

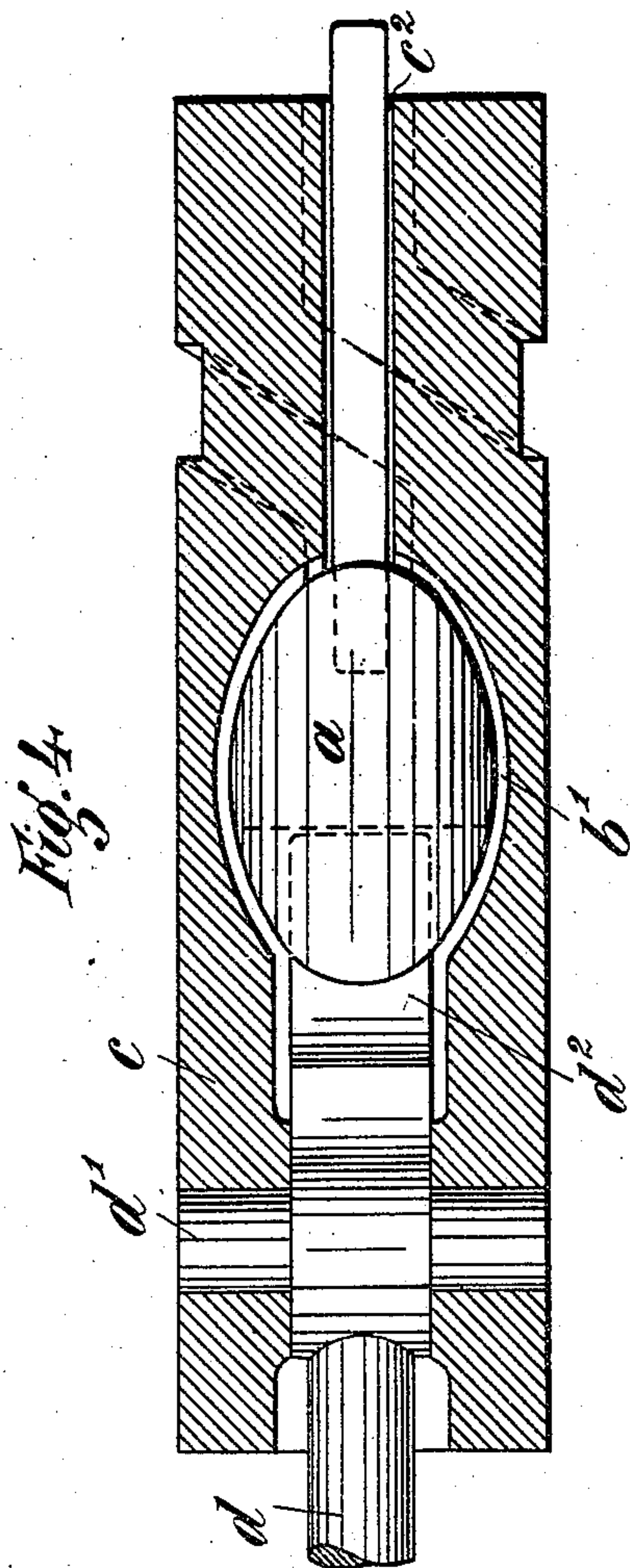
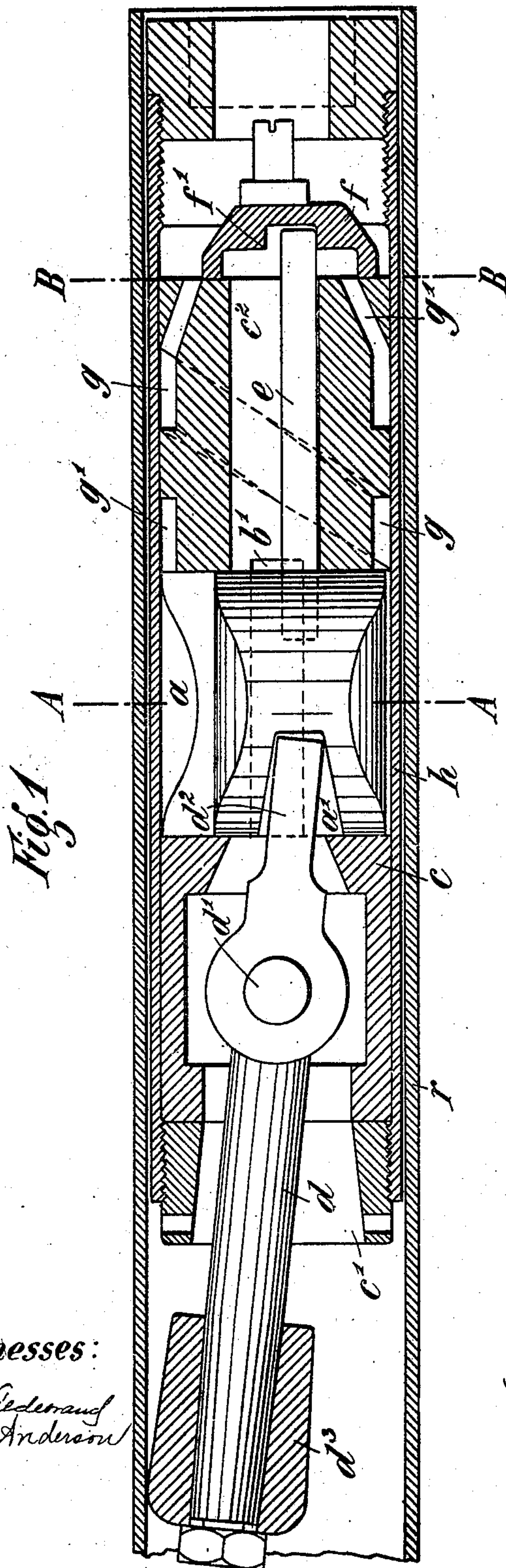
No. 847,335.

PATENTED MAR. 19, 1907.

E. HEUBACH.  
TUBE CLEANER.

APPLICATION FILED DEC. 16, 1904.

2 SHEETS—SHEET 1.



Witnesses:  
E. O. Niederauf  
M. F. Anderson

Inventor:  
Ernst Heubach  
by Georgii Massie  
Attorney

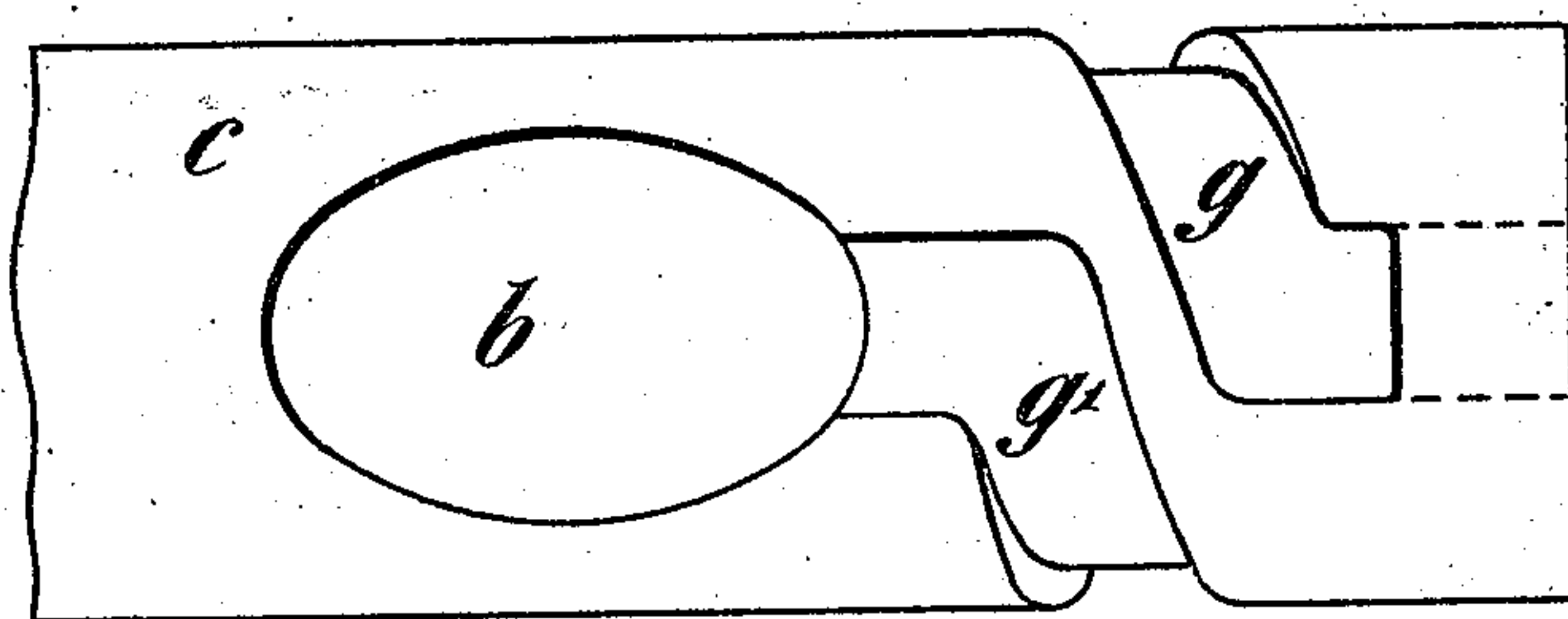
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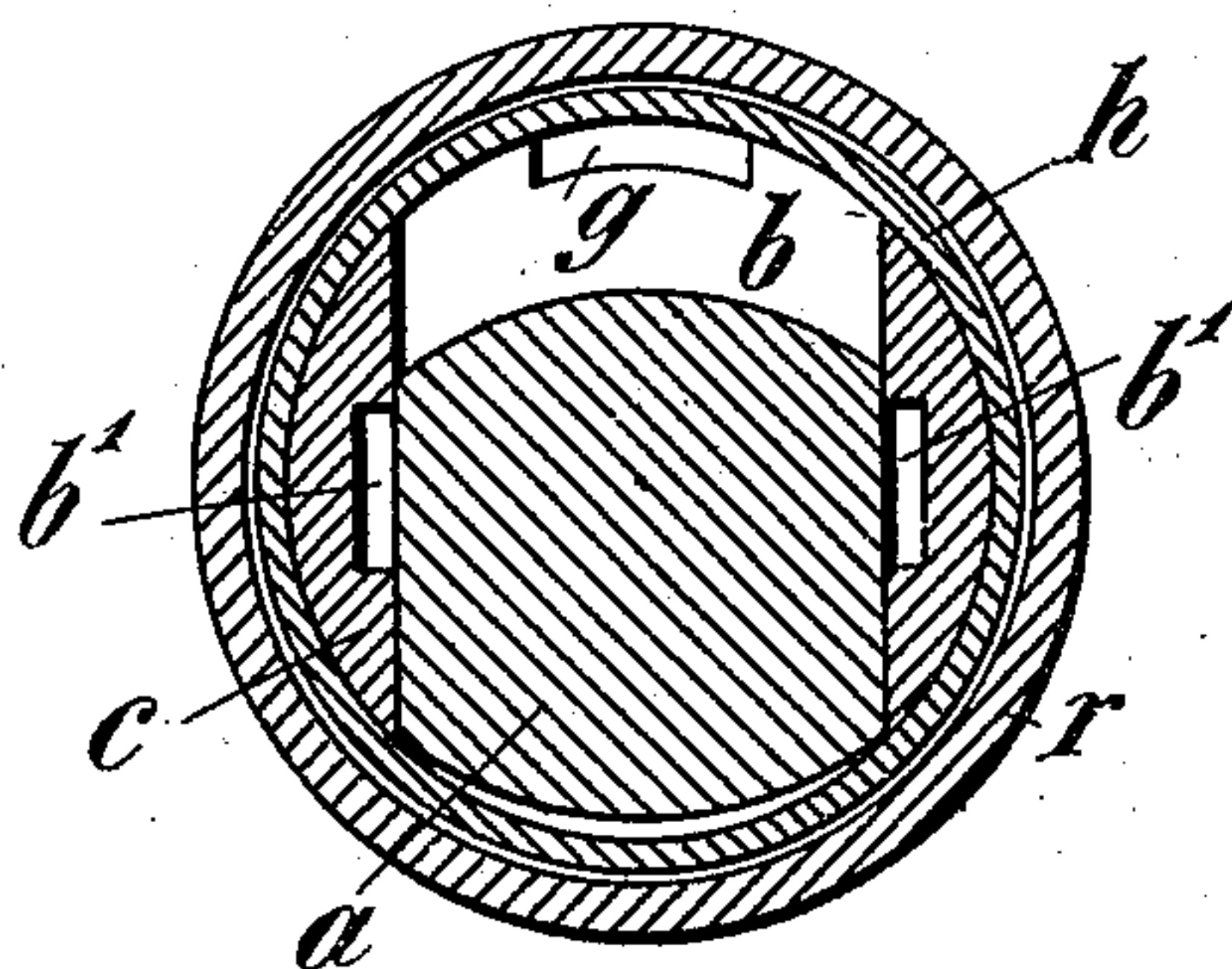
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2 SHEETS—SHEET 2.

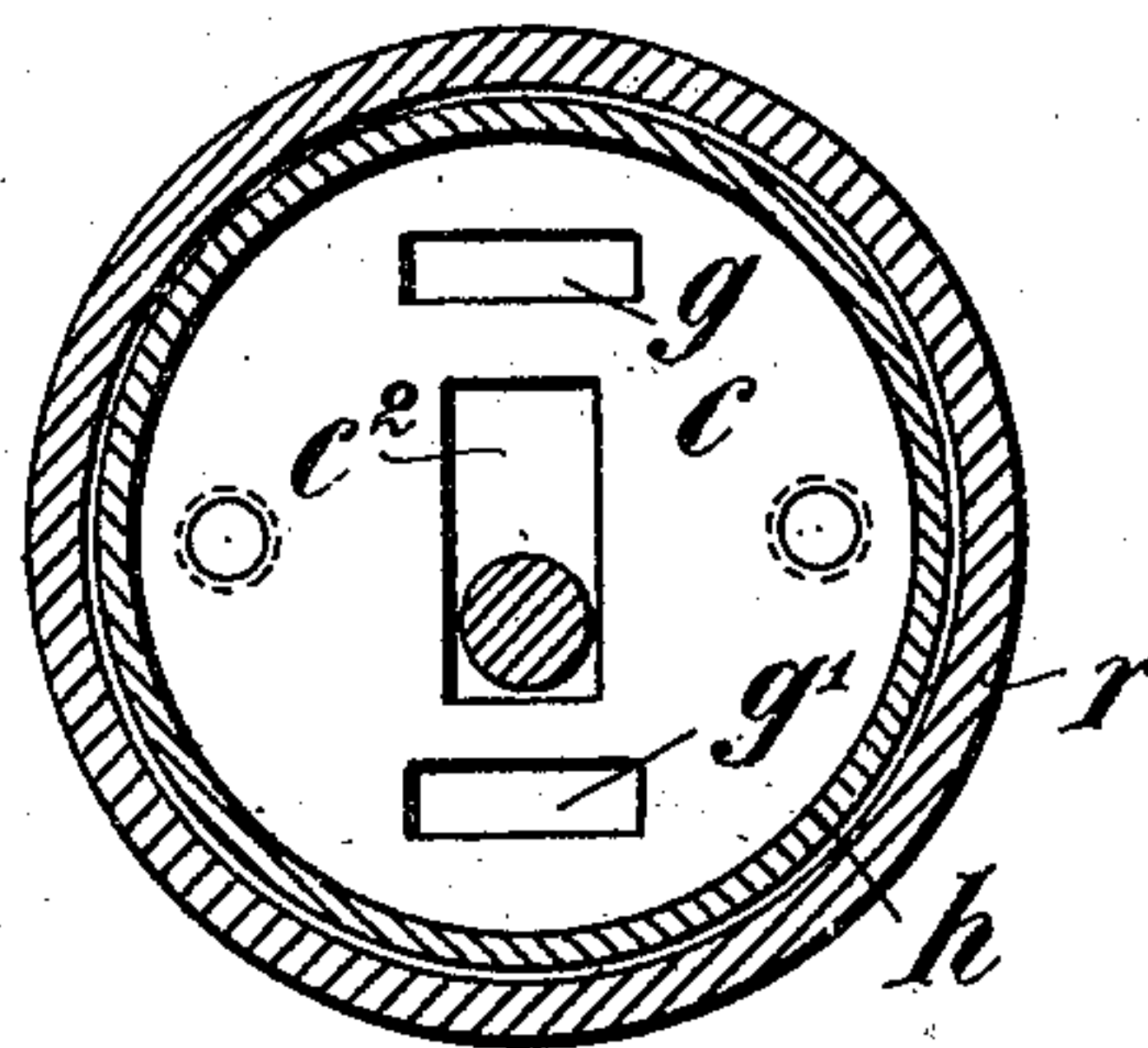
*Fig. 5*



*Fig. 2*



*Fig. 3*



*Witnesses:*

*E. O. Hildebrand*  
*M. F. Anderson*

*Inventor:*

*Ernst Heubach*  
*by Georgii Massie*  
*Attorney*



# UNITED STATES PATENT OFFICE.

ERNST HEUBACH, OF BERLIN, GERMANY, ASSIGNOR TO BENNO HERMAN,  
OF DETROIT, MICHIGAN.

## TUBE-CLEANER.

No. 847,335.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed December 16, 1904. Serial No. 237,139.

*To all whom it may concern:*

Be it known that I, ERNST HEUBACH, engineer, a subject of the Emperor of Germany, and residing at 19 Elisabeth Ufer, Berlin, S. O., Germany, have invented a new and useful Improved Tube-Cleaner for Tubular Boilers, of which the following is a specification.

The present invention relates to a tube-cleaner for tubular boilers.

Tube-cleaners having oscillating hammers as hitherto known can be employed only in the case of tubes having an internal diameter above ninety millimeters—that is, tubes having a comparatively large diameter—whereas in practice boiler-tubes having a smaller diameter than the above principally occur, usually about fifty-one millimeters. The tube-cleaner according to the present invention is an improvement upon those tube-cleaners in which the piston, operated by steam, compressed air, water, or the like, is arranged between the valve-gear and the pivot of the hammer and engages a continuation of the handle of the latter. These tube-cleaners usually employ a piston having a circular cross-section, the transverse dimensions of which cannot exceed a maximum determined by the internal diameter of the tube.

The object of the present invention is an enlargement of the cross-section of the piston in the direction of the axis of the tube, as a limit for the dimensions of the piston does not exist in this direction, and the piston receives an elliptic cross-section instead of the circular cross-section hitherto employed, the major axis lying in the direction of the axis of the tube and the minor axis at right angles to the same.

The accompanying drawings illustrate, by way of example, one embodiment of the present invention.

In said drawings, Figure 1 is a longitudinal section; Fig. 2, a section on the line A A of Fig. 1, and Fig. 3 a section on the line B B of Fig. 1, of a tube-cleaner lying in a tube which is to be cleaned. Figs. 4 and 5 are detail views, Fig. 4 being a part-sectional plan, the plane of section being at right angles to the sectional plane of Fig. 1 through the cylinder for the piston and the body for the bearings for the hammer, and Fig. 5 being a perspective view of part of said body.

In the drawings, *a* is the new elliptic piston, and *b* the cylinder appertaining thereto, which is formed by the middle portion of the body *c*. The hammer *d* is mounted in this body at the front end on pivots *d'*, and a continuation *d<sup>2</sup>* of the handle of the hammer engages in a recess *a'* in the piston *a*, so that a direct engagement of the piston with the hammer is brought about. This engagement takes place also with the utilization of steam, water, or air pressure of no greater intensity than that hitherto employed, but with a greater force than hitherto, because the pressure-surface of the piston is now greater in consequence of its elliptic form. The enlargement of the cross-section of the piston in the direction of the major axis of the ellipse is subjected to no limitation, so that the pressure-surface suffices in any case for all requirements occurring in practice.

A pin *e*, which is rigidly connected with the piston *a* by being screwed into the latter, if desired, extends from the piston *a* through a slot *c<sup>2</sup>* in the back part of the body *c* and reaches into the reversing slide-valve *f* with its free end. On account of the to-and-fro movements of the piston *a* taking place transversely to the axis of the tube *a* the pin *e* is moved to and fro in the slot *c<sup>2</sup>* and strikes at the end of its movement against the slide-valve *f*, so that the latter admits the steam, the compressed water, or the like alternately into the ports *g* and *g'*. These ports run helically round the back part of the body *c*, as can be clearly seen by referring to Figs. 1, 4, and 5.

In the case of the position shown in Fig. 1 the piston *a* has just reached the end of its stroke in the one direction, and shortly before this the pin *e* has engaged the slide-valve *f* and driven it so that the steam or the compressed water can now flow into the port *g*. The result of this is that the return stroke of the piston immediately takes place, whereby the head *b<sup>3</sup>* of the hammer is likewise moved in the opposite direction. Shortly before the piston *a* again reaches the end of its stroke the pin *e* has again struck the slide-valve *f* and reversed the same once more, so that the motive fluid now passes into the port *g'* and acts on the other side of the piston.

The water to be displaced by the piston on its reversal, which water has performed work



during the preceding stroke, is driven back through the admission-port opening into the water-space to the space  $f'$  in the interior of the **D** slide-valve and flows through the slot  $c^2$ , through an annular groove  $b'$ , turned in the cylinder  $b$ , and through the space  $c'$  in the body  $c$ , formed at its front part as a hollow body, and washes out of the tube the pieces of scale knocked off by the hammer.

The water thus removed is simultaneously effective for the relieving of the slide-valve.

The body  $c$  and the valve-gear are accommodated in a casing  $h$ , which is arranged for screwing onto of the pressure-fluid pipe.

What I claim is—

1. In a device of the character described, the combination, with a tubular casing, a cylinder formed therein, an elongated piston arranged within the cylinder with its greater diameter parallel to the axis of the casing and movable transversely of said casing, a valve-chamber formed within the casing, a wall separating the valve-chamber from the cylinder, an arm projecting from the piston and parallel to the axis of the casing, a slide-valve engaged by the arm, and channels for the motive fluid controlled by the valve and extending from one side of the valve-chamber to the opposite extremity of the cylinder.

2. In a device of the character described, the combination, with a tubular casing, a cylinder formed therein with its axis arranged transversely of the axis of the casing, a piston having an elliptical cross-section movably mounted within the cylinder with its major axis parallel to the axis of the casing, a valve-chamber within said casing, a wall separating the valve-chamber from the cylinder, an arm projecting rigidly from the piston at right angles to its line of travel, a slide-valve engaged by the arm, and motive-fluid channels extending helically through the wall from one side of the valve-chamber to the opposite extremity of the cylinder.

3. In a device of the character described, the combination, with a tubular casing, a cyl-

inder formed therein with its axis arranged transversely of the casing, a piston having an elliptical cross-section movably mounted within the cylinder with its major axis parallel to the axis of the casing, a valve-chamber within said casing, a wall separating the valve-chamber from the cylinder, an arm projecting rigidly from the piston at right angles to its line of travel through a slot formed in said wall, a slide-valve engaged by the arm and spanning the slot, motive-fluid channels extending helically through the wall from one side of the valve-chamber to the opposite extremity of the cylinder, and an exhaust-channel extending from the slot around the piston to an exit-port on the opposite side thereof.

4. In a device of the character described, the combination, with a tubular casing, a cylinder formed therein with its axis arranged transversely of the casing, a piston having an elliptical cross-section movably mounted within the cylinder with its major axis parallel to the axis of the casing, a valve-chamber within said casing, a wall separating the valve-chamber from the cylinder, an arm projecting rigidly from the piston at right angles to its line of travel through a slot formed in said wall, a slide-valve engaged by the arm and spanning the slot, motive-fluid channels extending helically through the wall from one side of the valve-chamber to the opposite extremity of the cylinder, an exhaust-channel extending from the slot around the piston to an exit-port on the opposite side thereof, and mechanism mounted in the exhaust-port and actuated by the piston.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNST HEUBACH.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.