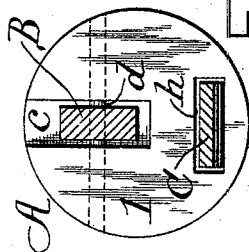
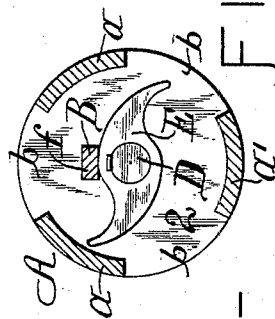
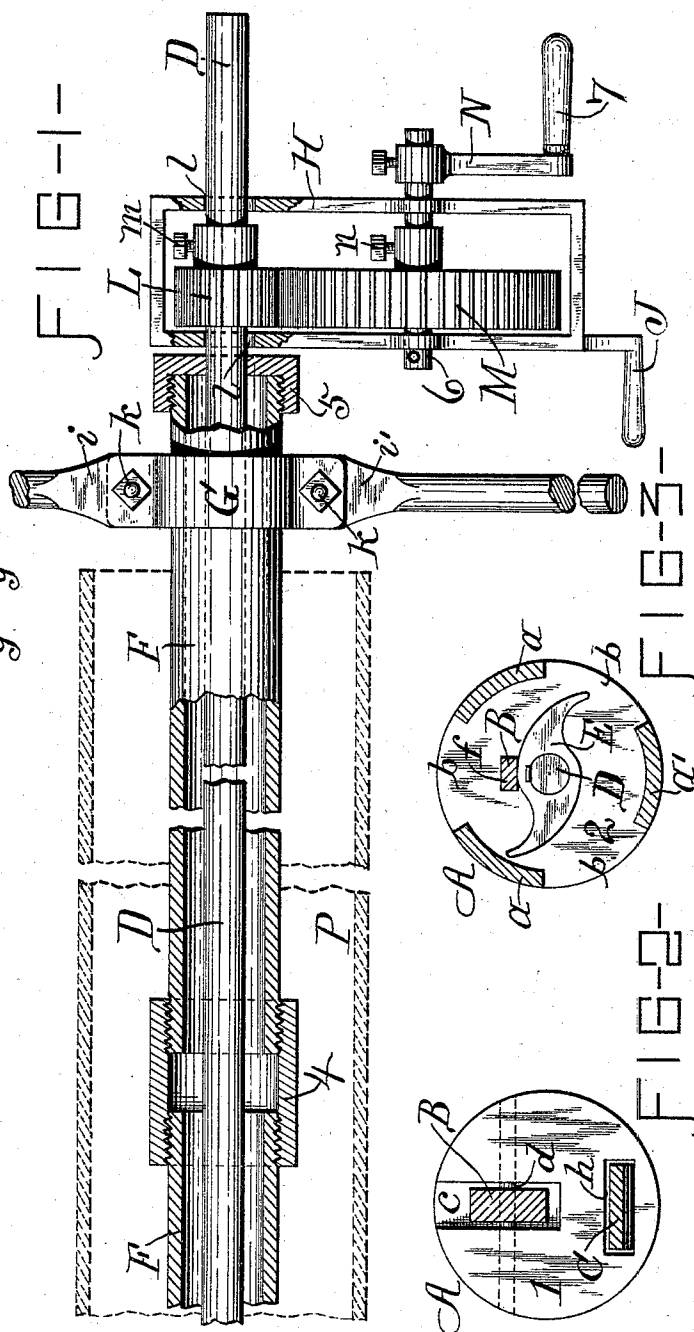
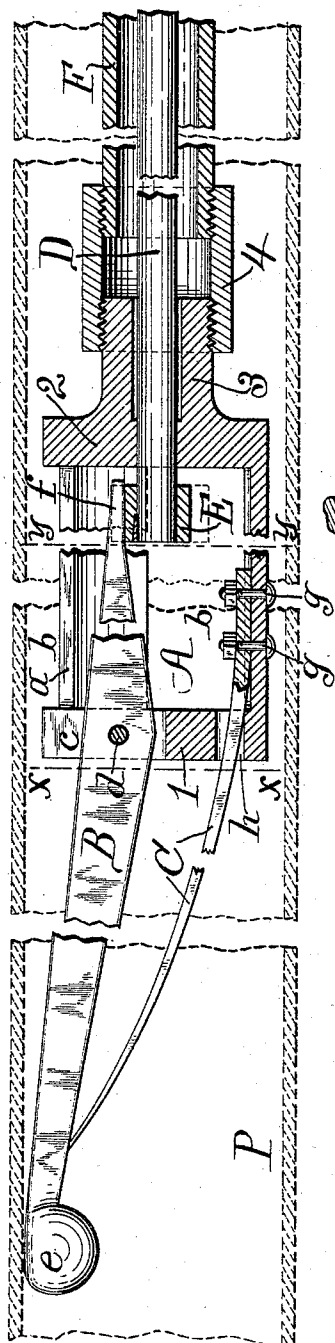


(No Model.)

W. H. TEBEAU.  
HAMMER FLUE CLEANER.

No. 540,081.

Patented May 28, 1895.



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# UNITED STATES PATENT OFFICE.

WILLIAM H. TEBEAU, OF SYRACUSE, NEW YORK.

## HAMMER FLUE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 540,081, dated May 28, 1895.

Application filed October 12, 1894. Serial No. 525,737. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. TEBEAU, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Hammer Flue-Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, in which—

Figure 1 is a conjoint side and sectional longitudinal elevation of my hammer flue-cleaner as disposed in operative position for the removal of scale, &c., from a tube or flue of a steam-boiler, which representation is, by reason of the lengthiness of the device in comparison to its diameter or width, delineated in broken lengths or sections to permit of the illustration of its construction on a satisfactory scale; Fig. 2, a transverse section taken upon dotted line *x x*, Fig. 1, and looking toward the external disk-like face of the enlarged body portion of my tool; and Fig. 3 is a transverse section taken at dotted line *y y*, Fig. 1, and looking toward the rear of the interior portion of the apertured body.

Like letters and figures of reference denote corresponding parts throughout the views of the drawings.

The object of my invention is, the production of a tool of novel, useful, and effective construction peculiarly adapted for the removal of scale from boiler tubes or flues while the same are in position within the boiler.

For the attainment thereof my invention consists in the novel features of construction, arrangement, operation and adaptation hereinafter described, and specifically enumerated in the annexed claims.

Referring to the accompanying drawings illustrative of my hammer flue-cleaner, A denotes the open cylindrical body whereto is pivoted the hammer arm or lever B; said body being somewhat elongated lengthwise, and comprising the circular or disk-like heads 1, 2, connected by longitudinal bars *a*, *a'*, disposed about the periphery substantially equi-distant apart, thereby creating between them elongated openings *b*, *b'*; which bars, of segment shape in cross-section, are so dis-

posed that two (the upper ones) lie facing each other, while the remaining bar *a'* lies at the bottom and at a spot coinciding to a vertical line drawn midway the opposite-standing upper bars hereinbefore mentioned.

At *c* I designate a vertical slot or opening formed centrally in the upper portion of the forward head 1 of the body A, through which passes and is there journaled the lengthy hammer arm or lever B before referred to; a pivot-pin *d* standing across the opening and penetrating the head at either side suitably supporting the swinging hammer arm. The exceedingly lengthy portion of the hammer arm extending taperingly forward from the front head 1 of the body terminates in a hammer *e*, preferably of semi-globular shape, and leaving upwardly a straight or slightly rounded edge, practically lineal with the upper straight edge of the arm or lever whereof it is an integral part. The much shorter rearwardly extended portion of the hammer-arm gradually tapers toward its end and there terminating in the tip *f* having a lower straight edge. By preference the sides of the horizontally extended hammer-arm are flat, and in cross-section said arm is of substantially uniform thickness.

C represents the actuating spring (in a certain direction) of the hammer member, said elongated spring plate being firmly secured at its butt end to the interior of the body A by means of bolts *g* connecting same to the inner face of the lower located bar portion *a'* of said body, from whence, extending slightly curvilinear, it passes out through the head 1 by means of the horizontal lower opening *h* therein, and continues, gradually decreasing in thickness, forwardly outward some considerable distance, its extremity abutting the under edge of the hammer arm or lever contiguous the protuberance constituting the hammer, which spring-plate of steel is, by choice, of a width much greater than that of the hammer-arm it operates upon; and, referring to said arm, I find it advisable in order to attain essential sweep and stroke thereof within the circumscribed limits of its action, that its forward portion extending longitudinally out from the body A should be about double the length of the rear portion lying within said body.

Passing centrally through the head portion 2 and the rearwardly protruding neck or boss 3 thereof is a cylindrical shaft or rod D, the forward extremity whereof stands out a moderate degree from the inner disk-like face of aforementioned rear head of the body A, and upon said outstanding end there is keyed a cam E, preferably a double cam as illustrated, although, if desired, obviously a single cam with one curvilinear actuating portion in lieu of the two wing-members forming the double cam, may be employed.

Normally the tip of the hammer-arm bears lightly upon a central portion of the cam's edge substantially midway its extended portions, the hammer arm and hammer practically occupying the position shown in the drawings. However, if the cam is so turned as to impel the tip end outward evidently there would be a change in position of the hammer arm and hammer.

The rotating shaft D actuating the cam E extends horizontally rearward from the body A some considerable distance—in fact is sufficiently elongated to insure of a moderate portion of the rear termination lying outside the front end of a boiler tube when my tool is so disposed with relation to the tube as to admit of its hammer operating at the farthest extremity thereof.

F, F, denote lengths or sections of pipes inclosing in non-contact the shaft D from where it enters the neck 3 of the body to a point invariably located slightly beyond the front end of the boiler tube being operated on by my flue cleaning tool; preferably connected lengths of gas pipe being utilized; say one length to start with, and further lengths being added thereto from time to time as the shaft, body, hammer, &c., penetrates rearwardly from the front of the flue or tube being operated on.

The end of the neck or boss 3 of the body A is threaded, as are also the ends of the pipe length or lengths F; which pipes are respectively united together by interiorly threaded couplings 4, one of which unites the threaded neck 3 of the body A to the contiguous pipe length.

Screwed to the outer end of the outermost pipe F is a cap 5 having a circular central opening through which passes loosely the hammer operating-shaft D.

Secured to the outer length of pipe F between the contiguous end of the flue or tube of the boiler and the cap 5 is a double-handled clip-bar G, the segment-like shaft inclosing parts of the two handle members  $i, i'$ , overlapping at the sides of said shaft and connected together—the two parts—by bolts  $k, k'$ ; said clip portion being so firmly secured to the periphery of the pipe F that a thorough grasp is attained.

The manipulating bar G is calculated, when properly manipulated in the hands of an operator, to rotate or turn the united pipe lengths F and forward body A and operative

mechanism thereat within the interior of the boiler flue, as desired.

Removably hung upon the shaft D just outside of the cap 5 terminating the outward projection of the pipe length F, there is a skeleton frame H of practically the shape shown, and terminating at its inner lower corner in horizontal handle J adaptable for grasping by a person's hand. This vertically supported frame H, of rectangular shape in side elevation, is provided at its upper portion with circular apertures  $l, l'$  formed lineally in the front and rear uprights of the skeleton frame, and the shaft D extending through them proper supporting of said frame is accomplished.

The apertures  $l, l'$  are of sufficiently greater diameter than the shaft D as to permit of the ready sliding along the shaft, as required, of the frame H, as well as insuring such freedom that the rotation of said shaft will not effect the position of the frame normally remaining vertical.

Within the frame H, and standing centrally and transversely to the shaft, are two gears, meshing one with the other, the small upper one L being mounted longitudinally movable on the hammer operating shaft D, while the underneath large gear M is mounted on a shaft 6 supported by bearings in the frame, to the outer or forward end there being secured an operating handle bar N having a handle 7, by the turning whereof the large gear revolves imparting motion to the small companion gear and the shaft D whereto it is secured.

The hub of the upper gear L is provided with a set-screw  $m$  for securing the gear firmly to the shaft D. To permit of the sliding of the frame H forward or rearward along said shaft and concurrently its gearing, all that is requisite is the loosening of the set-screw  $m$  of the hub of the small gear from impingement with the shaft D; the frame then being slid along to desired location on the shaft and the set-screw tightened, again securing said gear thereto in operative relation. The large gear is secured firmly to its gudgeon by a set-screw (or spline)  $n$ .

P indicates (by dotted work) a section of the flue or tube of a boiler, and is shown for exemplifying with exceeding clearness the application of my tool (or machine) for the purposes it is particularly designed and adapted for.

By the turning of the handle 7 rotation is, through the intermediate means, imparted to the cam E in the body A, the cam by its action on the arm or lever of the hammer intermittently impelling the hammer toward that side of the inner periphery of the boiler flue lying antagonistic to the normal position delineated in the drawings, the hammer arm in said travel crowding against and impelling the spring-plate C in the direction said arm is moving, and then as quickly as the tip end of the arm is freed from and clears a pro-

tuberant pressing part of the cam, the spring-plate flies back to its normal attitude carrying with rapidity in like direction the hammer-arm and hammer, the sharp and sudden impact of the hammer against the contiguous inner surface of the boiler flue causing through the concussion resultant the loosening and dislodgement of the scale on the outside of the flue at and adjacent where the blow or blows were struck interiorly. From time to time during the penetration of the striking hammer, &c., along the interior of the flue, the proper extension of the pipe or sleeve F is attained by the adding of requisite lengths.

To change circumferentially the position of the hammer within the boiler flue, the united pipe sections F are turned, as desirable, through proper working by the hands of the clip-bar G.

Evidently, as the actuating rod D gradually penetrates farther and farther into the boiler flue or tube it is essential that from time to time the sliding frame H with its gearing should be moved varying degrees along the shaft D in the direction of its outer end.

The purpose of the handle J of the frame is, through retention by an operator's hand, to insure proper upholding and steadying of both shaft and other parts, and particularly the steadying of the frame H and throwing same into varying inclinations with respect to its cylindrical support D.

The practically incessant rapping upon the interior surface of a boiler flue through the hammer blows causes such jarring and vibration of the metal as to invariably loosen the scale adhering to the exterior of the flue, which scale dropping to the bottom of the boiler is readily removed by means of access thereto through the hand-holes of the boiler. That concurrently it clears the soot from the interior of the tubes or flues operated on is obvious.

Through the employment of my tool (or machine) which absolutely clears the flues from scale while they are in position within the

boiler, an important and advantageous result is attained, my invention obviating the necessity of employing non-satisfactory compounds for intended removal of scale or prevention of its formation, or the crude means now usually employed for removing scale mechanically, *i. e.*, removal of the tubes from the boiler, then rapping them with a hammer, and replacing same in position again by the welding of the tube ends and resetting in the boiler, all a matter of annoyance and expense.

That the use of my device will necessarily insure a direct saving of fuel from the fact that its employment twice or thrice a year for the removal of scale from the tubes is sufficient, may readily be understood.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a flue-cleaning machine adapted for operating on a tube or tubes disposed within a steam boiler, a hammer operating mechanism, an advance body whereto the hammer arm is pivoted, an elongated shaft working a member adapted to carry the hammer in one direction, a tubing loosely encompassing the shaft aforesaid, and suitable means for rotating exteriorly of the boiler the shaft working a portion of the hammer actuating mechanism, substantially as described.

2. A boiler flue-cleaning device adapted by hammer - blows to remove the scale from boiler tubes while same are mounted in the boiler, comprising a hammer, a spring, a cam, an elongated cam-rotating shaft leading from the body portion through tubing to a point exteriorly the boiler, and adjustable gearing for rotating aforesaid shaft, and means for impelling the advance of the hammer within a boiler-tube, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 18th day of June, 1894.

WILLIAM H. TEBEAU. [L. s.]

Witnesses:

WM. C. RAYMOND,  
E. KANKEMOELLER.