

(No Model.)

E. W. VANDUZEN.

BOILER TUBE CLEANER.

No. 330,443.

Patented Nov. 17, 1885.

Fig. 1.

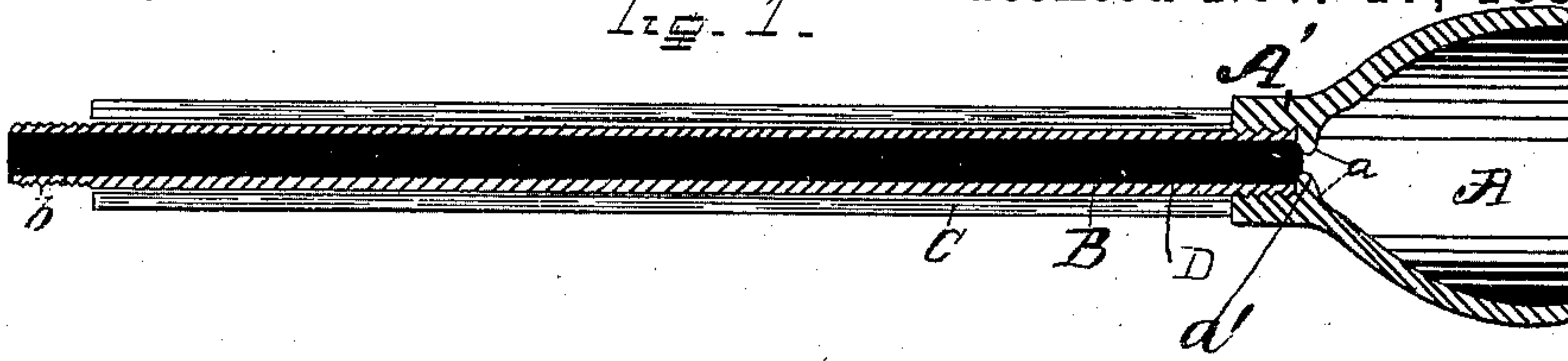


Fig. 2.

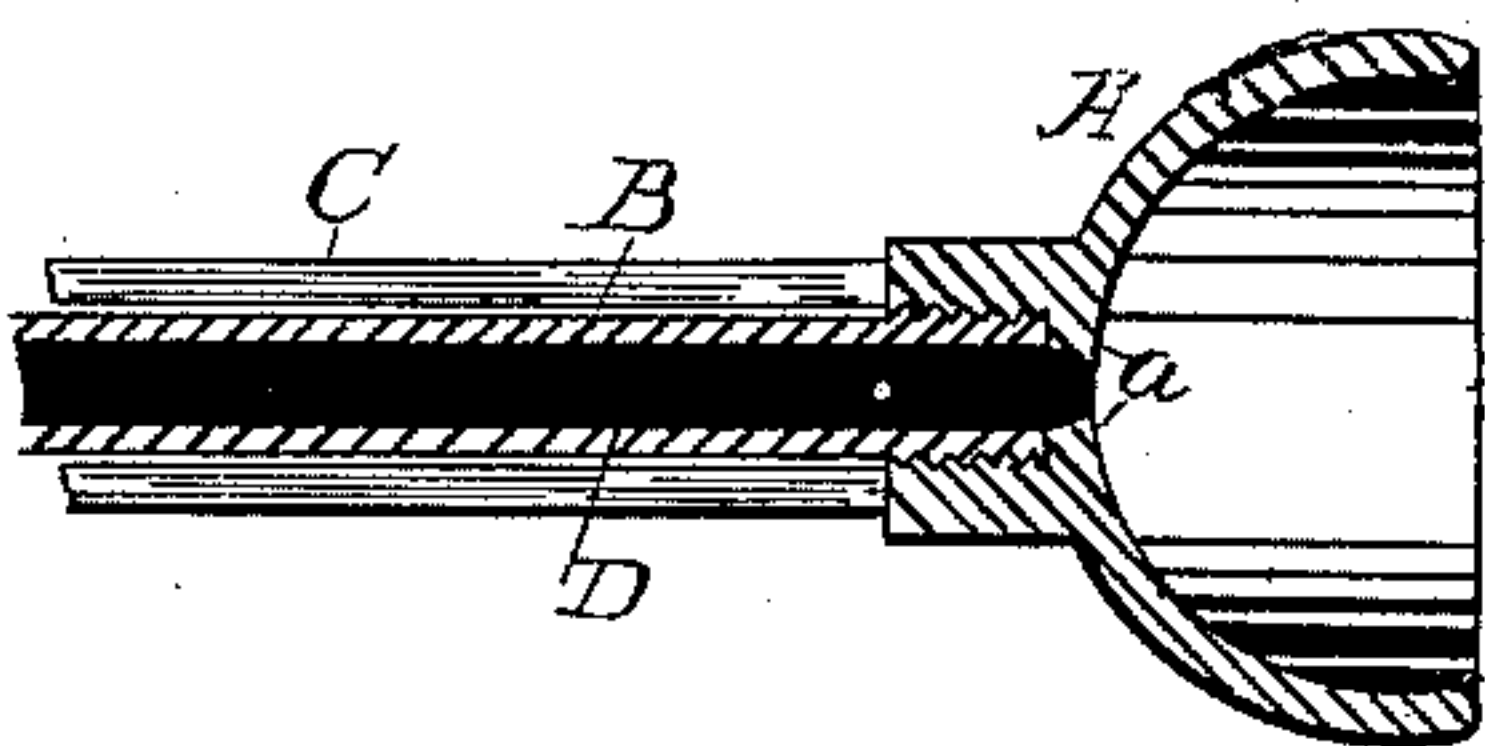


Fig. 3.

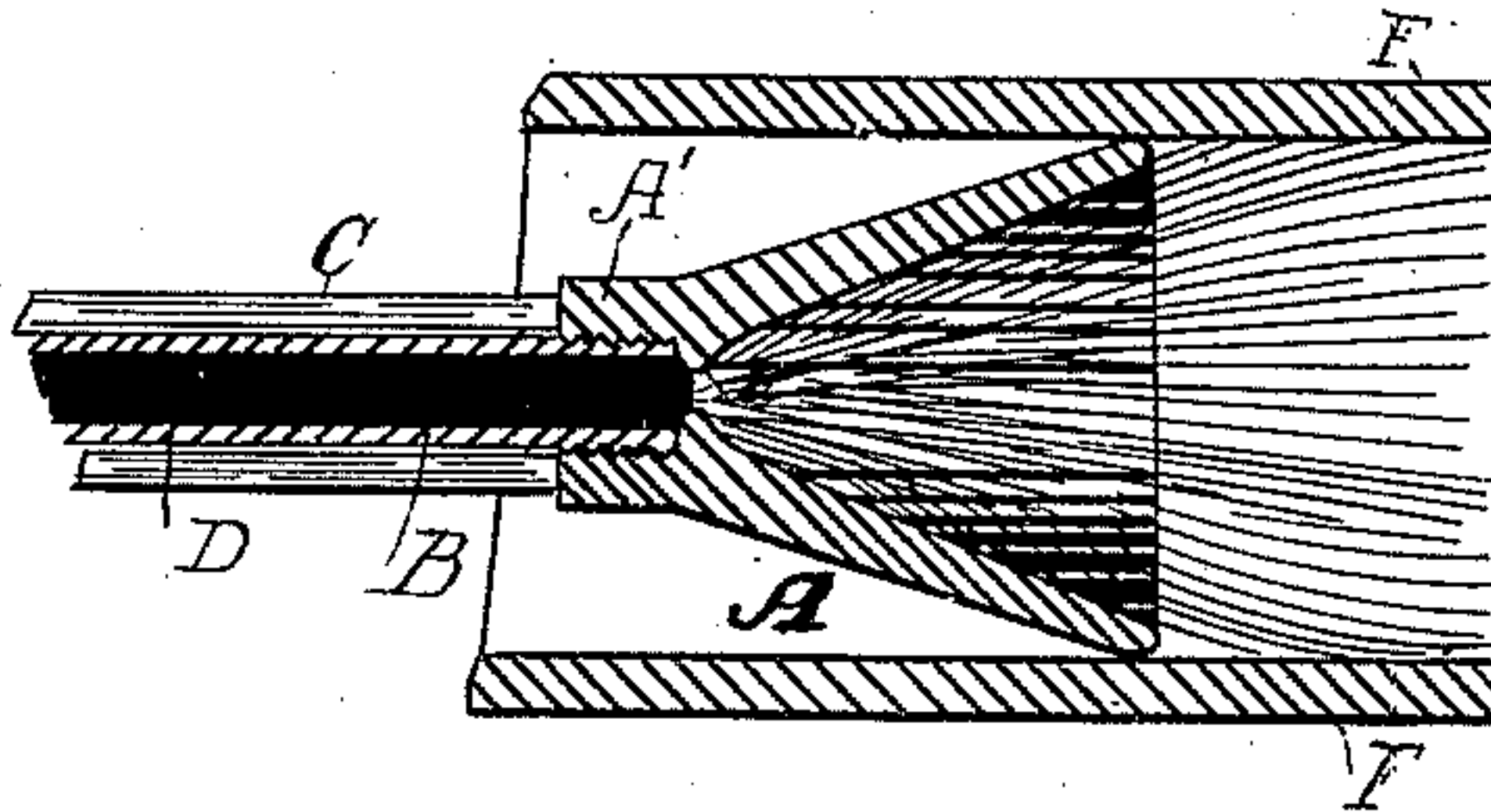


Fig. 4.

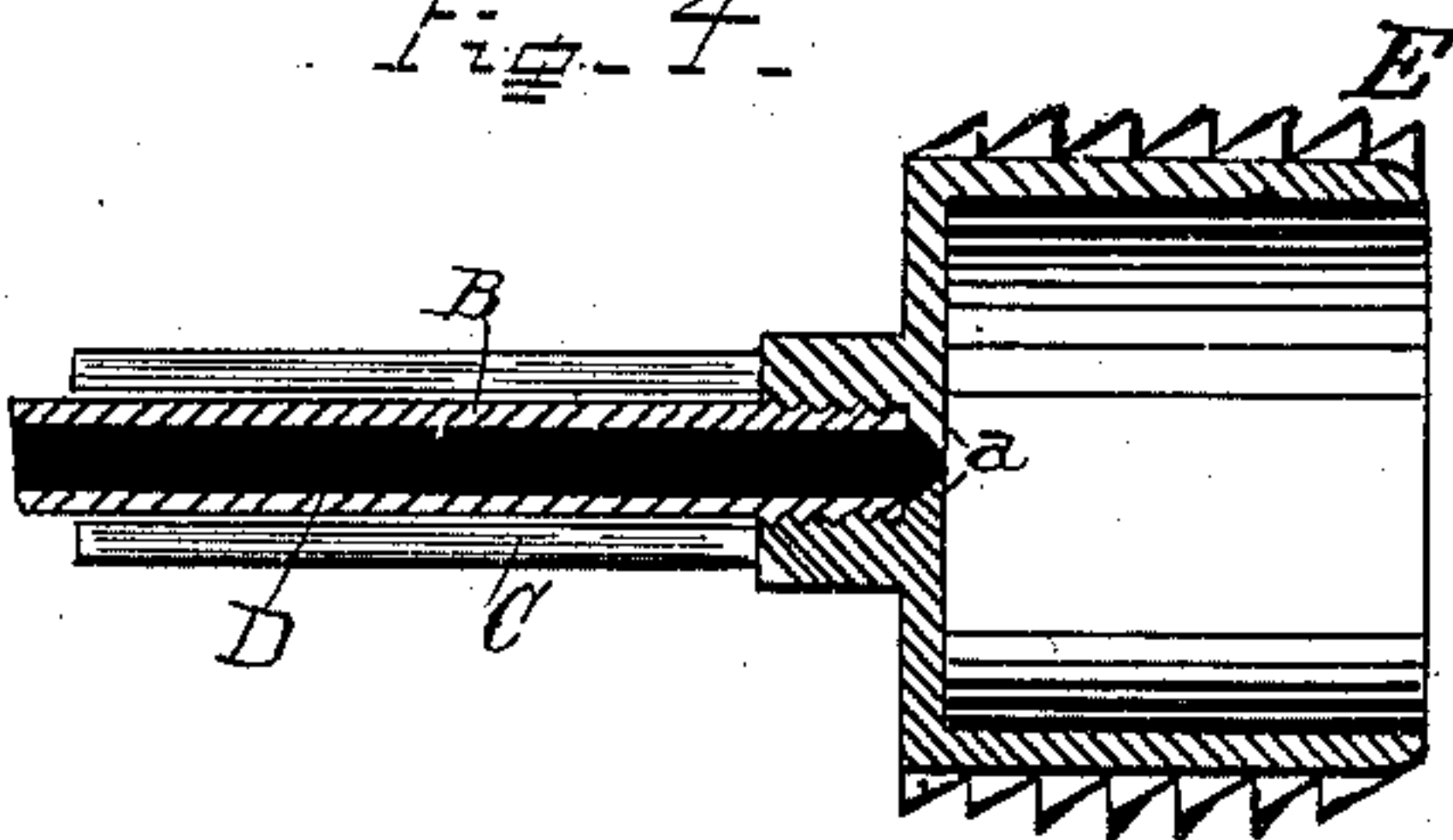


Fig. 5.

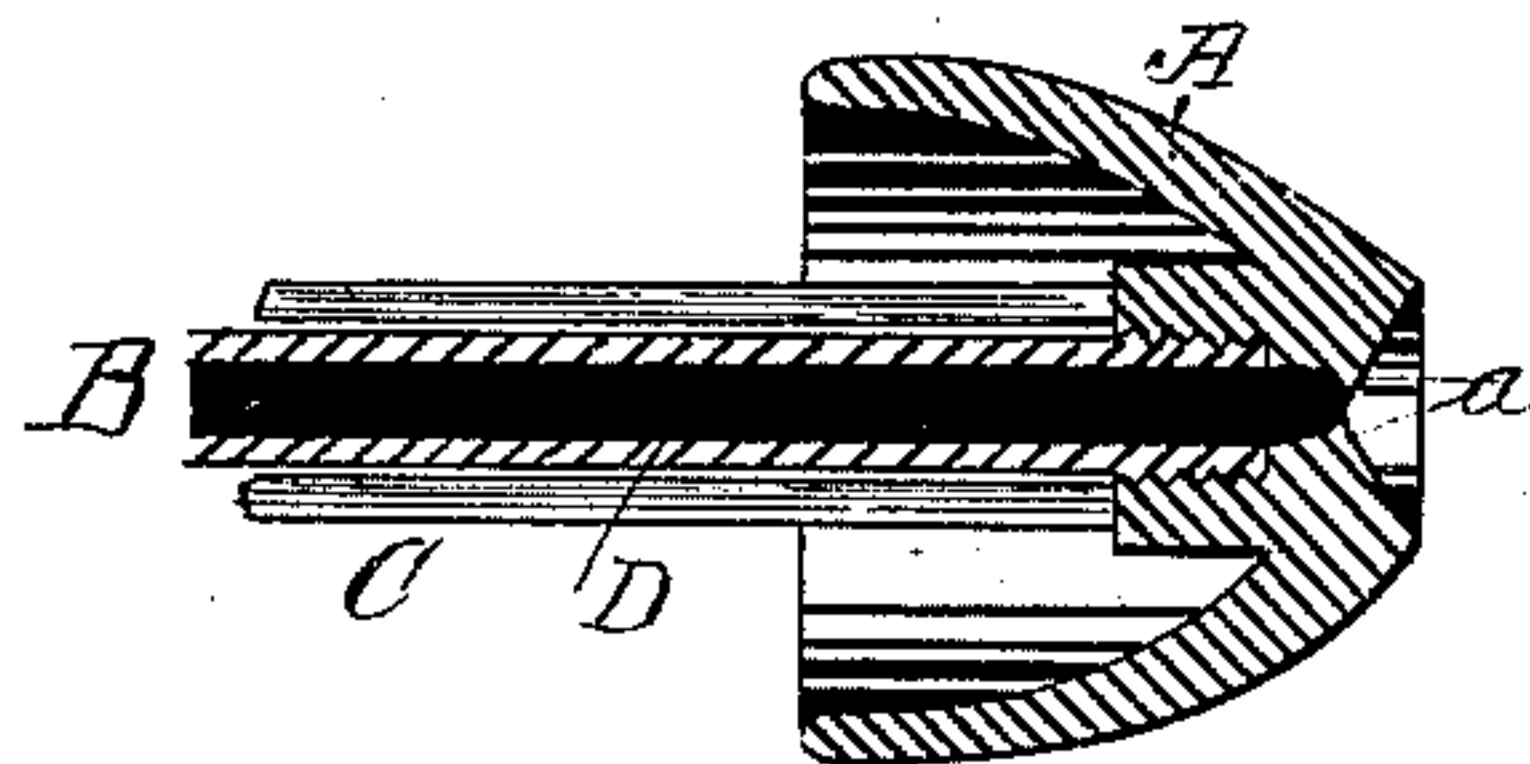


Fig. 6.

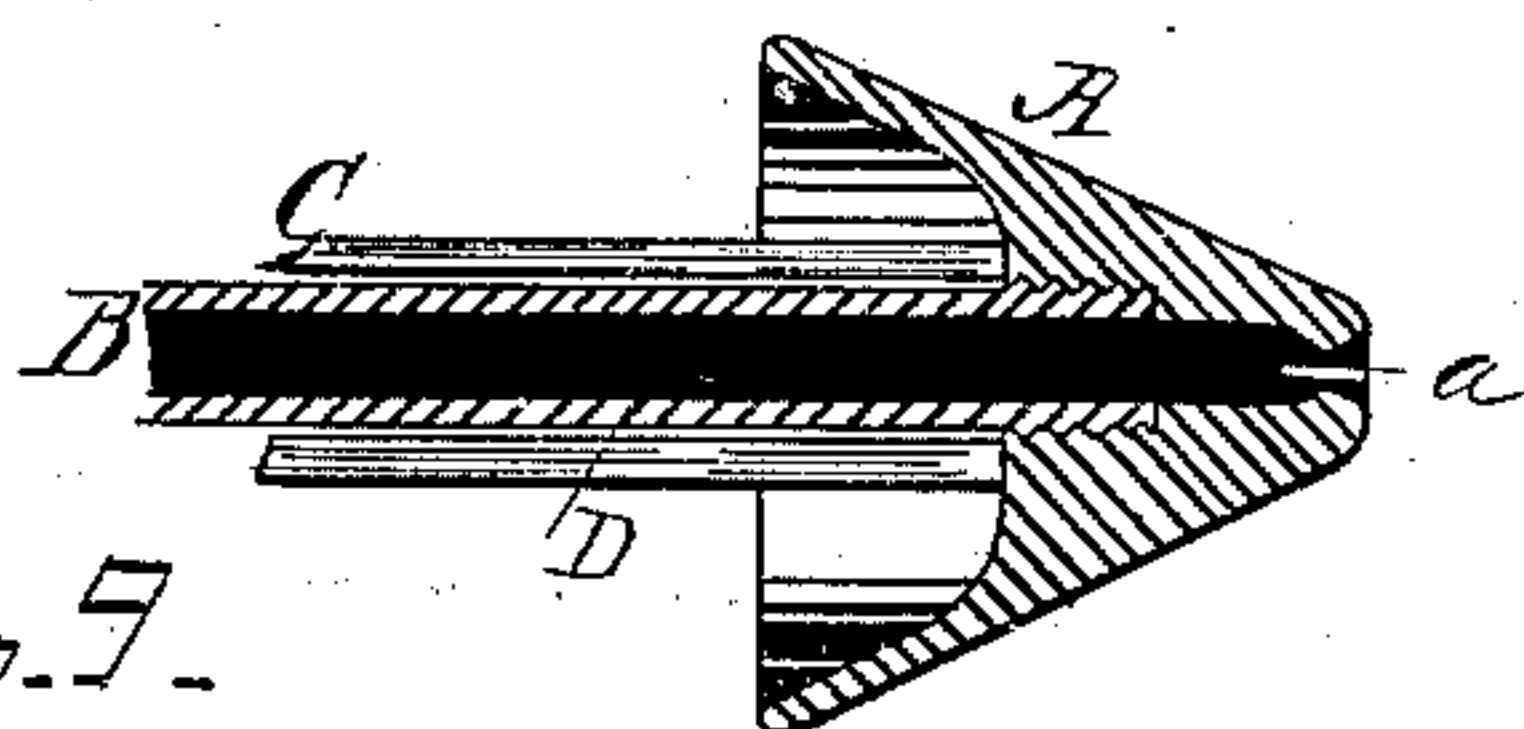


Fig. 7.

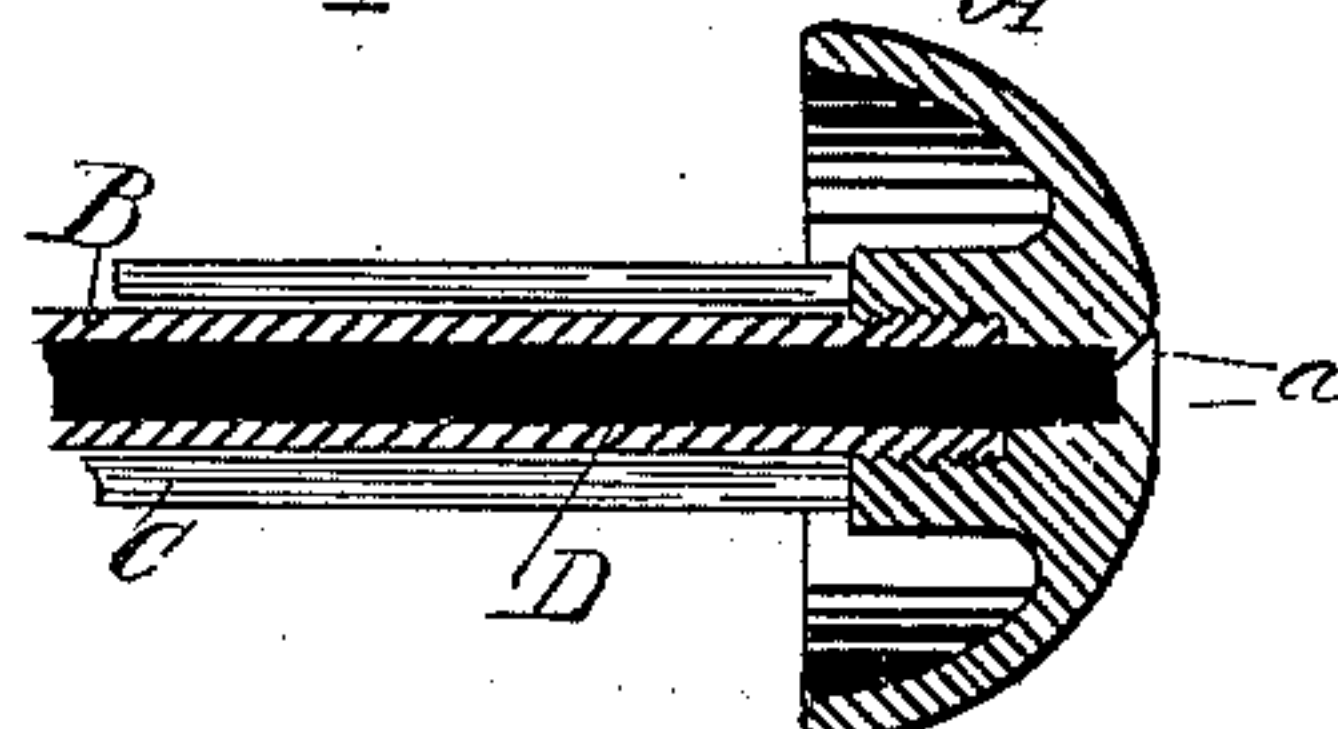


Fig. 8.

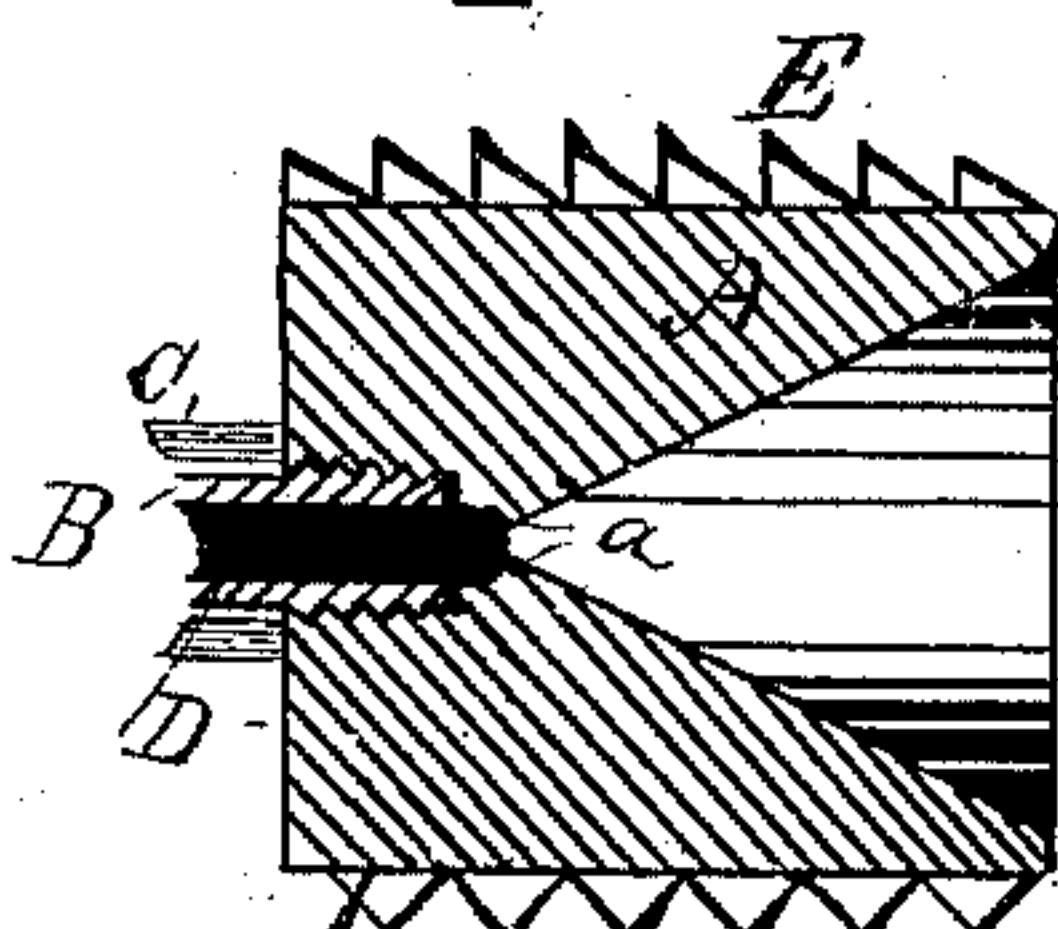
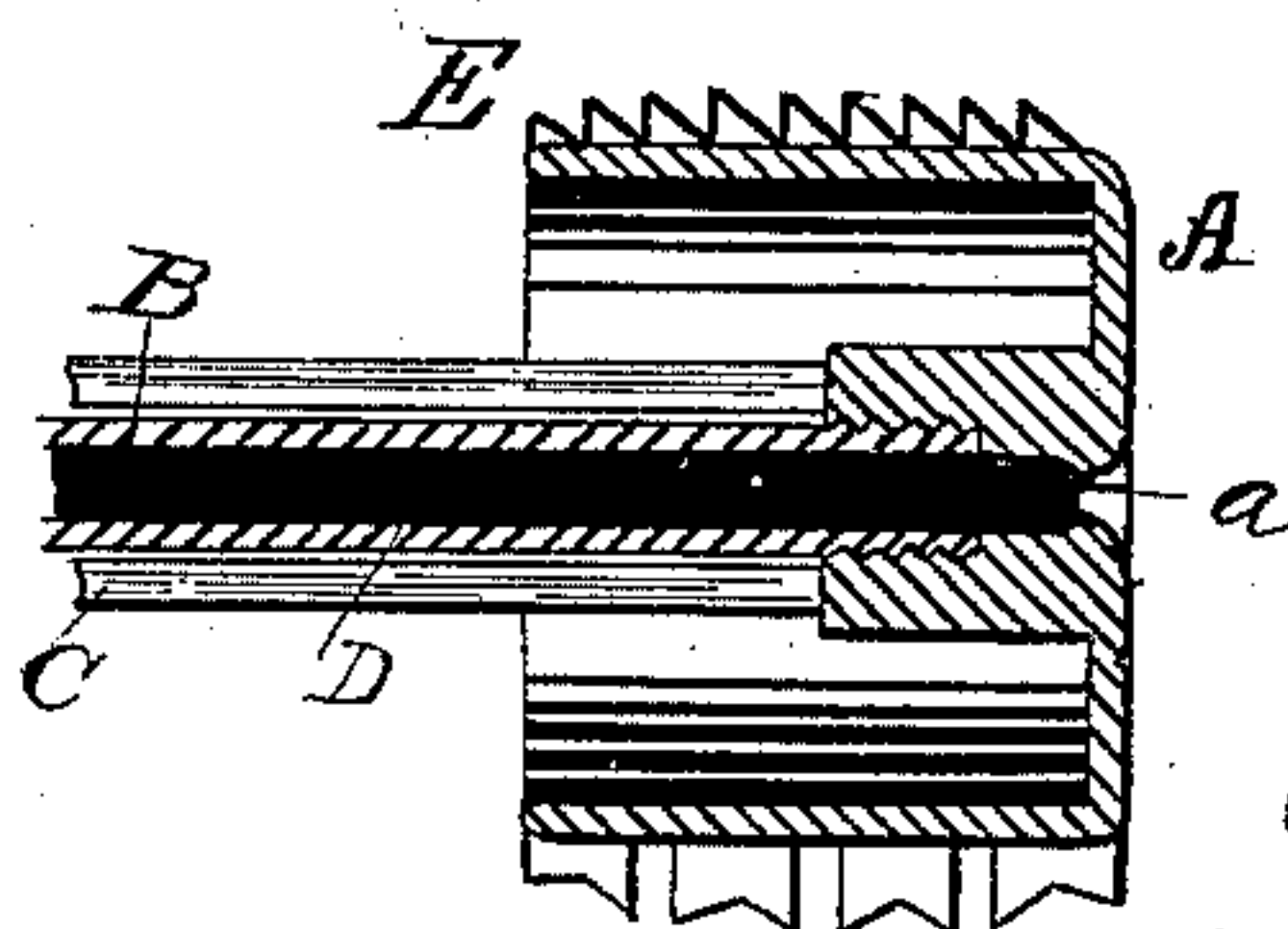


Fig. 9.



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UNITED STATES PATENT OFFICE.

EZRA W. VANDUZEN, OF NEWPORT, KENTUCKY.

BOILER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 330,443, dated November 17, 1885.

Application filed August 8, 1884. Serial No. 139,991. (No model.)

To all whom it may concern:

Be it known that I, EZRA W. VANDUZEN, a resident of the city of Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Boiler-Tube Cleaners, of which the following is a specification.

My invention is designed to provide a device for cleaning boiler flues or tubes thoroughly, quickly, and easily.

The several features of my invention and the advantages arising from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, Figures 1, 2, 4, 5, 6, 7, 8, and 9 represent central longitudinal sections, respectively illustrating certain features of my invention; and Fig. 3 represents a central longitudinal section of a tube-cleaner, illustrating the preferred form of my invention, and showing the cleaner applied to the interior of the tube, and showing the course of the steam through the cleaner and flue.

A indicates the tube-cleaner, which consists in general of an outwardly-extending annular flange or extension of any desired shape, and taking any desired direction, united to a head, A'. This head A' is provided with a thin diaphragm, *a*', and this latter is perforated by an opening, *a*. To the head of the cleaner is connected, by screw-thread or in any other suitable manner, a rigid extension, B, which serves the office of a handle, and preferably, also, for a part or all of its length (as desired) serves as a conduit for the conduction of steam to the opening *a* of the cleaner. This rigid extension is exteriorly covered with any proper substance, C, which is a non-conductor of heat. This non-conducting substance C allows the operator to handle the extension B and successfully operate the cleaner without burning his hands. Steam is admitted to the cleaner in the rear of the opening *a*. Such admission may be accomplished by a steam-pipe independent of said handle, and connected at one end to said cleaner and at the other end to the source of steam-supply. Preferably, however, the rigid extension or handle B is for a part or the whole of its length provided interiorly with a conduit, D, communicating with the opening *a* of the cleaner and at the

other end with a source of steam-supply. I prefer that this conduit D shall extend through the entire length of this rigid extension or handle B, and the rear end of this conduit D, at the rear end of the handle, be connected with a source of steam-supply, and this source usually consists of a flexible tube connected immediately or otherwise to the boiler. This flexible tube is preferably connected to the rear end of the extension B by a coupling or union screwed onto the end *b* of the extension. The diaphragm *a*' is preferably flat on both faces; but, as illustrated in various figures on the drawings, one or both faces may be flared. The contracted opening *a* in the thin diaphragm *a*' causes the steam in passing through the opening *a* to be in part projected in divergent lines against the inner surface of the tube to which the cleaner is applied. The annular flange or enlargement A is preferably concentric with the opening *a*, and serves several important purposes, viz: First, it acts as a stopple or plug for the tube, and prevents cold air from rushing into the end portion of the tube in rear of the cleaner. If the cold air were allowed to enter the tube, (the boiler and tubes being heated,) this cold air would chill the tube, cause it to shorten in length, and cause it to leak at the heads of the boiler. Second, the cold air would condense the steam issuing from opening *a* and prevent said steam from being an efficient aid in expelling the dirt from the tube. The outer surface or surfaces of this flange A constitute a scraper or scrapers to scrape from the surface of the tube the dirt adhering thereto. Where the outer surface of the flange or extension A is of a cylindrical form, as shown in Figs. 4 and 8, this outer surface is preferably provided with teeth E, suitably shaped, preferably annular, and in planes at right angles to the longitudinal axis of opening *a* and conduit D. These teeth preferably have one abrupt side, either front or rear. In Fig. 4 the teeth are shown in part as having an abrupt rear side. In Fig. 8 the teeth are shown as having alternately front and rear abrupt sides. For example, the front tooth has an abrupt front side and the tooth in rear of said tooth has an abrupt rear side. The third tooth is shaped like the first, and the fourth tooth like the second, and so on.

The mode in which my cleaning device operates is substantially as follows: The cleaner A is introduced into the end or mouth of the boiler-tube to be cleaned. Steam is now admitted to the conduit D, and, dashing against the diaphragm a' , it is sprayed through the opening a and projected forward, part of it in straight lines of direction and part in divergent lines against the inner surface of the tube, and drives before it and expels from the tube the loose particles of dirt, as soot, ashes, scale, &c., and other substances clogging the tube. The cleaner is pushed forward in the tube. The outer surface of the part A of the cleaner scrapes and detaches the various kinds of dirt from the surface of the tube, and the steam expels said dirt as soon as it is detached. The cleaner is now retracted, and if the tube is not perfectly clean the operation of advancing and retracting the cleaner may be repeated.

In the preferred form of my invention, shown in Fig. 3, the annular flange A has a chamber opening out forward and communicating at rear with the orifice a , the sides of the chamber being flaring, and at its forward end the flange is approximately of the same diameter as the tube to be cleaned. When the teeth E are combined as with this form of invention, the annular flange will be thickened at rear for a greater or less distance, according to the number of transverse rows or rings of teeth. An illustration of one form of such thickening, &c., is shown in Fig. 9. When there are a number of rows of teeth, E, on a given flange, the points of the teeth of the center rows are preferably farther from the longitudinal axis of the cleaner than are the teeth of the rows nearer the ends of the flange or cleaner. This conformation of the teeth allows the cleaner to be more readily inserted into the tube and the handle to move toward any side of the tube without causing the cleaner binding in the tube.

While the various features of my invention are preferably employed together, one or more of said features may be employed without the remainder, and in so far as applicable one or more of said features may be employed in connection with cleaners other than those specifically herein described.

I am aware that a device has been invented which has a conical point to be inserted in the end of a boiler-tube, and having a small orifice through which steam escapes into the tube; but this is not within the scope of my invention as defined in the following claims.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The cleaner having thin flat diaphragm a' , provided with contracted opening a , substantially as and for the purposes specified.

2. The cleaner having thin flat diaphragm a' , one side of which is flat and the other flaring, about the edge of the opening a , substantially as and for the purposes specified.

3. The cleaner having thin flat diaphragm a' , provided with opening a , and rigid extension B, containing conduit D, the extension being covered with a substance which is a non-conductor of heat, substantially as and for the purposes specified.

4. The cleaner provided with thin flat diaphragm a' , opening a , and extended annular flange A, substantially as and for the purposes specified.

5. The cleaner provided with thin flat diaphragm a' , orifice a , and annular flange A, having teeth E, substantially as and for the purposes specified.

6. The cleaner provided with thin flat diaphragm a' , orifice a , and annular flange A, provided with annular teeth E, having one abrupt side facing forward, substantially as and for the purposes specified.

7. The cleaner having thin flat diaphragm a' , opening a , flange A with flaring sides, and rigid extension B covered with a non-conductor of heat, and provided with internal conduit, D, substantially as and for the purposes specified.

8. The combination of flange A, having flaring sides, thin flat diaphragm a' , opening a , rigid extension B, covered with a non-conductor of heat, internal conduit, D, and teeth E, substantially as and for the purposes specified.

9. The cleaner having thin flat diaphragm a' , orifice a , and annular flange A, provided in front of orifice a with a chamber having flaring sides, and also provided with rows of teeth, the center rows projecting out farther from the longitudinal axis of the cleaner, substantially as and for the purposes specified.

10. The cleaner provided with thin flat diaphragm a' , orifice a , and flange A, provided with rows of teeth, the center rows projecting out farther from the longitudinal axis of the cleaner, and having open chamber provided with surface flaring outward from orifice a , and having teeth E, and rigid extension connected to the cleaner and covered as described, and provided with conduit B, substantially as and for the purposes specified.

11. A cylinder-cleaner provided exteriorly with annular rows of teeth, the rows diminishing gradually in diameter toward each end of the cleaner, substantially as and for the purposes specified.

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