

(No Model.)

H. E. & C. F. DOWNEY.
WRENCH.

No. 566,299.

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Fig. 1.

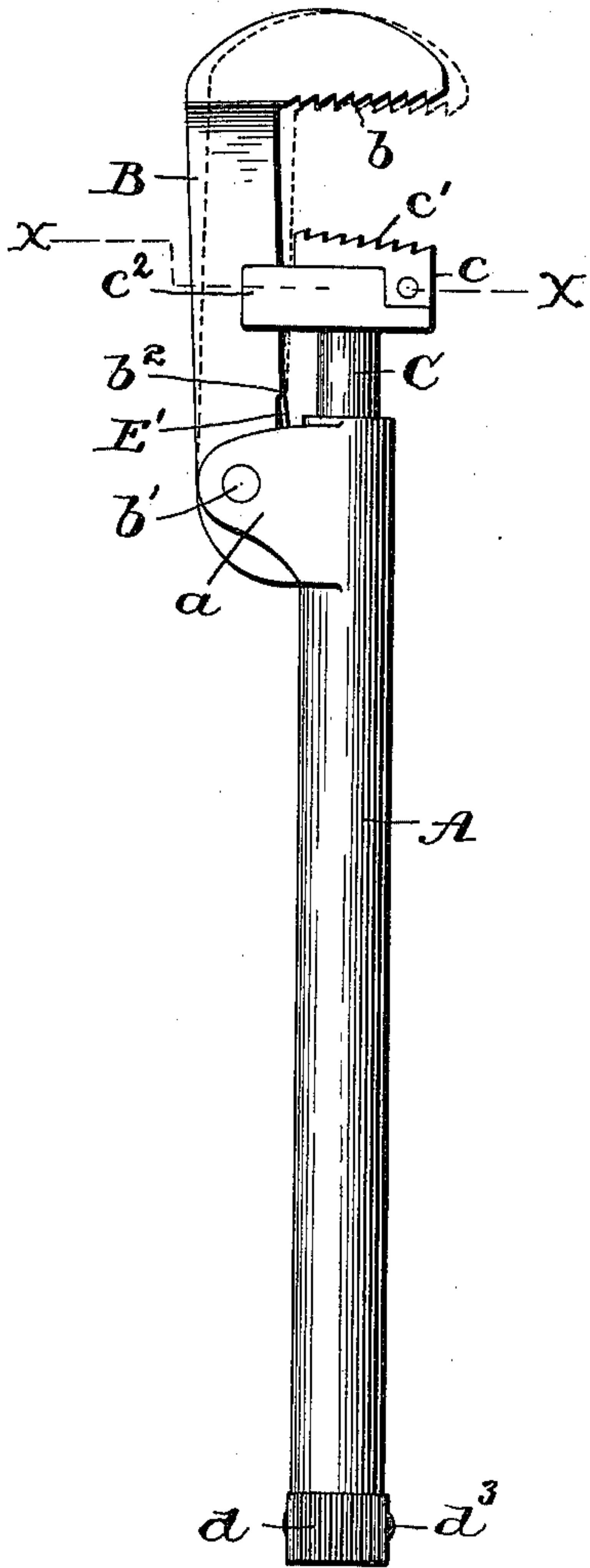


Fig. 2.

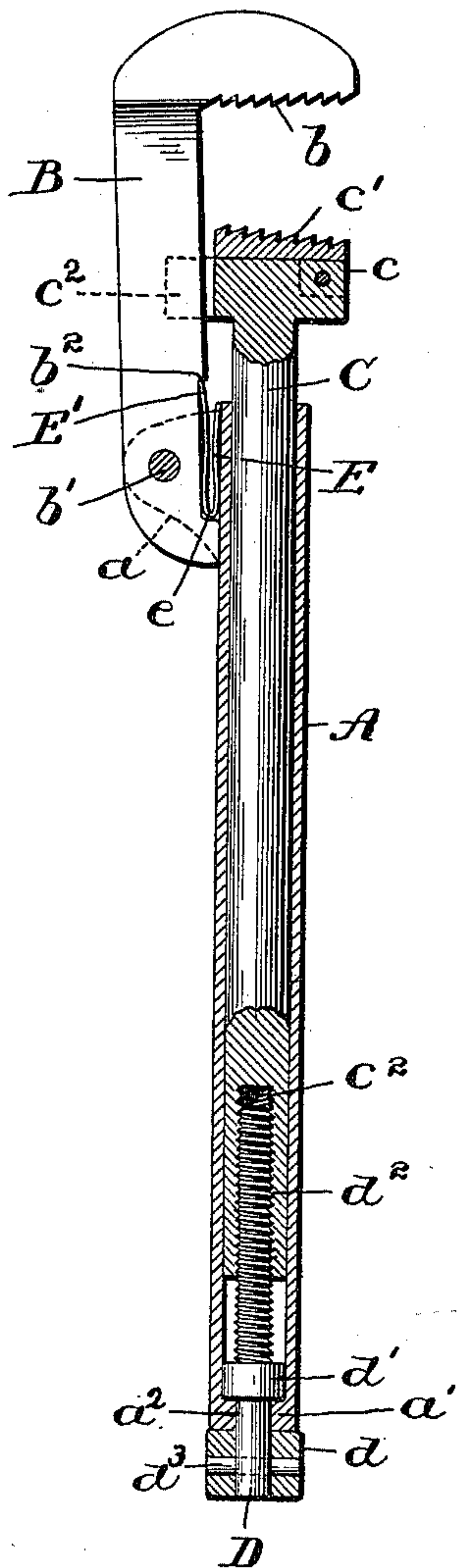
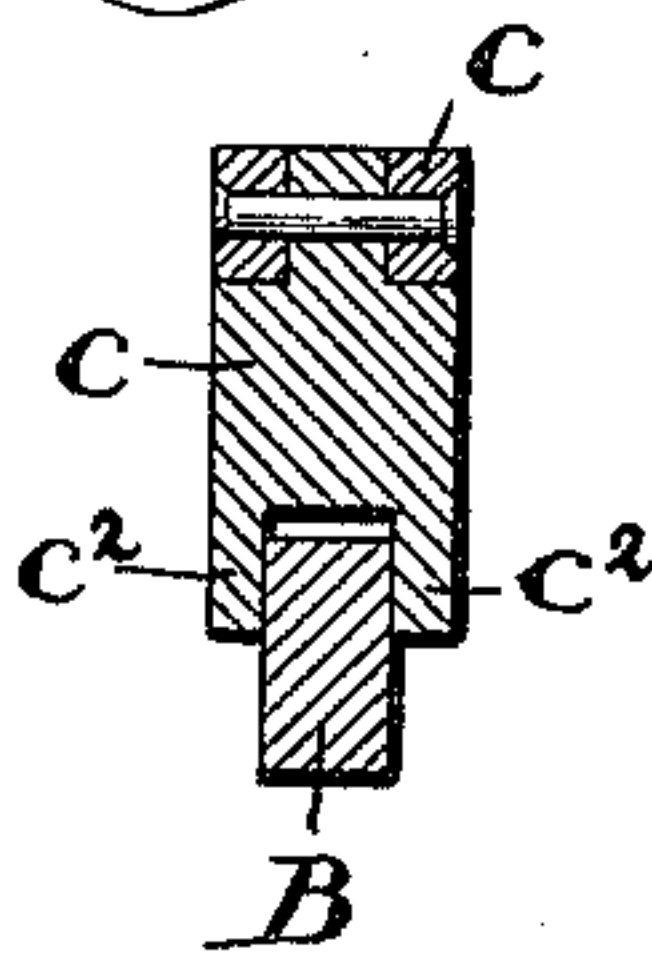


Fig. 3.



Witnesses.

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WRENCH.

SPECIFICATION forming part of Letters Patent No. 566,299, dated August 25, 1896.

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To all whom it may concern:

Be it known that we, HARRY E. DOWNEY and CHARLES F. DOWNEY, citizens of the United States, residing at Scotland, in the county of Franklin and State of Pennsylvania, have invented a certain new and useful Improvement in Wrenches, of which the following is a full, clear, and exact description, reference being had to the drawings which accompany and form a part of this specification, in which—

Figure 1 is a side view of a wrench embodying our improvements and showing the jaws open for the reception of a pipe or nut to be operated upon, and also showing, in dotted outline, the position which the swinging jaw occupies when the same is put under strain in operation. Fig. 2 is a sectional view of the tubular handle and contained parts and showing the swinging jaw, the spring, and the coacting parts in side view; and Fig. 3 is a section through the dotted lines $x x$ of Fig. 1.

The lettering in all the figures is uniform. Our invention relates to an improvement in that class of wrenches in which the forward gripping-jaw is supported upon an arm pivoted or otherwise movably attached to the handle, so that when strain is put upon the forward jaw it swings closer to the opposite jaw and so grasps and embraces the interposed pipe or nut with great firmness and tenacity.

Our improvements consist in a novel construction of the parts and their attachment together whereby greater strength of construction, less liability of the movable jaw to swing to and fro at random, much greater ease and convenience in operating, and a more compact and efficient wrench at low cost of manufacture are secured.

The construction and mode of operation of our improved wrench will be clearly understood from a careful examination of the lettered drawings.

The handle A, which may be of different lengths, from a few inches to several feet, to meet the requirements of larger or smaller wrenches, is made tubular, as shown in Fig. 2. At its rear end it is partially closed by a flange-shaped cap or cover a' , which is pref-

erably formed integral with the tubular handle itself. In the middle of this cap or cover a' is a circular opening a^2 , through which passes the stem D of the screw d^2 , which is provided between the said stem D and said screw d^2 with the collar d' . The screw-threaded stem is dropped into the tubular handle from the opposite end, subsequently occupied by the gripping-jaws, and the stem D passes through the hole a^2 . The collar d' rests so as to form a powerful endwise support against the inner side of the cap or cover a' , and the stem D protrudes from the end of the handle. A thumb-screw head d , perforated in its middle from end to end to fit the stem D and its outside corrugated, as shown in Fig. 1, to give secure grasp to the thumb and fingers, is passed over the stem D and secured in place by the transverse through rivet or pin d^3 , which passes also through the stem D and holds all secure.

Instead of the rivet d^3 we sometimes use a screw or other attachment.

It will be observed that the screw-thread d^2 is left handed, so that when turned to the right, like the hands of a clock, any object threaded upon this screw will be forced off toward the jaws of the wrench. The stem, provided with its collar and screw, is now securely seated in the end of the handle, so that it can be turned freely, but is incapable of longitudinal motion.

Within the tubular handle A, and extending through the same to its rearward end adjacent to the collar d' and to the external thumb-screw head d , is the longitudinally-sliding rod C, fitted therein, and at its rear end it is provided with a longitudinal hole having an internal screw-thread c^2 , which is adapted to engage with the screw-thread d^2 of the stem D immediately inside, so that when the thumb-screw head d is rotated it will screw the rod C forward toward the jaw b , or conversely, as the thumb-screw is rotated in one direction or the opposite. The screw-threads d^2 and c^2 we prefer to make with square threads and square intervals, as in ordinary monkey-wrench screws; but they may be made with V-threads of different angles, as desired.

The forward or jaw end of the rod C is en-

larged to form a broad-faced jaw provided with the upwardly-serrated toothed or roughened face c' , adapted to present opposite the jaw b , as will be described. This serrated face c' may be formed integral with the rod C; but we usually prefer to make it of a separate piece of hardened steel secured, as shown in Fig. 3, by a cross-rivet, the sides of this face-plate in rear of the serrations and a projecting pin upon the head of the rod C interdigitating, as shown in the figures, for this purpose. In this way the serrated portions may be readily removed when worn and replaced by a new front at small expense.

From the sides of the enlarged head c of the rod C extend downward two separate lugs $c^2 c^2$, leaving an interval between them, in and partially beyond the free ends of which the bar B of the movable and swinging jaw, as shown in Fig. 3, reciprocates transversely to the axis of the wrench, while at the same time preventing lateral movement of one jaw upon the other, so that perfect firmness of grip is secured upon the pipe or other object grasped against weaving of one jaw upon the other when under a side twist. This makes the wrench exceedingly effective for use vertically upon nuts or pipe-couplings as well as upon irregular pipes or other objects.

From the forward or jaw end of the tubular handle A extend laterally downward two lugs $a a$, rigidly secured thereto and preferably formed integral therewith and having a vertical space between them for the reception of the rear end of the swinging jaw-supporting bar B. At b' is a transverse rivet seated in these lugs and passing also through the rear end of the swinging jaw-bar B. This rivet b' is at such distance laterally beneath the handle A that an arc of a circle drawn from said rivet as a center and occupying the serrated face of the gripping-jaw b of the swinging bar B will gradually but considerably approach the head c of the rod C, occupying the axis of the tubular handle A. As a consequence, when the bar B is pivoted in place at b' to the lugs $a a$ and the jaw b is swung upward, it will occupy the position shown by the dotted outline in Fig. 1, and will have approached and firmly embedded the serrated faces of the jaws b and c in any object fitted to and interposed between the said jaws.

The bar B has a cross-sectional size sufficient to enter and occupy the space between the lugs $a a$ of the tubular handle A and is a continuous rigid structure extended from said pivot-support between said lugs to its jaw b . At its forward end it is expanded to form a broad-faced jaw having a serrated face b , the serrations pointing downward, the reverse of those of the jaw c . Under strain as the free end of the handle at its thumb-screw head is raised the swinging jaw will thus be drawn down upon the pivot b' as a

center and firmly grip and secure the object to be rotated against slip.

It will also be observed that, the distance between the serrated face b and the pivot b' always remaining the same, the swing of the jaw will always be along the same arc and the grip and compression be uniform, which is not the case when the distance between the serrated jaw and its center of rotation is changed by a screw-thread and nut upon the bar B itself at its center of the arc. On small pipes it is very difficult to make the jaws engage and bite in if the arc over which the swinging jaw closes is part of a circle of very small diameter, as the tendency to slip is increased thereby.

It is obvious that since the bar B and its attached jaw b together constitute a simple continuous casting or forging of steel the cost of replacing this part when worn will be very inconsiderable, so that all the parts exposed to rough usage can be removed and replaced at a trifling expense and in a moment by new parts.

To prevent the bar B and its attached jaw b from dropping down in the arc of a circle upon b' as a center when the wrench is to be applied in a downward direction and to insure easy removal when the grip is released by reversing the direction of swing of the handle, the spring E is interposed between the contiguous faces of the bar B and the tubular handle A and between the lugs $a a$. The spring we prefer to use, and for which the parts as shown in Fig. 2 are adapted, is a V-spring, having its lower leaf E' longer than its upper leaf E.

The under surface of A, between the lugs $a a$ and $a a$, is made simply flat, so as to afford a spring-seat, but the upper surface of the bar B is recessed at b^2 and up to e , so that when the V-spring E is laid with its lower leaf in the said recess of the arm B and then pressed upward between the lugs $a a$ and the rivet or pin b' is inserted the upper leaf of the spring E will bear with an upward thrust against the free end of the tubular handle A and the lower leaf of the spring E' will bear upon the upper surface of the bar B with a downward thrust between said rivet or pin b' and said jaw b , so as to hold the bar B to its open position, as shown in Fig. 1, or restore it to that position from that shown in the dotted outline of the same figure when released from grip upon a pipe or other object.

It will be seen that the lugs $a a$ at the sides and the recess $b^2 e$ of the bar B and the under surface of the tubular handle A together constitute a closed box, which securely fixes and contains the spring, so that no rivets, screws, or other attachments or fastenings are required to hold the spring, which drops out as soon as the bar B is unpinned from the lugs $a a$.

It will also be seen that the bar B does not slide longitudinally upon the spring E, so as

to tend to displace the same, but simply approaches and recedes along the arc of a circle centered at the pivoted support b' of said bar.

The spring E we make of brass preferably, or of steel or other elastic material, and its tension is only such as to keep the swinging jaw habitually in an open position, as shown in Fig. 1. In certain cases and for specific purposes we sometimes dispense with the spring E or use the same for other purposes, as desired, but we prefer to use the construction as specifically shown in the drawings. To prevent this bar B and its jaw b from opening too far upon the pivot b' , the rear end of the bar B, as shown in Fig. 2, is raised at e above the general level and abuts against the under side of the tubular handle, so as to maintain the bar B in a position substantially parallel to but some distance beneath the prolongation forward of the longitudinal axis of the tubular handle A. When the wrench is used, traction upon the handle in an upward direction draws the jaw b upward, compressing the spring E and approaching nearer to the serrated face c' of the opposite jaw. When the movement of the handle is reversed, the jaw b is drawn away from the jaw c and the object released, when the spring E restores the bar B to its normal position.

As shown in Figs. 1 and 2, the jaws b and c' are not parallel with each other, but while b is substantially at a right angle with the bar B and the axis of the handle A the jaw c' is sloped, so that the space between the jaws is less along the bar B than between their free ends, where the object to be grasped is introduced. In this way the pipe is interposed until its advance is arrested by the forward slope of the jaw c' , and then a slight movement of the handle upon the pipe as a center will instantly seize and turn it. Should the jaws become embedded too deeply into soft material, as frequently occurs when working in the interstices of machinery, the thumb-screw head at the rear end of the handle affords an easy and always accessible means of unscrewing the rod C in the handle A to any distance necessary.

The operation of the wrench is as follows: The handle grasped in one hand, the thumb-screw head is rotated until the jaws c' b are screwed up against the pipe, or nearly so. The handle is then swung around, carrying the pipe with it. The reverse motion of the handle releases the jaws and the spring E restores them to their normal position. The lugs c^2 c^2 of the jaw c prevent lateral displacement of the bar B and its jaw b , holding both jaws constantly opposite each other, the strain of one being carried by the strain of the other. The position of the thumb-screw head is always accessible, out of reach of moving or dangerous parts of the machinery operated on, and at the point most accessible and most easily operated. The support against end thrust is immediately within the flanged terminal cap or cover at the rear of

the handle, the jaw-supporting rod being a continuous structure from the screw adjacent thereto to the extreme face of the jaw itself, so that a heavy strain will not tend to jam the threads of the screw by weaving upon the threads thereof as if such screw adjustment were placed near the jaws themselves.

The wrench is equally adapted for square, hexagonal, or round nuts as for pipes, though principally adapted for use upon tubular objects. As its forward parts are small in dimensions and compact, the wrench can be introduced into openings and narrow crevices into which a more bulky wrench-head could not be inserted or operated and where the thumb mechanism could not be reached if located near the clamping or gripping jaws. It will be seen that the thumb-screw head may be readily operated by the same hand which is engaged in holding the handle.

We do not confine ourselves rigidly to the precise construction shown in the drawings. For example, the V-spring E may be an arched or other spring seated in the same manner as shown. The jaw c may be formed integral with the internal rod C. The lugs a a may be single and interposed between the sides of the bar B, slotted for this purpose, and other similar obvious modifications may be made as would be done by any skilled mechanic to meet special requirements without departing from the principles of our invention as herein shown, described, and claimed.

Having now described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a hand-wrench, the combination of a tubular handle having one of its ends partially closed by a flange-shaped cap or cover rigidly secured thereto, and provided with a central hole through the same, and rigidly-secured lugs extended laterally from the side of said tubular handle at the opposite end thereof, a stem-piece adapted to pass through said cap or cover and protrude externally, and provided with an enlarged internal collar adapted to rest against the inner side of said cap or cover, and a screw adapted to extend forward into said tubular handle, together with a rod fitted to reciprocate within said tubular handle along its entire length, said rod provided with a deep, threaded opening in its rear end constructed and adapted to engage with and be reciprocated longitudinally by the rotation of said stem, collar and screw, and at its opposite end provided with an enlarged wrench-head, and also an opposite wrench-head supported by and integral with a bar extending rearwardly and pivoted to said lugs of said tubular handle outside the line of axis of the same, and a spring adapted, by its pressure against said handle and the inwardly-movable supporting-arm of said swinging jaw, to maintain said swinging jaw in a fixed open position, the whole constructed to operate substantially as herein shown and described.

2. In combination with a tubular handle

having a centrally-open flange-shaped cap at one end, and laterally-projecting and integrally-attached lugs at the other, and internal longitudinally-reciprocating rod fitted therein and extended through said handle having wrench-jaw at its forward end, and internally-screw-threaded longitudinal hole in the other, together with a screw adapted to engage with said screw-threads of said hole, immediately within said flange-shaped cap, said screw provided with an enlarged collar adapted to be supported from within against the said terminal cap of said tubular handle, adapted to form a support for said wrench-jaw rod at rear of said handle and a stem projecting from said screw and collar through said opening in said cap, and provided with an external thumb-head by which said collar and screw are adapted to be rotated, and thereby advance or withdraw said rod and jaw along the axis of said handle, and also a bar formed in a single structure pivoted to said lugs and extended forward therefrom parallel substantially with the prolongation of the axis of said handle, and having a gripping-jaw extended upward from its forward end, and opposite the gripping-jaw at the forward end of said longitudinally-reciprocating rod, the opposite and adjacent faces of said gripping-jaws transversely serrated and tapered from their free open ends inward toward the supporting-bar of said forward jaw, so as to make a gradually inclined and narrowing passage for the transverse entrance of a pipe between said jaws, substantially as described.

3. In a pipe-wrench, in combination with tubular handle partially closed by an integral flange-shaped cap at one end, and provided with lateral pivot-lugs at the other, and a screw and collar within said handle, said collar supported against said cap at rear of said handle, and a stem protruding through said cap, and provided externally with an enlarged head for rotating said screw, a forwardly-projecting bar pivoted to said lugs, and adapted to swing toward the axis of said handle, and provided at its forward end with a gripping-jaw facing toward the open end of said tubular handle, together with a longitudinal rod adapted by a screw-thread to engage with and be longitudinally reciprocated within said tubular handle by said external head, and provided with a gripping-jaw at the end of the portion which extends outward and forward from the open end thereof, said gripping-jaw having rigidly attached to, or formed integral therewith, downwardly-projecting lugs adapted to embrace the sides of the supporting-bar of said forward jaw, and ride along the same and at the same time permit said swinging bar to swing outward between and partially beyond the free extremities of said lugs, so as to prevent lateral displacement between the two opposite jaws, substantially as described.

4. In combination with a handle constructed to support and operate a wrench, and having

at its forward end laterally-projecting lugs permanently secured thereto, and pivoted to said lugs a continuous rigid bar extended forward and provided with a wrench-jaw, said bar recessed between said lugs, and in advance of said pivot, and within said recess and the under side of said handle, and between said lugs, a spring held in place by said lugs, recess and handle, and adapted by its spring-pressure to engage with the bar and handle in front of said pivoted attachment, and force them apart, said swinging bar having a direct inward pressure upon said spring, and without lateral movement thereupon together with a stop upon said bar in rear of said pivot adapted to prevent excessive backward swing of said bar around said pivot, substantially as and for the purpose described.

5. As an article of manufacture a wrench consisting of a tubular handle, a projecting rotating thumb-head, adapted to operate an internal screw, a reciprocating rod within said handle engaging with said screw, and reciprocated by the rotation thereof, a jaw at the forward end of said rod, having a detachable serrated gripping-face secured thereto, and downwardly-projecting, bifurcated lugs, a forward opposite gripping-jaw, supported by a bar, out of line of the axis of said handle, and pivoted to the lugs at the forward end of said handle, and adapted to move within and partially beyond the bifurcations of said inner jaw upon said pivoted bearing, and a flat-bladed spring supported and concealed between the lugs of said handle laterally, the under surface of said handle above, and the upper surface of said bar below, held in a recessed support in advance of said pivoted bearing, and so constructed that the said pivoted bar shall close directly upon said spring without lateral or sliding movement thereupon, and that said spring shall force the forward jaw outward along the arc of a circle centered on said pivot, and provided with a stop to prevent undue outward motion of said bar and jaw, substantially as described.

6. As an article of manufacture, a wrench composed of a tubular handle, closed by a flange-shaped cap at one end with a central opening, and having laterally-projecting lugs on the opposite end of said handle formed integral therewith, a rigidly-constructed, swinging bar pivoted to said lugs, and provided with a gripping-jaw at its forward end faced opposite the open end of said tubular handle, and adapted to swing upon its pivoted support inward and toward the prolongation of said tubular handle, and a spring between said bar and said handle in front of said pivot to force the same apart; also an external head at the rear end of said handle detachably secured to a stem projecting through said cap, and said stem provided with an enlarged collar within said flange-shaped cap, adapted to form a single end support for the rod and its integrally-attached inner wrench-jaw, immediately within the rear end of said

handle and a screw-threaded portion within
 said handle, and a reciprocating rod fitted
 within said handle, having a gripping-jaw at
 its free forward extremity opposite the grip-
 5 ping-jaw of the bar aforesaid, and a longitu-
 dinal screw-threaded hole in its rear end fit-
 ted to engage with and be reciprocated within
 said handle by the rotation of said screw; the
 whole adapted to be put together from its
 10 several disassembled parts by first dropping
 the screw with its collar and stem into said tu-
 bular handle, the stem protruding therefrom,
 then attaching said external head to said
 stem, then dropping in the reciprocating rod
 15 and screwing the same backward to place by
 the screw-head protruding externally, after-
 ward placing the spring between said bar and
 the forward end of said handle and between
 the lugs thereof, and pressing the rear end
 20 of said bar up to place and inserting the rivet,
 the whole held in place by the position of the
 parts, without extra attachments, substan-
 tially as described.

7. In a wrench the combination of tubular

handle, A, provided with flange-shaped cap, 25
 a' , and central hole, a^2 , and at its opposite
 end with laterally-projecting and perma-
 nently-fixed lugs, a , the stem, D, internal
 collar, d' , and screw, d^2 , external head, d ,
 secured to said stem, D, internal reciprocating 30
 rod, C, extended through said handle
 having internal screw, c^2 , at one end and en-
 larged gripping-jaw, c , and serrated face, c' ,
 at the opposite end the rigid bar, B, pivoted,
 at b' , to the lugs, a , having a movement in 35
 the arc of a circle, but no longitudinal move-
 ment along said handle, and provided at its
 forward end with the opposite jaw, b , and
 the spring, E, interposed between B and A,
 and in advance of pivot b' , and also an abut- 40
 ting-stop, in rear of e , against the handle, A,
 substantially as described.

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Witnesses:

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