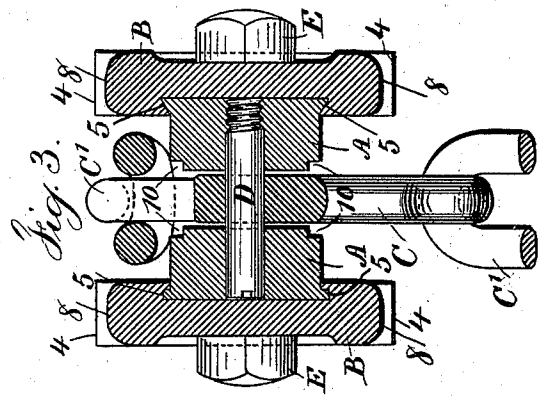
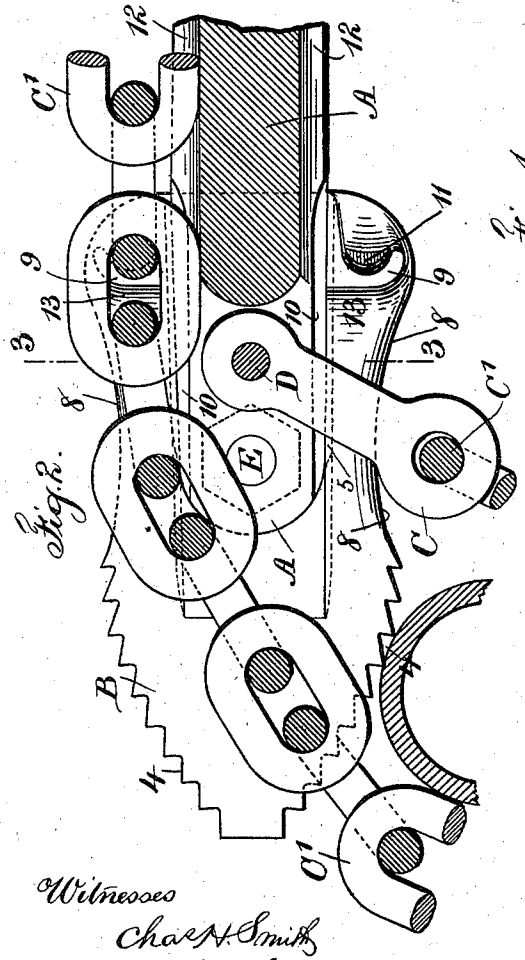
(No Model.) 2 Sheets—Sheet 1.

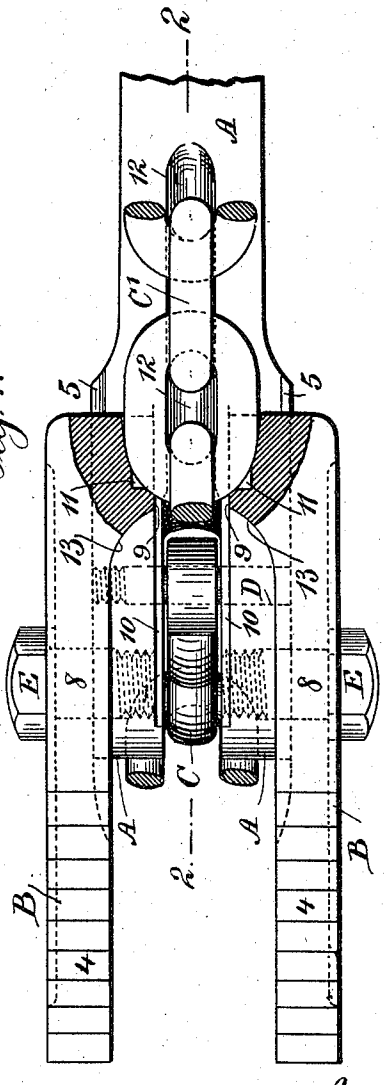
W. J. GRINDEN & G. AMBORN, Jr.

CHAIN WRENCH.

No. 577,653. Patented Feb. 23, 1897.







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(No Model.) 2 Sheets—Sheet 2

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Fig. 4.

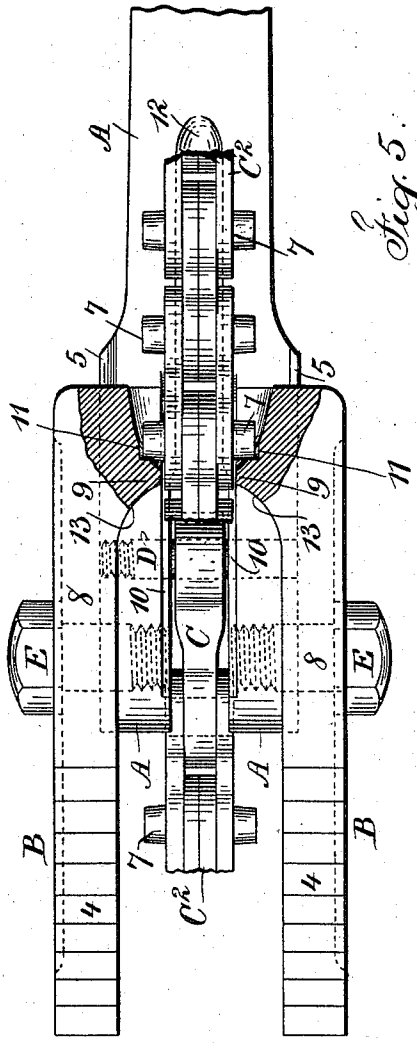
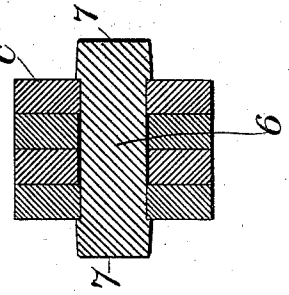


Fig. 5.



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WILLIAM J. GRINDEN AND GEORGE AMBORN, JR., OF BROOKLYN, NEW YORK, ASSIGNORS TO THE J. H. WILLIAMS & COMPANY, OF SAME PLACE.

CHAIN WRENCH.

SPECIFICATION forming part of Letters Patent No. 577,653, dated February 23, 1897.

Application filed April 1, 1896. Serial No. 585,710. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. GRINDEN and GEORGE AMBORN, Jr., citizens of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Chain Wrenches, of which the following is a specification.

Wrenches have heretofore been constructed in which a chain made of plate links with connecting-rivets that form pivots has been made use of, and in some instances the rivets have extended beyond the sides of the chain and have engaged hook-shaped projections upon the inner surfaces of jaws, and a chain of this character is well adapted to use in a pipe-wrench because it will take a more extended and even bearing upon the pipe and there is little liability to make indentations in the pipe and the pipe is supported by the encircling chain, but a chain of this character is substantially rigid in the direction of a plane passing through the pivot-pins. Chain wrenches often have to be applied to pipes or to the bends, T's, crosses, or other fittings by wrapping the chain around the part to be moved in a more or less irregular direction. Hence wrenches with cable chains are preferred for some kinds of work.

The object of the present invention is to adapt the pipe-wrench to either a plate-link chain or to a cable chain, and this invention relates to the features of construction and combination hereinafter more fully described and claimed.

In the drawings, Figure 1 is a plan view, partially in section. Fig. 2 is a longitudinal section at the line 2 2. Fig. 3 is a cross-section at the line 3 3. Fig. 4 is a plan similar to Fig. 1, showing parts of a plate-link chain in position on the wrench; and Fig. 5 is a cross-section of the plate-link chain on a magnified scale.

The handle A is of suitable size and length with an open cross-slot at the end, so that the jaws B are received at the outer sides of the forked end of the handle, and the link C of the chain is received at one end between the fork of the handle and connected by a pivot-pin D, and the edges of the jaws B are provided with the teeth 4 upon both rounding surfaces at the front parts of the jaws.

It is important to connect the jaws B and the fork of the handle in a very firm and reliable manner, and with this object in view we prefer to make the jaws of the fork on the handle with dovetail projections 5, received into similarly-shaped recesses on the inner faces of the jaws B, and these parts should taper slightly, so that when the jaw is driven onto the fork of the handle the parts will bind firmly, and as there is pressure upon the front ends of the jaws when the wrench is in use these dovetail projections may alone be relied upon for fastening the jaws upon the handle, but usually we provide the bolts E, which are passed through holes in the jaws and into the front portion of the handle-fork. This insures great strength and reliability in the connections between the jaws and the handle.

The chain C′ is represented with ordinary elongated links, and forms what is known as a "cable" chain, and the chain C^2 is made of plate links with cross-rivets 6, and forms what is known as a "plate-link" chain.

In the present improvement either a chain C′ or C^2 can be made use of, the link C at the end of either chain being adapted to pass into the mortise at the fork of the handle and be secured by the pivot-pin D, and in order to change the wrench by taking out one chain and applying another the pivot-pin D is to be removable. This may be effected by driving off one of the jaws and removing such pivot-pin, and we have represented the pivot-pin as having a screw-thread near one end screwing into the hole in the jaw, so that by unscrewing the pivot-pin the same may be removed with facility.

In the construction of plate-link chains, such as shown in Letters Patent No. 499,508, the pivot-pins have projected beyond the outer surfaces of the links, and these pivot-pins have been received into recesses behind hook-shaped projections upon the inner faces of the jaws, but a difficulty has been experienced in chains of this character, namely, that the ends of the crossing rivets require to be spread so as to prevent the links slipping off,

and in this character of chain it has been usual to make the holes in the intermediate links larger than the holes in the outer links, so that the pivot-pins will drive tight in the holes of the outer links; but notwithstanding this it has been necessary to spread the ends of the pivot-pins to hold the parts of the chain together, so that they may not become loose by continued wear; but in all chains of this character heretofore constructed the outer ends of the pivot-pins have been of larger diameter than such pins adjacent to the outer surfaces of the links, and this entails the twofold disadvantage, first, the taper-surfaces of the pins do not take a proper bearing against the hook-shaped projections upon the jaws, and bearing principally at their outer and larger ends the strain tends to bend the pivot-pins by a leverage action, and, second, the pivot-pins are not spread sufficiently adjacent to the outer surfaces of the plate links to prevent the chain becoming loose in consequence of the plates spreading apart. In the present improvement these difficulties are avoided by riveting up the pivot-pins into a hollow die of the proper shape, so as to upset or spread the metal the most directly adjacent to the outer surfaces of the plate links. In the cross-section Fig. 4 the parts are illustrated on a sufficiently large scale to show this improvement, wherein the ends 7 of the rivets 6 are upset, so as to be larger than the portions of the rivets that pass through the links of the chain, and hence the projecting ends of the rivets are larger or quite as large at the surfaces of the links as at their outer ends. Hence the links are properly riveted together and the projecting ends of the rivets take an even bearing in the recesses provided for them in the jaws, as hereinafter described.

Upon reference to Letters Patent No. 499,508 it will be observed that the curved front ends of the jaws that are formed with teeth are approximately similar to a gothic arch, and the centers from which the curvatures are described are but slightly in advance of the bolt made use of in attaching the jaws and which bolt also forms a pivot-pin for the link that connects the chain to the handle.

In the use of chain wrenches of this character we have found that the teeth on the jaws bear upon the pipe midway, or nearly so, between the points of contact of the chain as it passes off from the pipe, and the leverage is short and the chain tightened with great force. Hence under the severe strain the parts frequently become locked and the chain and wrench cannot be easily loosened from the pipe, and sometimes the chain has to be cut before the wrench can be detached. We avoid this serious difficulty by deepening the slot at the forked end of the handle, so that the pivot-pin D is farther to the rear and behind the attaching-bolts E, and hence the parts of the chain will pass forward to the pipe and at such an angle that the parts cannot become wedged or blocked, and the leverage will be lessened, because the pivotal attachment D is farther from the pipe. Hence the chain will not be tightened to such an extent, and the teeth will be indented but little in the pipe; and it will be apparent that in consequence of placing the pivot-pin D to the rear, as before described, the link *c* and the portion of the chain immediately connected therewith are at such a forward inclination as they pass to and around the pipe as it rests against the teeth of the jaw that the chain can be easily slackened by a movement of the handle A in the reverse direction to that in which it has been moved when rotating the pipe, and this result is also promoted by the ends of the handle-jaw extending forward and supporting the chain at a distance from the pivot-pin D.

It will be observed in Fig. 2 that the teeth of the jaws that are nearest to the pivot-pin D are so far forward that such pivot-pin is about as far from the nearest tooth as the teeth are from one another across the jaw. Hence the parts stand in nearly an equilateral triangle to each other, the teeth being at a forward angle of nearly sixty degrees from the center line at the pivot-pin. By this construction there are not any teeth along those portions of the jaws that are near the pivot-pin D, and the chain wrench cannot become wedged upon the pipes.

Instead of making the jaws B at the rear of the teeth 4 either straight or convex, as heretofore, we make these portions of the jaws concave, as at 8, the object being to more easily loosen or tighten the chain around the pipe, that is to say, when the wrench is being applied to the pipe the concave portions 8 of the jaws can rest upon the pipe, the chain can be passed around the pipe and engaged, as hereinafter described, and then by drawing the wrench bodily backward the teeth of the jaws are brought into contact with the pipe, and in so doing the chain is sufficiently tightened to cause the parts properly to hold the pipe, and when the wrench is to be disconnected the movement in the other direction brings the concave portions 8 of the jaws adjacent to the pipe, and the chain is immediately slackened sufficient to allow it to be easily unhooked and disconnected.

In consequence of the inner end of the chain being connected in line with the center of the handle either side of the jaws can be made use of and the chain can be swung upwardly or downwardly and hooked as desired, and the hooks or connecting devices for the chain are at the rear ends of the jaws and at both sides, and to provide the proper device for receiving and holding either a cable chain or a plate-link chain the jaws and handle have to be constructed as next described.

The space between the inward projections 9 is to be sufficient for the reception of the plate-link chain, and it is advantageous to groove the inner edges of the forked handle at 10, so as to allow the edges of the outer

links of the plate chain to rest in these grooves, so that the recesses 11, that receive the ends 7 of the chain-rivets, may be at the ends of the outwardly-flaring recesses that receive the end of one of the cable-links, and it will be observed that when the cable chain is laid into position the vertical link of the cable chain passes into the groove 12 in the handle or lever and into the slot between the fork of the handle, and the forward portion of the jaws behind the recesses 11 is curved, as at 13, to obtain the proper strength and at the same time not to interfere with the link of the cable chain lying flatwise upon the fork of the handle.

In Fig. 4 the jaws are shown in section to indicate the manner in which the plate links and the cross-pins are received, and in Fig. 1 the same parts are shown with the links of the cable chain in position, the recesses 11 being shaped so as to take a proper bearing upon the cable links or upon the projecting pivot-pins of the plate chain.

The distance between the recesses 11 and the curved ends of the handle A is such that the links of the chain rest against and take a bearing upon the rounding ends of the jaws of the handle A, as indicated in Fig. 2, the object of this construction being to lessen the strain upon the ends 7 of the chain-rivets or upon the links of the cable chain in consequence of the strain upon the chain being at a greater or less angle to the sides of the fork, so that the strain tends to press the links of the chain against the sides of the fork and distribute the strain so that the strain is less upon the ends 7 of the rivets or upon the link within the recesses 11. This construction lessens the risk of breakage and also extends the wearing capacity of the chain wrench.

We claim as our invention—

1. The combination in a chain wrench, of a handle forked at the front end and having dovetailed edges, jaws grooved upon their inner faces to fit the dovetailed edges and driven endwise upon the same, and a chain having an end link within the fork of the handle and a cross-pin for connecting the same, substantially as set forth.

2. The combination in a chain wrench, of a handle forked at its front end and having tapering dovetailed edges, jaws grooved upon their inner faces to fit the dovetailed edges and driven endwise upon the same, and a chain having an end link within the fork of the handle and a cross-pin for connecting the same, substantially as set forth.

3. The combination in a chain wrench, of a handle forked at its front end and having dovetailed edges, jaws grooved upon their inner faces to fit the dovetailed edges and driven endwise upon the same, and a chain having an end link within the fork of the handle and a cross-pin for connecting the same, and separate bolts passing through the jaws and into the fork of the handle, substantially as set forth.

4. The combination in a chain wrench, of a handle having a fork at its front end, jaws having serrated front edges and grooved in their inner faces to set tightly upon the outer sides of the handle-fork, and two separate bolts passing through the jaws and into the fork, substantially as set forth.

5. The combination in a chain wrench, of jaws having serrated edges at each side, a handle having a forked end, separate bolts passing through the jaws and into the fork for connecting such jaws to the fork, a chain and a pin crossing the axial center of the handle and nearer to the bottom of the fork than the separate bolts, for connecting the end link of the chain to the fork and preventing the wrench becoming wedged upon the pipe, substantially as set forth.

6. The combination in a chain wrench adapted for use with either an open cable or flat-link chain, of two jaws having serrated edges, a handle forked at the end, a chain and cross-pin for connecting the end link of the chain in the fork, the jaws being provided with flaring recesses adapted to receive and interlock with a cable chain having open elliptical links and with recesses 11 within the flaring recesses for receiving the ends of the cross connecting pins or rivets in a flat-link chain, substantially as set forth.

7. The combination with the jaws having serrated edges at each side, of a forked handle received between the jaws and permanently connected to them, the jaws being extended to the rear and formed with recesses to receive the projecting ends of the chain-pivots or the curved ends of the cable-chain links, and the edges of the handle-fork being grooved to receive the edges of the plate links of the chain, substantially as set forth.

8. The combination with the forked handle of jaws grooved upon their inner surfaces and setting against the outer surfaces of the forked handle, separate bolts passing through the jaws and terminating at the inner surface of the fork of the handle, and a chain and a removable pin passing through the fork and through the end link of the chain, substantially as set forth.

Signed by us this 23d day of March, 1896.

WM. J. GRINDEN.
GEORGE AMBORN, JR.

Witnesses:
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