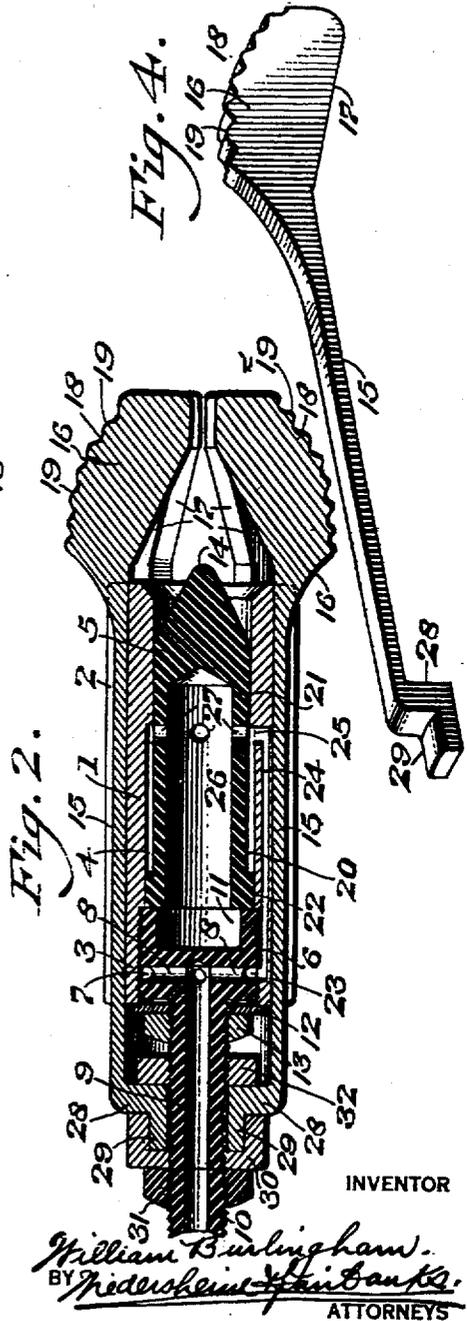
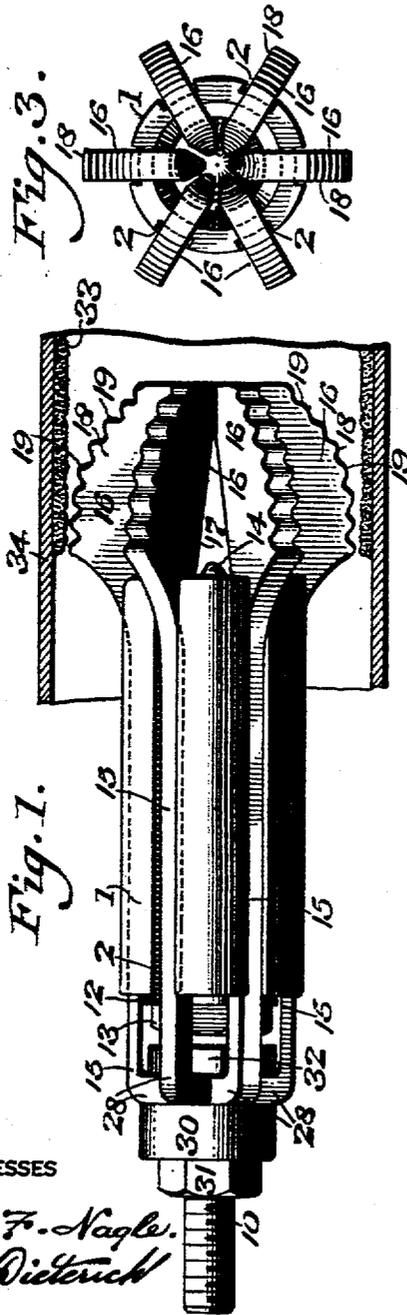


W. BURLINGHAM.
 PERCUSSIVE BOILER TUBE CLEANER.
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PERCUSSIVE BOILER-TUBE CLEANER.

1,151,510.

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To all whom it may concern:

Be it known that I, WILLIAM BURLINGHAM, a citizen of the United States, residing at Newport News, county of Warwick, State of Virginia, have invented a new and useful Percussive Boiler-Tube Cleaner, of which the following is a specification.

My invention consists of a novel construction of a percussive boiler tube or flue cleaner, in which a plurality of independent or removable cutting blades are adapted to be radially spread or otherwise vibrated within a tube or flue to loosen and remove deposits of scale from the inner or outer sides thereof, said blades being adapted to extend substantially the entire length of the body or barrel of the tool and being located in longitudinal grooves in said body and provided with offset portions and clamping devices located beyond the rear extremity of the tool so that in case of breakage, anyone of said blades can be readily replaced.

It further consists of a novel construction of resilient shank having at one end thereof an offset portion with a terminal tongue whereby the vibratory blade is enabled to be secured in the desired position, the opposite end of said shank having secured thereto the cutting or scale removing devices having the externally and internally converging walls.

It further consists of a novel construction of a body or barrel of a pneumatic tool having longitudinally extending grooves therein adapted for the reception of the resilient shanks of the cutting blades, the outer ends of said shanks being free to vibrate and the inner ends of said shanks being rigidly secured in position near the inner end of the tool, whereby said cutting blades are adapted to move outwardly by the impact of the reciprocating piston therewith, while their inward movement or retraction to normal position is effected by the resiliency of the shanks to which said blades are attached, means being also provided for enabling the loosened and comminuted scale, which is removed by the action of my novel implement, to be blown out from the end of said tube or flue by the exhausted motive fluid from the plunger cylinder.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my inven-

tion, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same will give in practice satisfactory and reliable results.

Figure 1 represents a side elevation of my novel construction of percussive flue cleaner, illustrating in section a portion of a flue in which the latter is operated. Fig. 2 represents a longitudinal, sectional view of the cleaner. Fig. 3 represents an end view of Fig. 1. Fig. 4 represents a perspective view of one of the vibratory blades of the cleaner removed.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 indicates the body, barrel or casing of a percussion tool having a series of longitudinal grooves 2 in its cylindrical wall, and an axial bore having a screw-threaded portion 3, a large-diameter plunger cylinder 4, and a small-diameter cylindrical plunger 5 operating through it. A threaded head 6 is secured in the threaded widened portion of the bore, and has a peripheral channel 7, communicating by radial channels 8, with an axial bore 9 in the head, and with an externally screw-threaded inlet pipe 10. The forward end face of said head is preferably formed with a cup or recess 11. A disk 12 fits upon the threaded pipe 10 and is clamped against the upper end of the body 1 by a nut 13, upon the threaded pipe, and said pipe is connected in any suitable way to a supply of fluid under pressure, such as compressed air, steam or other motive fluid controlled by a valve, (not shown).

The walls of the longitudinal grooves 2 in the outer periphery of the barrel support the resilient shanks 15 of the independent, detachable or removable cutting or impact blades 16, having converging inner edges 17, and converging outer impact heads 18, having the faces or edges, which are formed with transverse serrations or teeth 19, or similar cutting projections, and extending to converge over the lower or outer end of the barrel. A plunger 20 is reciprocable in the plunger cylinder, and has a small-diameter piston 21 fitting the small-diameter plunger cylinder and a large-diameter piston 23 at its upper end and reciprocable in the large-diameter plunger cylinder. A port 23 in the threaded portion of the bore of the barrel communicates with the peripheral

channel in the head 6 and connects through a passage 24 and port 25 with the lower end of the large-diameter plunger cylinder. The lower end 14 of the plunger is tapering and fits between the converging inner edges of the cutting or impact blades.

The plunger has an axial chamber 26, having its upper end open, and ports 27 through its side and uncovered in the large-diameter plunger cylinder when the plunger is in the uppermost position. The ends of the shanks of the cutting blades are offset or bent inwardly at 28, and rearward to form tongues 29, whose outer faces are convex and are held within a flanged cap 30 secured upon the inlet-pipe by a nut 31, which clamps the offset portions of the shanks of the cutting blades against the nut 32 upon the inlet-pipe 10.

The percussive tool is here illustrated as of the well-known "Chouteau" valveless type, but may be of any other convenient construction, wherein the hammering piston or plunger is rapidly reciprocated. The motive fluid flows through the inlet-pipe and the channels in the screw-threaded head to the channel opening into the lower or forward end of the large-diameter cylinder and through the ports in the plunger into the chamber in the same to expand and force the plunger downward to cause the tapering end 14 thereof to strike the inner oblique edges 17 of the cutting or impact blades, expanding the latter with great rapidity against the scale or deposits 33 in the tube or flues 34, so as to cut or chip the former with the outer teeth or projections. When the ports in the plunger are uncovered at the extremity of the down-stroke, the air behind the plunger and in its chamber flows out between the blades, and the inlet air flows from below against the face of the large piston and returns the plunger upward. The exhaust air blows into the boiler flue and removes the chipped scale or deposit at the end of the same. As the entire tool is comparatively short, it can be employed in flues of considerable curvature, and the cutting blades strike very rapid and short blows upon the deposits and disintegrate the same and knock them from the exterior or interior of the flue.

External scales or deposits upon a flue can be dislodged by the blades from the inside of the flue, the serrations 18 being dispensed with, if desired, under such conditions.

The spring shanks 15 of the vibrating cutting or impact blades are of sufficient resiliency to cause the blades to spring inwardly toward the axis of the tool, when the tapering end of the rapidly reciprocating plunger is returned from between their converging edges, and the impact of the tapering end of the plunger causes the impact

blades to vibrate with great rapidity, their teeth striking and chipping or dislodging the scale or deposits, as they spring outwardly. As the spaces between the outer portions of the blades are proportionately wide, the detritus removed from the interior of the flue has sufficient room to enable it to be easily blown out of the flue by the exhausting motive fluid.

If the blades, their shanks or their offset tongues break or lose their elasticity, the rear nut 31 can be unscrewed and the cap 30 moved from the tongues of said shanks, when any or all of the resilient hammering blades are readily accessible and can be removed and replaced without dismantling or disturbing any other elements of the device.

By making the outer surfaces of the impact heads 18 to converge inwardly, it will be apparent that the device can readily be inserted and propelled along within the tube or flue which it is desired to clean.

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

1. In a percussive tube or flue cleaner, the combination of a body, a reciprocating piston therein, and independent and separately removable impact blades having converging outer faces supported within longitudinally extending grooves in said body, said piston and the inner faces of said blades having coating inclined surfaces, and said blades being of greater length than said body.

2. In a percussive tube or flue cleaner, a body having grooves in its periphery, independent and separately removable impact blades of greater length than said body, and having resilient shanks supported in said grooves, means inclosing and securing the inner ends of said shanks to said body, and a freely reciprocating plunger to expand and rapidly vibrate the outer or free ends of said blades.

3. In a boiler flue cleaner, a body having grooves in its periphery extending the length thereof, a hammering plunger reciprocable within said body, and independent and separately removable cutting blades radially supported in said grooves upon said body and having outer converging faces formed with transverse cutting projections and having inner converging faces adapted to receive the impact of such reciprocating plunger.

4. In a percussive tube or flue cleaner of the character stated, a body formed with longitudinally extending grooves in its outer surface, a hammering plunger reciprocable within said body, independent and separately removable cutters having resilient shanks located in said grooves and having one of their ends removably secured to the rear end of said body, said cutters projecting beyond the forward end of said body

and adapted to be engaged and rapidly vibrated by the reciprocations of said plunger, said resilient shanks effecting the retraction of said blades.

5 5. In a percussive tube or flue cleaner, a body, a hammering plunger reciprocable in said body, a screw-threaded inlet pipe extending from the upper end of said body, resilient cutters having shanks with offset
10 inner ends formed with tongues bearing against said inlet pipe, a flanged cap upon said inlet pipe and having its flange overlapping the tongues of said shanks, and a

nut upon said pipe and bearing against said cap.

15 6. In a percussive tube or flue cleaner, a detachable impact blade, comprising an offset end having a terminal tongue, an intermediate resilient shank, and an impact head having an inclined inner face and a serrated
20 outer cutting face.

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."