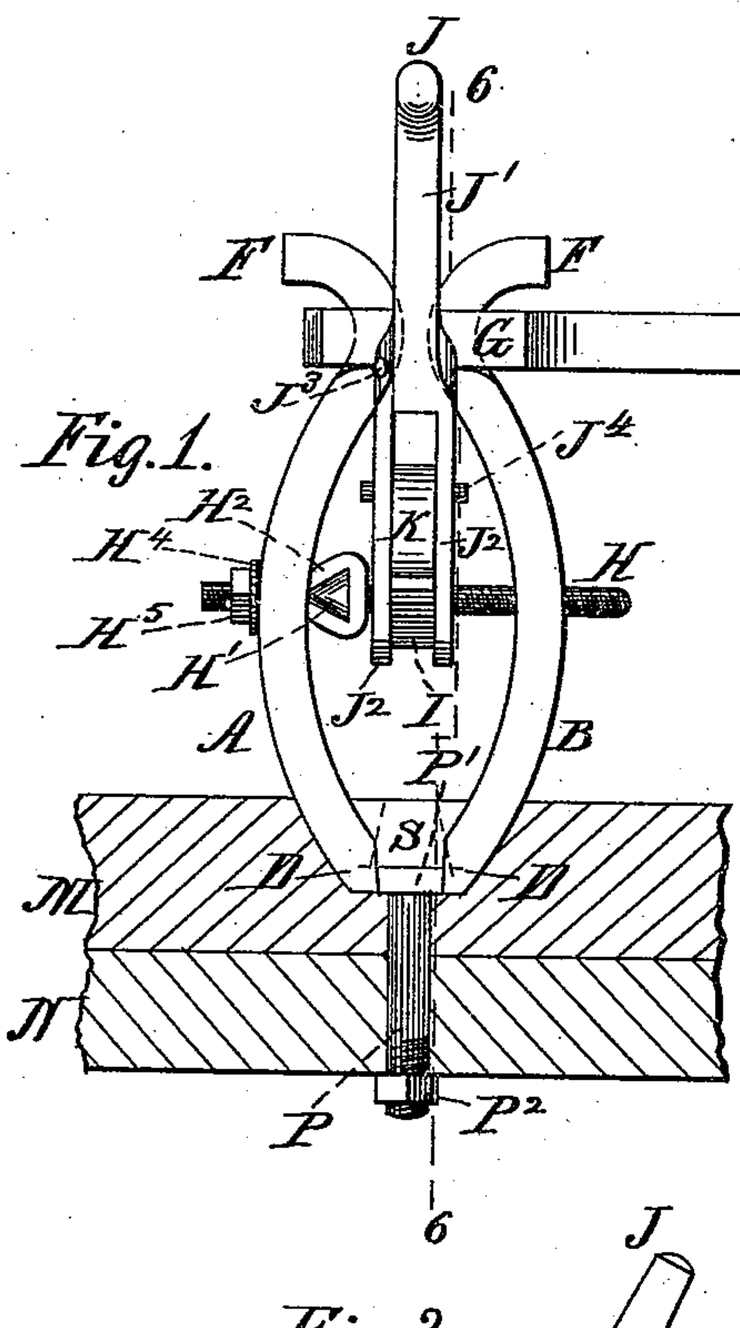


Fig. 2.

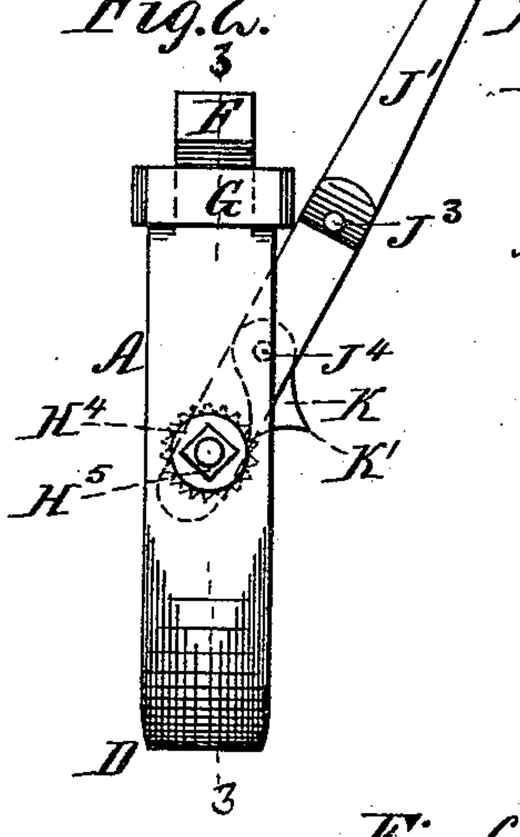


Fig. 3.

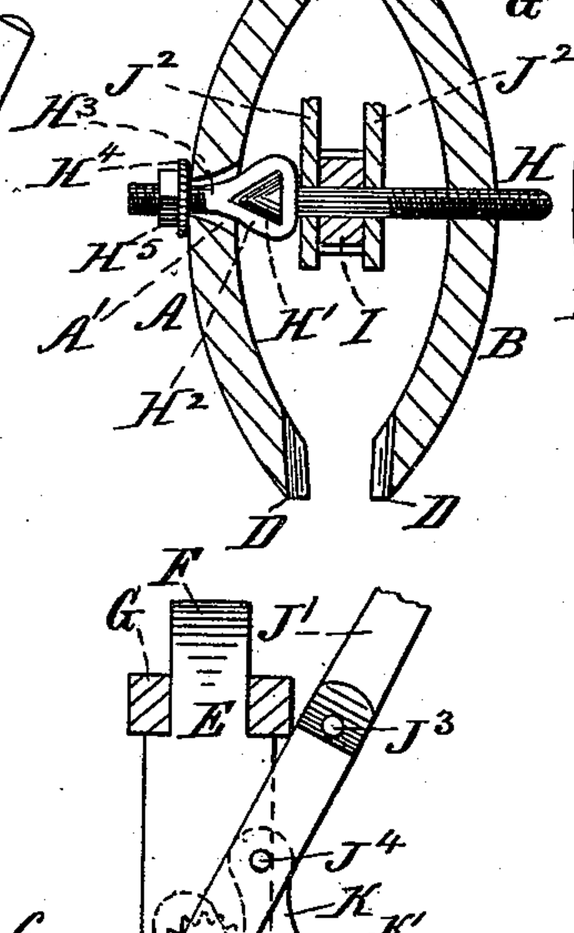


Fig. 4.

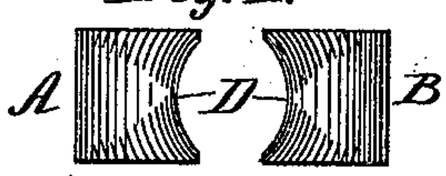


Fig. 5.

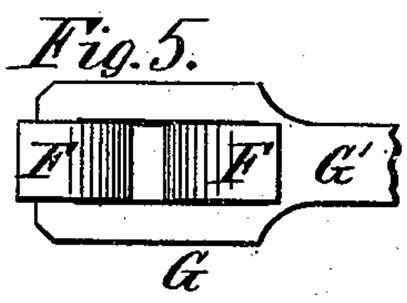


Fig. 7.

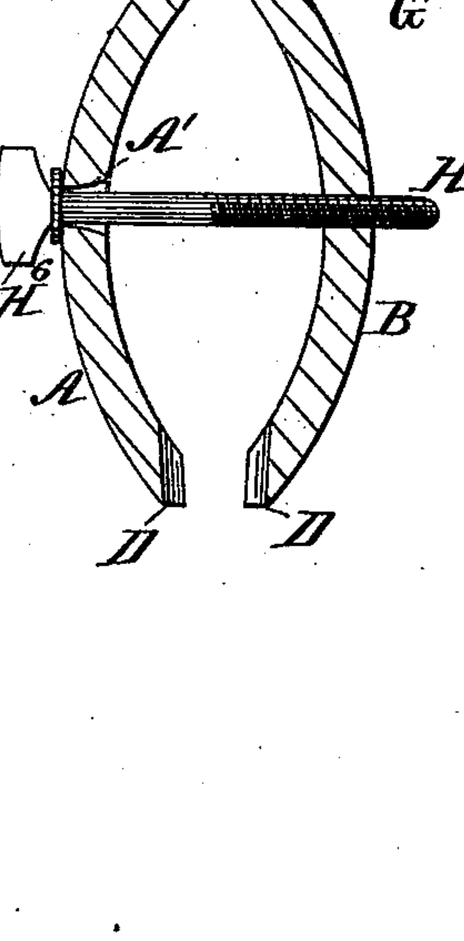


Fig. 8.

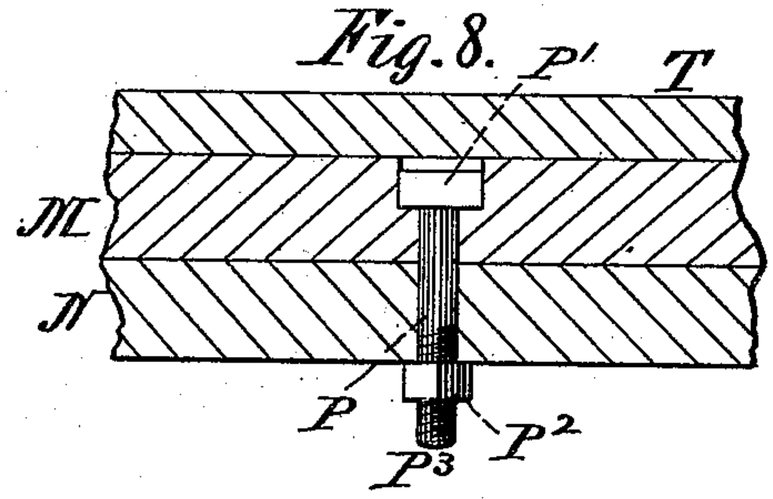


Fig. 6.




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# UNITED STATES PATENT OFFICE.

JOHN MATTAN, OF CINCINNATI, OHIO.

## WRENCH.

SPECIFICATION forming part of Letters Patent No. 446,143, dated February 10, 1891.

Application filed September 9, 1889. Serial No. 323,387. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN MATTAN, a citizen of the United States of America, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful improvements in wrenches for holding a bolt while the nut thereof is being turned, of which the following is a specification.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this specification, Figure 1 is a top view of a complete wrench embodying my invention. This figure also shows the jaws of the wrench applied to a sunken bolt-head to hold the latter while the nut is being unscrewed therefrom. Fig. 2 is a side elevation of the said wrench. Fig. 3 is a vertical central longitudinal section of the wrench, taken at the dotted line 3 3 of Fig. 2, the outer or free end portion of the lever which is united to the coupling embracing said jaws being broken off to economize space in the drawings, that side of this said section being shown which faces toward the right-hand edge of the sheet of drawings. Fig. 4 is an elevation of the front ends of the jaws. Fig. 5 is an elevation of the rear ends of the jaws and the link or coupling which embraces them, and also showing a portion of the lever fixed to said coupling. Fig. 6 is a transverse longitudinal section taken at the dotted line 6 6 of Fig. 1, omitting the bolt P and timbers M N, and showing in elevation the ratchet-wheel and keeper and showing in section the shaft of the ratchet-wheel, a portion of the lever for operating the keeper being shown in elevation. Fig. 7 is a section of the jaws, taken at the same line and in the same direction as the section shown in Fig. 3 was taken. In this figure the ratchet-wheel and keeper are omitted, and a modified description of screw for approximating the jaws is shown. Fig. 8 shows a cross-section of timbers and a side view of a bolt and nut, the head of the bolt being inaccessible.

In many wooden structures composed of different parts some of these parts are connected together by bolts whose heads are sunk within the wood of the structure. In some cases the outer surface of the head of the bolt is flush with the outer surface of the wood, and in many instances the outer surface of the head is located in the wood at quite a distance from the outer surface of the wood. In other words, the bolt-head is deeply embedded in the wood and at a distance from either surface of the wood. Among the various structures which contain bolts sunken in the wood, may be mentioned barges and other vessels, road vehicles (especially wagons,) bridges, and the like.

In unscrewing the nut from the bolt the bolt will often turn with the nut, and thereby prevent the nut from being unscrewed from the bolt. After a few months of use and exposure it happens in a large majority of instances that the nut becomes quite firmly united to the bolt and stuck fast thereto by reason of the oxidation of the nut and bolt at the points where they come into contact, this rusting serving to render the nut and bolt to a great extent integral with each other. In such event the nut and bolt stubbornly resist the efforts to turn the nut on the bolt. In consequence the bolt will turn with the nut, as the latter is turned by the wrench, and all efforts to unscrew the nut from the bolt are futile. The difficulty hereinbefore experienced has been to reach the sunken bolt-head and to properly grasp the same in such a manner as to prevent the bolt from turning while the nut is being unscrewed. My invention overcomes these difficulties, as will be apparent from the following description and its mode of operation.

A represents one jaw, and B the opposing jaw. The forward or grasping end of each jaw is curved transversely, each jaw having an end curve C. When the jaws are in position, the concave front end D of one jaw is opposite the concave front end D of the other jaw, substantially as shown in figure 1. The front ends of each jaw are not only curved, but are sharpened to a cutting-edge. The jaws may be held together at rear in any suitable manner. A novel and convenient construction whereby they are united and at the same time provided with ends or heads to receive blows of the hammer or sledge is as follows: Each jaw near its rear end has an in-

ward curve at E, and its rear end F is curved outward. The jaws are placed together in position for operation, and a link or coupling G encircles both of them at the curved or neck portion E E. The shape of each of the curved portions E E is angular, so that when placed together they form an angular figure, preferably that of a parallelogram. The interior opening of the link or coupling G, which binds the parts E E of the jaws together, is also angular, and the inner sides of this coupling are adapted to closely fit against the outer sides or faces of the united parts E E. The coupling G is provided with a lever G′ for enabling the operator to hold the coupling G, and with it the jaws A B, stationary while in use. The portions F F are thick and their rear ends are preferably flat and in the same plane one with another for receiving blows of a hammer or sledge. A suitable device for approximating the jaws and for separating them at will is to be employed. A novel means for this purpose is as follows: In the jaw B and near its longitudinal center is a transverse opening extending through the jaw and provided interiorly with a screw-thread. In this screw-threaded opening works a screw H, whose screw-thread engages the screw-thread of the opening. That end of the screw-shank which is nearest to the jaw A is provided with a head H′. A link $H^2$ incloses said head, the shank of screw H passing through the free end of said link or coupling $H^2$. This link or coupling is connected to the shank $H^3$, provided with a screw-thread, and this shank passes through and engages a screw-threaded opening A′, extending through the jaw A. The screw-threaded portion of the shank $H^3$ projects beyond and outside of the jaw A. On this portion of the shank is placed a washer $H^4$ and next a nut $H^5$. The washer thus lies against the jaw A and between it and the nut $H^5$, in order to prevent the nut from directly bearing against the jaw, and thereby wearing into the jaw and increasing the resistance of the nut to any attempt to rotate. The connection between the screw-shank H and its head H′ and coupling $H^2$ is preferably a swivel-joint. The opening A′ through the jaw A for the reception of the shank $H^3$ is intentionally enlarged toward the inner surface of the jaw A. The sides of the said opening A′ are beveled inwardly, one toward the rear end E of the opposing jaw and the other side of said opening being beveled toward the front end E of the opposing jaw. The length of the opening A′ therefore is in the direction of the length of the jaws, and the opening is just wide enough to admit the shank $H^3$, and the width of the link $H^2$ expanding like the mouth of a trumpet inwardly in the direction of the front and rear ends of the opposing jaw. This construction of the slot A′ allows the jaws A B free play when drawn together or separated through the agency of the screw H. The front ends D D when moved together or separated each describe a part of a circle whose center is their respective portion E. Were it not for this enlargement of the opening A′, the jaws would resist an attempt to move the front ends D D toward each other or in the opposite direction. At the same time, the opening A′ being narrow, as hereinbefore mentioned, the jaws, in connection with the coupling G, are retained in substantially the same plane with the screw-shank H and the shank $H^3$, and consequently the front ends D D of the jaws will be always opposite one another, substantially as shown in Fig. 4.

The object of swiveling the head H′ is to enable the screw-shank H to be rapidly turned, and said swivel-connection is a very convenient description of bearing for the screw-shank H. On the screw-shank H and at the central portion of the two jaws is located a ratchet-wheel I. One end of the lever J is also pivoted on said shaft. The preferred form of the lever consists of the shank J′, which, in the neighborhood of the screw-shank H, is divided into two forks $J^2$ $J^2$, one of these forks $J^2$ being on one side of the ratchet-wheel I and the other fork $J^2$ on the other side of the ratchet-wheel I. The screw-shank H passes through these forked portions $J^2$ $J^2$ substantially as shown. For convenience of manufacture and adjustment, one of these forks $J^2$ of the lever is made separate from the shank J′, and is applied thereto substantially as shown at $J^3$. Between the forks $J^2$ $J^2$ is located a double pawl K, denominated the "keeper," the keeper being pivoted to the forks $J^2$ $J^2$ by means of a pivotal connection, which latter is preferably a rod $J^4$. This rod $J^4$ passes through one of the forks $J^2$ and then through the keeper K, and thence through the other fork $J^2$ of the lever J. This pivot $J^4$ may be a bolt, substantially as shown, having its head outside of one of the forks and its securing-nut outside of the other fork. The space between the forks $J^2$ $J^2$ extends upward toward the free end of the lever J far enough to admit of this keeper being moved upward and thrown over, so as to engage the other side of the ratchet-wheel from that which the keeper heretofore engaged. This will be obvious in the explanation now to be made in connection with Fig. 6. In this figure the keeper is shown with one of its pawls K′ engaging the ratchet, and while in this position the reciprocations of the free end of the lever J will cause the ratchet to be moved in one direction—namely, in the direction of the arrow $K^3$. The keeper may be reversed, and then its other pawl K′ will be the one which engages the other side of the ratchet, as shown by dotted lines in said Fig. 6. In such event the reciprocation of the lever J will cause the ratchet to be turned in the direction shown by the arrow $K^4$—namely, in a direction opposite to that hereinbefore mentioned. The ratchet-wheel I is rigidly connected to the screw-shank H, so that the rotation of the ratchet-wheel I rotates this screw-shank.

Having described my improved wrench, I

will now proceed to explain its mode of operation.

In order to illustrate the capacity of my wrench for performing the work it is intended to do, I will now describe its use in holding stationary a bolt the location of whose head in the wood renders it most difficult to reach and hold and prevent it from rotation while the nut is being unscrewed. Such an instance is shown in Fig. 1, where M represents one timber and N indicates another timber bound together by bolts, as P. Here the bolt-head P′ was at the time of the building of the structure into which the parts M N enter deeply sunk into the timber M, leaving a recess S in the timber M, receiving the head P′ of the bolt P. The walls of this recess S, between the head of the bolt and the outer surface of the timber M, in course of time have approached each other, so that the diameter of the recess S everywhere, except at the point where it is filled by the bolt, is of less width than the head of the bolt. In such instances it has been very difficult heretofore to reach the bolt-head P′ and prevent it from turning when the nut $P^2$ of said bolt was to be unscrewed, so as to remove the bolt P or separate the parts M N one from another for any reason. The process of reaching the bolt-head was very tedious, and much time was lost in extracting the bolt.

To extract the bolt by means of my wrench, I separate the points D D of the jaws by turning the screw H. The turning of the screw H is accomplished by reciprocating the lever J. In this instance the lever should be inclined in the direction the reverse of that shown in solid lines in Fig. 6, and the keeper K should be in the position shown in Fig. 6 by dotted lines. Thus by the reciprocation of the lever J the pawl $K^2$ of the keeper K will engage the ratchet I at every forward movement of the lever J, and thus operate to open the jaws. When the points D D of the jaws have been opened a little wider apart than the width P′ of the bolt P, the points of the jaws are placed upon the outer surface of the wood M directly opposite the bolt-head P′, so that the axial line of the bolt shall as nearly as possible coincide with the axial longitudinal line of the wrench. The wrench is then held in this position by the lever G′, and one or more blows are struck upon the rear surface of the ends F F of the wrench with a hammer, sledge, or other heavy instrument. Usually one or two blows will suffice. The ends D D of the jaws are thereby driven forward into the wood, one passing to one side of the bolt-head and the other to the other side of the bolt-head. The inclination of the lever J is now reversed, and the position of the keeper K is likewise reversed. The lever J and the keeper K will then occupy the position shown in solid lines in Fig. 6. The lever J is now reciprocated and the screw-shank H turned forward. This movement of the screw-shank will compel the ends D D of the jaws to approach each other and tightly grasp between them the head P′ of the bolt P. The jaws, held stationary by means of the lever G′, now prevent the bolt from turning; and the nut $P^2$ can be readily unscrewed from the bolt. In many instances the bolt-head P′ is round instead of square. The round form of bolt-head does not interfere with the efficient action of the wrench; but the wrench will hold the round bolt-head firm and stationary while the nut of the bolt is being unscrewed. Should the forward points D D of the jaws be driven somewhat past the bolt-head P′ through accident or intentionally, the jaws will nevertheless, on account of the shape of the ends D D, as shown in the drawings, grasp the bolt-head, and in such event the forward points of the jaws will at the same time grasp the shank of the bolt between the bolt-head and the nut. In such event the wrench will still continue to hold the bolt stationary while the nut is being unscrewed. After the nut has been removed from the bolt the jaws are easily withdrawn. The entire operation of applying the wrench so as to hold the bolt stationary is the work of but a few moments.

My device is also especially valuable in holding shanks of bolts and turning them while the nut is being unscrewed in instances where the bolt-head itself cannot be reached. An illustrative instance of this mode of application of my wrench is shown in Fig. 8, where the bolt-head P′ is covered by a superincumbent strip T of wood or iron. In many cases it would not be possible or desirable to remove the strip T, and in some instances it would be impossible to do so. In either event the ends D D of the jaws are applied to that portion $P^3$ of the screw portion of the bolt P which projects below the nut $P^2$. (See Fig. 8.) The ends D D of the jaws are thus approximated and then tightly grasp the portion $P^3$ of the bolt, and hold the bolt stationary until after the rotation of the nut upon the bolt has been commenced. After the nut has been rotated several times on the bolt it will then usually turn easily upon the bolt and the services of the wrench will be no longer necessary.

In Fig. 7 I have shown the jaws A B, provided with screw-shank H, extending through both jaws, the lever J, keeper K, and ratchet-wheel I being omitted. In such event the screw H may be turned by means of its enlarged end of head $H^6$ or an equivalent projection located at its end or upon its shank between the jaws, or the screw-shank H, being angular at the central point of its length between the jaws, may be grasped by a suitable tool and turned; but the construction of the shank, as shown in Figs. 1 and 3, with a swivel and nut $H^5$ and the presence of a device for rotating the screw in either direction at will, such as lever J, keeper K, and ratchet-wheel I, are preferred, because found more convenient in use and greatly enhancing the facility of operating the wrench.

While the various features of my invention are preferably employed together, one or more of said features may be used without the remainder, and in so far as applicable one or more of said features may be used in connection with wrenches other than the one herein specifically set forth.

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

1. In a wrench, the jaws A B, each having its front end portion concave and terminating in a sharp edge, each of the jaws being provided near its rear end with the outward projection F, the curved ends E E being embraced by the link or coupling G, and a device for approximating and separating said jaws, said last-named device being located between the ends D D of the jaws and the said link or coupling, substantially as and for the purposes specified.

2. In a wrench, the jaws A B, each having its front end portion concave and terminating in a sharp edge, each of the jaws being provided near its rear end with the outward projection F, the curved ends E E being embraced by a link or coupling G, rigidly united to a lever G′, substantially as and for the purposes specified.

3. In a wrench, the combination of the two jaws, each in a separate piece, provided at one end with concave edges and at the other end provided with anvil-heads, each head being connected to the main part of the jaw by a neck, the jaws being held together in the vicinity of the anvils by a loop connected to a handle and centrally united by a screw-shank, one of the jaws being provided with the enlarged flared opening A′, through which passes the said screw-shank, substantially as and for the purposes specified.

4. A wrench having curved jaws A B, the concave portions of whose front ends face each other and terminate in an edge, each of the jaws being provided near its rear end with a neck E and the projecting anvil portion F, the jaws being united together at the neck by a coupling G, rigidly united to the lever G′ and centrally united by a screw-shank H, swivel $H^2$, shank $H^3$, and nut $H^5$, substantially as and for the purposes specified.

5. A wrench having curved jaws A B, the concave portions of whose front ends face each other and terminate in an edge, each of the jaws being provided near its rear end with a neck E and projecting anvil portion F, the jaws being embraced and united together at the neck by a link-coupling G, rigidly united to the handle G′ and centrally united by a screw-shank H, triangular swivel $H^2$, shank $H^3$, and nut $H^5$, the jaw A being furnished with a slit enlarged in the direction of the length of the jaw and receiving a portion of the triangular swivel $H^2$, substantially as and for the the purposes specified.

6. A wrench having curved jaws A B, the concave portions of whose front ends face each other and terminate in an edge, each of the jaws being provided near its rear end with a neck E and projecting anvil portion F, the jaws being united together at the neck by a link-coupling G, rigidly united to the handle G′ and centrally united by a screw-shank H, triangular swivel $H^2$, shank $H^3$, and nut $H^5$, the jaw A being furnished with a slit enlarged in the direction of the length of the jaw and receiving a portion of the triangular swivel $H^2$ and provided with the ratchet-wheel I, fixed to screw-shank H, and with lever J pivoted thereon, and pawl or keeper K for engagement with the ratchet, substantially as and for the purposes specified.

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Attest:
F. W. BROWNE,
G. A. W. PAVER.