

No. 626,401.

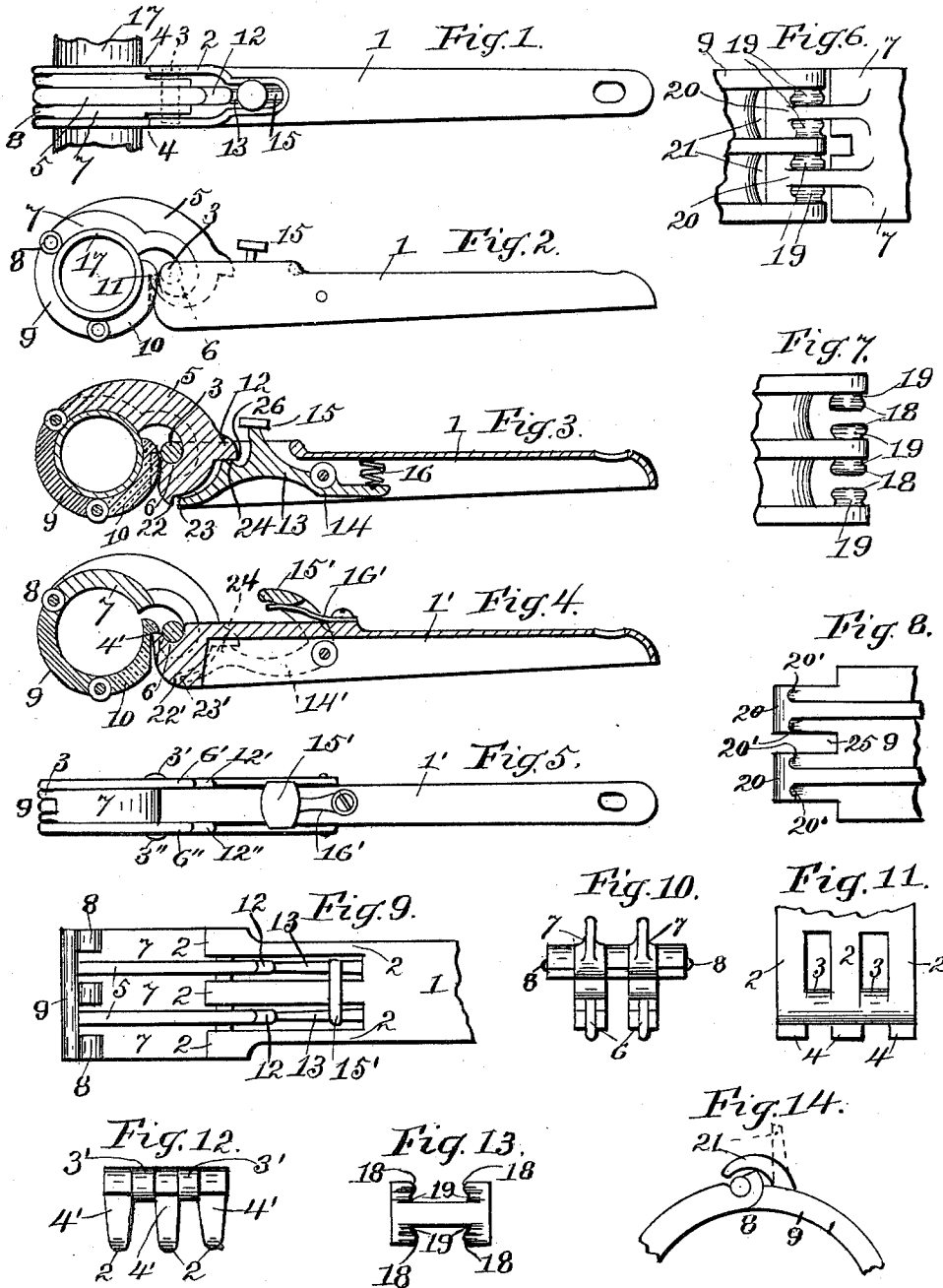
Patented June 6, 1899.

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PIPE WRENCH.

(Application filed July 27, 1898.)

(No Model.)



WITNESSES:

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PIPE-WRENCH.

SPECIFICATION forming part of Letters Patent No. 626,401, dated June 6, 1899.

Application filed July 27, 1898. Serial No. 686,997. (No model.)

To all whom it may concern:

Be it known that I, S LLOYD WIEGAND, a citizen of the United States, residing at Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Pipe-Wrenches, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to pipe-wrenches or wrenches for grasping and rotating cylindric objects, and has for its objects the grasping of such forms without abrasion or other impairment of the surface or shape of such objects and holding them by compression and frictional grasping so as to rotate them.

To this end this invention consists of an arrangement of a lever having the pivot or pivots and fulcrum or fulera alternated in position across the lever and a ring formed of segmental links and a spring device for automatically engaging and disengaging the ring of segments from frictional hold on the pipe, whereby the grasp for rotation or torsion in one direction shall be firm and automatic and the release from such torsional grasping hold for motion of the segments and lever in the opposite direction shall be also automatic and a second lever and a spring whereby the ring of clamping-segments is held against accidental disengagement from the pipe or from the lever-handle at the option of the operator to substitute other segmental rings adapted to grasp pipes of different diameters, and, further, embraces improved means of uniting the segments, pivots, and fulera so that from their form they are of inexpensive production and under stress are not easily liable to impairment.

The invention is hereinafter fully described, and shown in the accompanying drawings, in which—

Figure 1 shows a plan of the invention. Fig. 2 shows a side elevation thereof. Fig. 3 shows a central lengthwise section. Fig. 4 shows a section of a modified form thereof. Fig. 5 shows a plan of the form shown in Fig. 4. Fig. 6 shows a form of joints or pivotal connection by which the segments are united. Figs. 7 and 8 show separately the parts involved in the joints before assembling them. Fig. 9 shows a shortened plan view of a wrench having several pivots and fulera; and Figs.

10, 11, and 12, respectively, show a front view of the hooked segment and of the top and front views of the end of the lever of the form depicted in Fig. 9.

Referring to the first three figures of the drawings, 1 represents the lever-handle, preferably formed as a hollow trough or shell with a forked end 2, having a pivot 3 placed in the fork and projecting fulera 4 upon the ends of the fork close to the pivot 3.

5 is a link having a hook 6 engaging the pivot 3 and a segment 7 having a cylindric concavity adapted to fit upon a cylindric object to be grasped and a joint 8 to which is pivotally attached a segment 9 of a like concave curvature adapted to fit the cylindric object, and a further segment 10 hinged to the segment 9, also of like concavity, adapted to fit the cylindric object and having hooks or recesses 11 in the ends, which receive the fulera 4.

A short lever-arm, projection, or lug 12 is formed on the hook 5, which engages the point 24 in the arm 13 of the lever 14, pivoted to the handle 1 and having a lever-arm or handle 15 and a spring 16, by which the lever-arm 12 is pressed upwardly by the lever-arm 13 and so held that the hook 6 remains in engagement with the pivotal fulcrum 3.

The end 23 of the arm 13 extends beyond the point 24, contacting with the short lever-arm 12 sufficiently to reach a projection 22 on the end of the hook 6 when the hooks 11 are disengaged from the fulera 4, but does not contact with the projection 22 when the hooks 11 are engaged with the fulera 4. The projection 22 by the reaction of the spring 16 on the lever 14 presses the arm 13 against the lever-arm 12 and turns the hook 6 on the pivot 3, so that the projection 22 on the hook is pressed and held against the end 22 of the lever-arm 13 and the hook 6 is held in engagement with the pivot 3. By simply pressing the arm 15 or the lever 14 forward the hook 6 is disengaged from the pivot 3, so that the ring of segments is readily detached from the handle 1 and others substituted suitable for grasping pipes of other diameters. This feature of protection against unintentional disengagement of the grasping-ring from the handle is important, because in erecting screwed tubular structures the tool must frequently be used in

inverted position and reached from ladders and scaffolding and by climbing, so that the workman can apply but one hand to the tool, and it is alike important to have the best facilities for prompt intentional disengagement and engagement of several sets of segments from a single handle to suit various sizes of tubing, thus rendering a pipe-fitter's outfit of tools of less cost, weight, and bulk and more convenient for transportation.

The pivot 3 may be single between two fulcras 4, as shown in Figs. 1, 2, and 3, or duplex on each side of a single fulcrum, as shown in Figs. 4 and 5, or a number of pivots and fulcras may be alternated with each other, as shown in Figs. 9, 10, and 11, on which arrangement depends this important feature—*i. e.*, that these parts can be of adequate strength to sustain great stress and have the axes of the pivotal points of the lever so near to each other as to produce contraction of the segmental ring with such force that the frictional grip of the ring always exceeds the force applied to turn the pipe, thus precluding the possibility of slipping on the pipe.

The operation of the device as applied to a cylindric object—as, for instance, a pipe 17, as shown in Figs. 2 and 3—is by passing the segments around the pipe and engaging the hooks 11 with the fulcras 4, and applying downward pressure to the lever-handle 1 the hook 6 is held downwardly and the hook 11 of the segment 10 is forced upwardly, contracting the ring upon the cylinder or pipe 17.

The proportions of leverage due to the proximity of the axis of the pivot 3 to the axis of the fulcras 4 and the length of the radius of the cylinder 17 grasped within the ring of segments are such that the pressure and friction resulting from such grasping are vastly in excess of the power that can be exerted by the lever 1 on the surface of the cylinder 17 to rotate it. In other words, the multiplication of the power by the short arm of the lever 1, whose radial length may be stated as the distance between x and y (see Fig. 2) as compared with the radial distance from the center of the tube 17 to its circumference, both being compared with the radius of the long lever-arm 1, and the multiplication of the force, being in inverse ratio to the relations of these radii, any force applied downwardly to the handle 1 is so greatly multiplied that it constricts the ring of segments 7, 9, and 10 and produces such frictional hold between it and the surface of the cylinder 17 that the segmental ring will hold beyond any possibility of slipping upon the pipe or cylinder 17 and compel the cylinder to turn with the ring when the handle 1 is moved downwardly. By alternating the pivots 3 with the fulcras 4 the required degree of constricting force can be obtained with a commensurate strength of parts.

When the handle 1, as shown in the drawings, is moved upwardly, then the fulcras 4 are lowered or retracted from the hook 11 and the

grasp of the ring of segments upon the cylinder 17 is relaxed. Disengagement of the hook 11 from the fulcras 4 is prevented by the spring 16, lever 14, and lever-arm 13 pressing upwardly upon the lever-arm 12, so as to prevent further motion than the mere relaxing of the grasp of the segments upon the cylinder 17, and the reaction of the spring as transmitted through the lever 14, arm 13, and the lever-arm 12 also holds the hook 6 in engagement with the pivotal fulcrum 3.

When it is desired to open the ring of segments 7, 9, and 10 to remove it from the cylinder 17, by pressing the lever-arm 15 forward by hand the lever-arm 13 is lowered, so as to let the lever-arm 12 descend, and the hook 11 becomes disengaged from the fulcras 4. The ring of segments 7, 9, and 10 may then be opened and removed from the cylinder 17. The projection 22 then meets the end 23 of the lever-arm 13 and holds the hook 6 in engagement with the pivot 3, the segments 7, 9, and 10, connected with the handle 1, as previously explained, ready for reapplication to a pipe 17. By pressing the lever-arm 15 farther forward the end 23 of the lever-arm 13 clears the projection 22, and the hook 6 is then free to be removed from the pivot 3 and handle 1 and other rings or segments suitable for other sizes of pipes or cylinders can be substituted.

The several segments 7, 9, and 10 can be united by pivot-pins and knuckles, forming a hinged joint, as shown in Figs. 1 and 2, or may be united by hinged joints formed integrally with the segments, as shown in Fig. 6, in which the segments have pivots 19 with hooks 20 engaging them, provided with circumferential ridges 18 on the pivots 19, as shown in Figs. 6, 7, 8, and 13, and concavities or grooves 20' in the hooks 20, into which fit the ridges 18 upon the pivots 19, so that any tendency to bend the parts or separate them sidewise is counteracted by the pressure of the ridges engaging in the grooves of the other member of the joints. As shown in Fig. 13, the pivots 19, having ridges 18 thereon, are formed on a link 24, which fits into the clefts 25 (shown in Fig. 8) between the hooks 20.

In order to hold the parts of the segments together in connection with each other, flexible projections 21, of ductile metal, are formed upon one segment 9, as shown in Fig. 14, which, being bent over the pivots of the adjacent segment, hold it loosely in connection with the other segment and prevent the separation of the parts.

In the form of the wrench depicted in Figs. 4 and 5 instead of having the pivot in the forked lever 1 the fulcras 4 are placed centrally and pivots 3 made duplex, with one upon each side, (marked 3' and 3''), and instead of the central hook 6 the hooks marked 6' and 6'' are formed on each side of the segment, so as to engage the pivots 3' and 3''. The lever-arms 12' and 12'' are formed on the

hooks 6' and 6'', and the lever 13', pressing under the lever 12' and actuated by a spring 16', serves to hold the parts in connection with each other, the lever-arm 15' being forked, so as to straddle over the lever-handle 1' and the spring 16' operating under the lever-arm 15 to produce the lifting effect on the lever-arm 12'.

In the form shown in Figs. 9, 10, and 11 the pivots 3 and fulera 4 are alternated in multiple, but operated in the same manner as in those previously described.

The levers and segmental rings are separately merchantable, for which reason the levers and rings are separately claimed.

Having described my invention, what I claim is—

1. In a wrench for pipes and like cylindrical objects, a lever-handle having a pivot and a contiguous fulcrum, in combination with an open ring of pivotally-connected segments provided with terminal hooks, one terminal hook adapted to engage the pivot from its inner side, and the other terminal hook engaging the fulcrum from the outer side of the said pivot, as set forth.

2. In a wrench for pipes and like cylindrical objects, a lever-handle having pivots and contiguous fulcrums, in combination with an open ring of pivotally-connected segments provided with terminal hooks, one terminal hook adapted to engage the pivots from their inner sides, and the other terminal hook engaging the fulcrum upon the outer sides of the said pivots, as set forth.

3. In a pipe-wrench, a trough-shaped lever-handle having a pivot and a fulcrum at one end thereof, a series of segments hinged to each other to form an open ring, the terminal segment of each ring being provided with hooks adapted to engage on said pivot and fulcrum, and a lever-arm formed on one of said hooks, in combination with a lever and spring actuating said lever, arranged to engage a lug of said lever-arm to hold said hook in engagement with the pivot and fulcrum substantially as set forth.

4. In a pipe-wrench handle, a lever having a pivot and fulcrum at one end thereof formed integrally therewith, in combination with a lever pivotally connected with said fulcrum and lever, and a spring actuating the same, adapted to hold the terminal hooks of open segmental clamping-rings in engagement with said pivot and fulcrum, substantially as set forth.

5. In segmental clamping-rings for grasping pipes, hinged joints having circumferential ridges on one member, combined with cir-

cumferential grooves on the other member, engaging said ridges, to restrict lateral bending and spreading of parts, under stress, substantially as set forth.

6. In segmental rings for grasping pipes and similar objects, pivots formed integrally with one segment, hooks formed integrally with the adjacent segment, adapted to receive said pivots, in combination with flexible projections formed on one segment adapted to be bent over the other segment to hold the hooks and pivots in engagement, substantially as set forth.

7. In a clamp for holding pipes, segments hinged to each other to form an open ring, one terminal segment having a hook adapted to engage a lever-fulcrum, the other terminal segment having a hook adapted to engage a pivot upon a lever, and provided with one or more projections adapted to engage a spring-actuated lever, to hold the hook in engagement with and disengage the hook from the pivot substantially as shown and described.

8. A lever for pipe-wrenches having pivots and fulera alternating in position with each other, as described, and adapted to engage terminal segments of a contractible ring, said pivots and said fulera being closely approximated in position of axial lines, as shown, thereby insuring adequate automatic contraction and frictional grasp of the ring upon an inclosed cylinder, in excess of the force transmitted from a lever to turn the cylinder, substantially as set forth.

9. In a pipe-wrench, a lever-handle having contiguous corresponding pivots and fulera, combined with a series of segments hinged together, the one end of the series having hooked connections with the said pivots, and the other end provided with hooks adapted to engage and disengage the said fulera, as set forth.

10. In a pipe-wrench, a lever-handle having one or more pivots and one or more fulera at one end thereof, a series of segments hinged to each other to form a contractible open ring, the terminal segments of each ring being provided with hooks adapted to engage on said pivots and fulera, a projection on one of the hooks and a lever having an operating-arm and spring arranged to release or hold the lever in engagement with the projection and thereby control the engagement of the hook on the ring-segment with the pivot, all combined as set forth.

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Witnesses:

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