

No. 760,148.

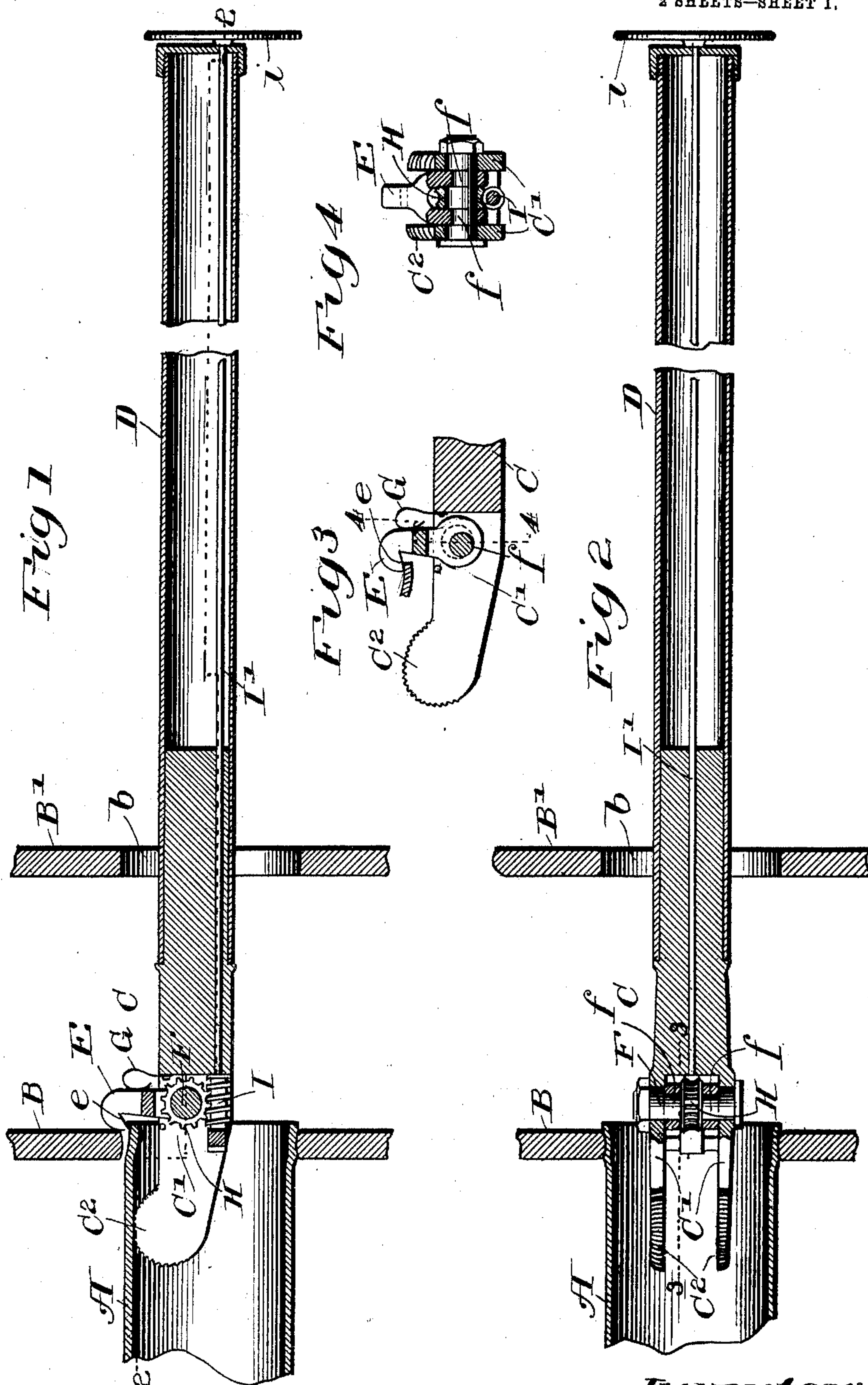
PATENTED MAY 17, 1904.

H. A. POPPENHUSEN.  
IMPLEMENT FOR DETACHING BOILER TUBES.

APPLICATION FILED MAR. 12, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:  
Carl H. Crawford  
William Hall

by

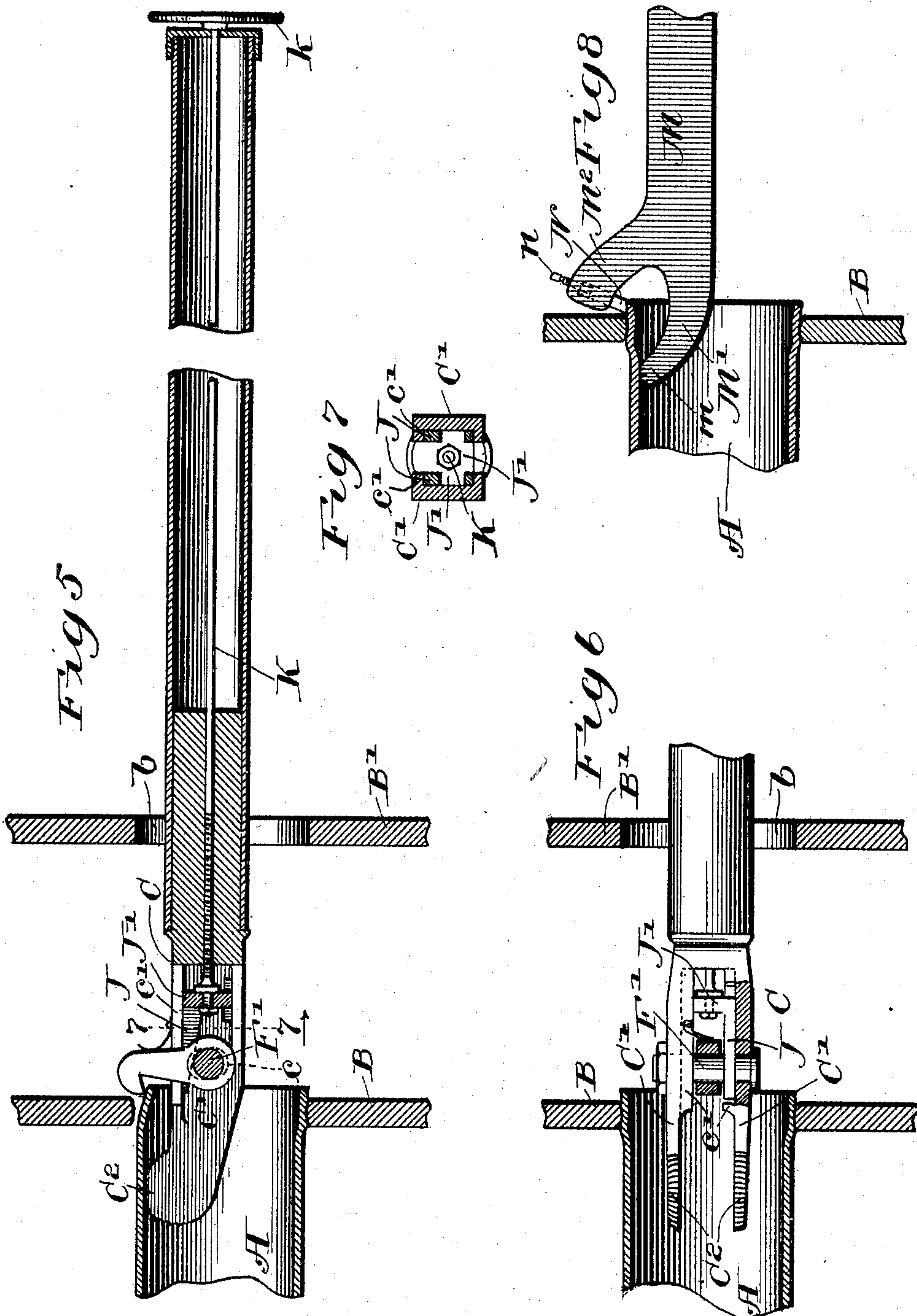
Inventor:  
Herman A. Poppenhusen  
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# UNITED STATES PATENT OFFICE.

HERMAN A. POPPENHUSEN, OF CHICAGO, ILLINOIS.

## IMPLEMENT FOR DETACHING BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 760,148, dated May 17, 1904.

Application filed March 12, 1903. Serial No. 147,388. (No model.)

*To all whom it may concern:*

Be it known that I, HERMAN A. POPPENHUSEN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Implements for Detaching Boiler-Tubes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel tool or implement for use in detaching boiler-tubes from the tube-sheet or head in which they are secured.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a sectional view taken on a vertical plane through one end of the tube and the adjacent walls of the water-head of the tubular boiler and also longitudinally through a preferred form of implement embodying my invention. Fig. 2 is a plan section taken on line 2 2 of Fig. 1. Fig. 3 is a detail section taken upon line 3 3 of Figs. 2 and 4. Fig. 4 is a cross-sectional view taken upon line 4 4 of Figs. 1 and 3. Fig. 5 is a sectional view similar to Fig. 1, showing a somewhat similar form of construction in the tool or implement. Fig. 6 is a detail plan section of the construction shown in Fig. 5. Fig. 7 is a cross-section taken on line 7 7 of Fig. 5. Fig. 8 is a view illustrating in side elevation the working ends of an implement embodying the same general features of construction that are shown in the other figures of the drawings, but of more simple character in its details.

As shown in the several figures of the drawings, A indicates the end of a water-tube, B the tube-sheet in which the end of the tube A is secured and which forms the inner wall of the water-head, and B' a plate forming the outer wall of the water-head and which is provided with an opening or orifice b, arranged in alignment or opposite the end of the tube A.

First referring to the form of implement

illustrated in Figs. 1 to 4, C indicates the main part or head of the same, and D a tubular extension forming a long and rigid handle or lever, these parts together constituting the shank of the tool. The head C is provided at its end or extremity with two parallel bearing-arms C' C', provided with laterally-extending convexly-curved bearing parts or extensions C<sup>2</sup>, which are adapted for contact with the inner surface of the tube A, into which the end portion of the head C is inserted when the tool is in operation. The marginal parts of the lateral projections C<sup>2</sup> of the arms C' are preferably toothed or serrated, so that they will grip the interior of the tube and prevent the tool from slipping when said extensions are in bearing against the side wall of the tube. Pivotally mounted on the head C is a gripping-hook E, said hook being adapted to extend from the head C at the same side of the same at which the projections C<sup>2</sup> are located and being adapted to swing at its free end in the direction of the longitudinal axis of the shank. As herein shown, said gripping-hook is mounted on a pivot-pin F, which extends through the arms C' C', and the inner end of the gripping-hook is extended between said arms and provided with bearing-apertures to engage said pivot-pin. As shown in said figures of the drawings, moreover, the said gripping-hook E is forked at its inner end, or that which engages the pin F, and its side portions are located adjacent to or in contact with the inner faces of the arms C' C'. The gripping-hook E is, moreover, mounted to swing freely on the pin F, and a spring is applied to the same in such manner as to throw the outer or free end of the hook toward the outer ends of the arms C', the spring employed in the construction in the drawings being a sheet-metal spring G of U form attached to the head C and bearing at its free end against the rear face of the said gripping-hook. The free end of the gripping-hook is provided with a gripping tooth or projection e, which has an angular, sharpened, or biting end and is directed inwardly or toward the head C. The said gripping-hook and its tooth are so arranged with



respect to the arms  $C'$  that when the lateral projections  $C^2$  at the ends of said arms are engaged with the inner surface of the tube the end of the tooth will have gripping or biting engagement with the outer surface of the marginal part of the tube which projects beyond or outside of the plate B, so that when the free end of the shank of the implement is swung in a direction to carry the gripping-hooks inwardly with respect to the tube the ends of the tooth, having holding engagement with the tube at one point in its circumference, will bend the part of the tube engaged thereby inwardly, and thus free it from the edge of the wall with which it is in contact. When the gripping-hook is thus engaged with edge of the tube, the lateral bearing projections  $C^2$   $C^2$  will be in bearing against the inner surface of the tube, and as the shank B is moved or swung in a direction to carry the gripping-hook inwardly said projections  $C^2$  will roll upon the inner surface of the tube, the slipping of the implement endwise on the tube being prevented by the serrated or toothed edges of the said extensions  $C^2$ . An advantage is obtained from making the extensions  $c$  of convexly-rounded form and serrating them, as described, for the reason that as the projections roll upon the inner surface of the tube they will, by reason of their gripping engagement therewith, afford a shifting fulcrum for the lever and move or shift the hook in a direction toward the interior of the tube, thereby insuring the maintenance of the gripping engagement of the biting end of the hook with the margin of the tube as the latter is bent inwardly. It will of course be understood that in the operation of the implement in the manner described the gripping-hook at one movement of the implement will operate to bend inwardly only a small part of the circumference of the end of the tube, so that in order to completely release the end of the tube from the plate B it is necessary to repeat the operation at a number of different points around the edge of the tube, it being, however, ordinarily necessary to only bend inwardly the end of the tube for somewhat more than one-half of its circumference, after which the tube may be readily loosened and removed. It will of course be understood that in operating upon a tube the end of which is secured in the innermost of the two plates B and B', constituting the water-head of a boiler, it is necessary to introduce the implement through the opening  $b$ , provided in the outer plate B' for the purpose of cleaning the tube, and by reason of the relatively small size of the said opening the implement can be moved or swung a short distance only before its shank will come in contact with the edge of the said opening  $b$ , toward which it is being moved or swung. It is, however, often necessary to provide for a greater movement in the said gripping-hook than is permitted by the size of the opening

$b$ , because the movement of said hook permitted by the use of the hole  $b$  is necessarily short. To afford such greater extent of movement in the said gripping-hook without lengthening the arms  $C'$   $C'$  within the limited movement afforded by the opening  $b$ , I provide for a lateral adjustment upon the head C of the pivot of the said hook E, and I so construct the parts that after the edge of the tube has been bent inwardly as far as is possible by the swinging or movement of the shank the hook may then be adjusted bodily inward, so that when a new grip is taken upon the part of the end of the tube already depressed or drawn in by previous action of the tool a second action thereof will draw the inwardly-deflected part still farther inward and such inward adjustment of the gripping-hook, if necessary, be repeated several times until the inwardly-deflected part of the tube end is drawn inward far enough for the purpose desired. As shown in said Figs. 1 to 4, devices for shifting or adjusting the position of the gripping-hook E are provided as follows: The portions  $f$   $f$  of the pivot F which are engaged by the parts or arms of the gripping-hook E are made smaller than the end portions of said pin F, which engages the arms  $C'$   $C'$ , and are arranged eccentrically with respect to the said larger part of said pin, so that by turning the pin the eccentric bearing parts  $f$   $f$  will be carried inwardly or outwardly and shift or move the position of the gripping-hook to correspond with the position of said eccentric parts. For turning the pivot F the same, as shown in Figs. 1 to 4, is provided with a gear-wheel H, which is located at the central part of the pin or between the eccentric portions  $f$   $f$  thereof and the teeth of which are engaged with a worm I, which is mounted on a shaft I', having suitable bearings in the head C and extending through the lever-arm D to the outer end of the same, where it is provided with a hand-wheel  $z$ , by means of which it may be turned. By the construction described obviously the pin F may be turned for adjusting the gripping-hook F by manipulating the wheel  $z$  and without the necessity of removing the implement from its engagement with the tube.

In using the implement made as described the gripping-hook E will first be adjusted in its position of greatest extension. The end of the lever will then be inserted in the end of the tube and the tooth  $e$  of the hook engaged with the edge of the tube and then moved for so far as possible or until it comes in contact with the edge of the opening  $b$  toward which it is moved. If it is desired to depress the edge of the tube still further, the lever is then thrown backwardly and the hand-wheel  $z$  turned so as to shift or move the eccentric parts  $f$   $f$  of the pivot in a direction to carry or draw the gripping-hook inward, and a new hold is then taken on the part of the tube first



bent and the same again drawn inwardly as far as permitted by the angular movement of the lever.

In Figs. 5, 6, and 7 I have shown a somewhat different construction in means for adjusting the pivot of the gripping-hook. In this instance the said hook is connected with the lever by means of a pivot-pin  $F'$ , which is adapted to slide at its end in transverse grooves  $c\ c$  in the arms  $C'$  of the tool. For shifting or moving laterally the said pin  $F'$  two wedges  $J$  are arranged to slide endwise on the inner faces of the arms  $C' C'$ , said wedges bearing at their outer edges against inwardly-extending ribs  $c'$  on the said arms. The wedges are connected with each other by a cross-piece  $J'$ , Fig. 6, which is provided with a central aperture to receive the inner end of a screw-shaft  $K$ , which extends through the head  $C$  of the tube to the outer end or extremity thereof. The said shaft  $K$  is provided with shoulders at the opposite sides of the cross-piece  $J'$ , so that the shaft may turn in the said cross-piece, but is held from endwise movement with respect thereto, and the shaft is screw-threaded in its part which passes through the head  $C$ , so that when the shaft is turned it will be moved endwise and the wedges  $J\ J$  thereby given endwise movement in a manner to carry the pivot-pin  $F'$  inwardly or outwardly. Said shaft  $K$  is shown as provided at the outer end of the lever with a hand-wheel  $L$ , by which it may be readily turned.

Fig. 8 illustrates a simple form of implement embracing the general features of construction hereinbefore set forth. As shown in said Fig. 8,  $M$  indicates the shank or stock of the tool, which is provided at its end with a prong  $M'$  and a tooth  $M^2$ . The prong  $M'$  constitutes an extension of the main part of the stock and is provided with a laterally-directed and rounded end  $m$  and adapted to bear against the inner curved face of the tube  $A$ . The hook  $M^2$  extends laterally from one side of the main part of the stock and has at its extremity a socket adapted to receive an adjustable tooth or bit  $N$ , the working end of which is directed inwardly or toward the prong  $M'$ . Said tooth  $N$  is so arranged with respect to the prong  $M'$  that when the end  $m$  of said prong is bearing against the inner wall of the pipe or tube the tooth will be in position to act upon the margin of the tube which projects beyond the tube-plate, as clearly seen in Fig. 8. A set-screw  $n$  is shown as inserted through the arm  $M^2$  and endwise into the socket which receives the tooth or bit  $N$ , said set-screw serving to effect adjustment of the

bit and enabling the position of the same to be changed with respect to the arm  $M'$  in the same manner and with the same result as in the case of the gripping-hook shown in the other figures of the drawings.

I claim as my invention—

1. An implement for detaching boiler-tubes comprising a lever provided at its working end with a laterally-extending bearing arm or projection for contact with the interior of the tube and having a laterally-extending hook which is provided, adjacent to said bearing arm or projection, with a biting end or tooth which is directed toward the lever and is adapted to grip the end margin of the tube which projects from the tube-sheet, said laterally-extending bearing arm or projection having a convexly-curved, serrated bearing-surface affording a shifting fulcrum for the lever.

2. An implement for the purpose set forth comprising a lever provided at one end with a laterally-extended bearing projection and having adjacent to said bearing projection a laterally-extended gripping-hook, a pivot connecting said hook with the lever, the pivot being adjustable laterally on the lever, and means for effecting adjustment of said pivot.

3. An implement for the purpose set forth comprising a lever and a laterally-extending gripping-hook which is laterally adjustable on the lever, and operating means for shifting the position of said hook extending lengthwise of the lever.

4. An implement for the purpose set forth comprising a lever provided near one of its ends with a laterally-extending gripping-hook, a pivot-pin connecting said hook with the lever, and means for shifting or moving said pivot-pin laterally in the lever embracing an operating-shaft which extends through the lever to the outer end thereof.

5. An implement for the purpose set forth comprising a lever, a gripping-hook which projects laterally from the said lever near one end thereof, an eccentric pivot-pin by which said hook is connected with the lever, a gear-wheel on said pivot-pin, a worm engaging said gear-wheel, and an operating-shaft attached to the said worm.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 7th day of March, A. D. 1903.

HERMAN A. POPPENHUSEN.

Witnesses:

C. CLARENCE POOLE,  
GERTRUDE BRYCE.