

No. 620,224.

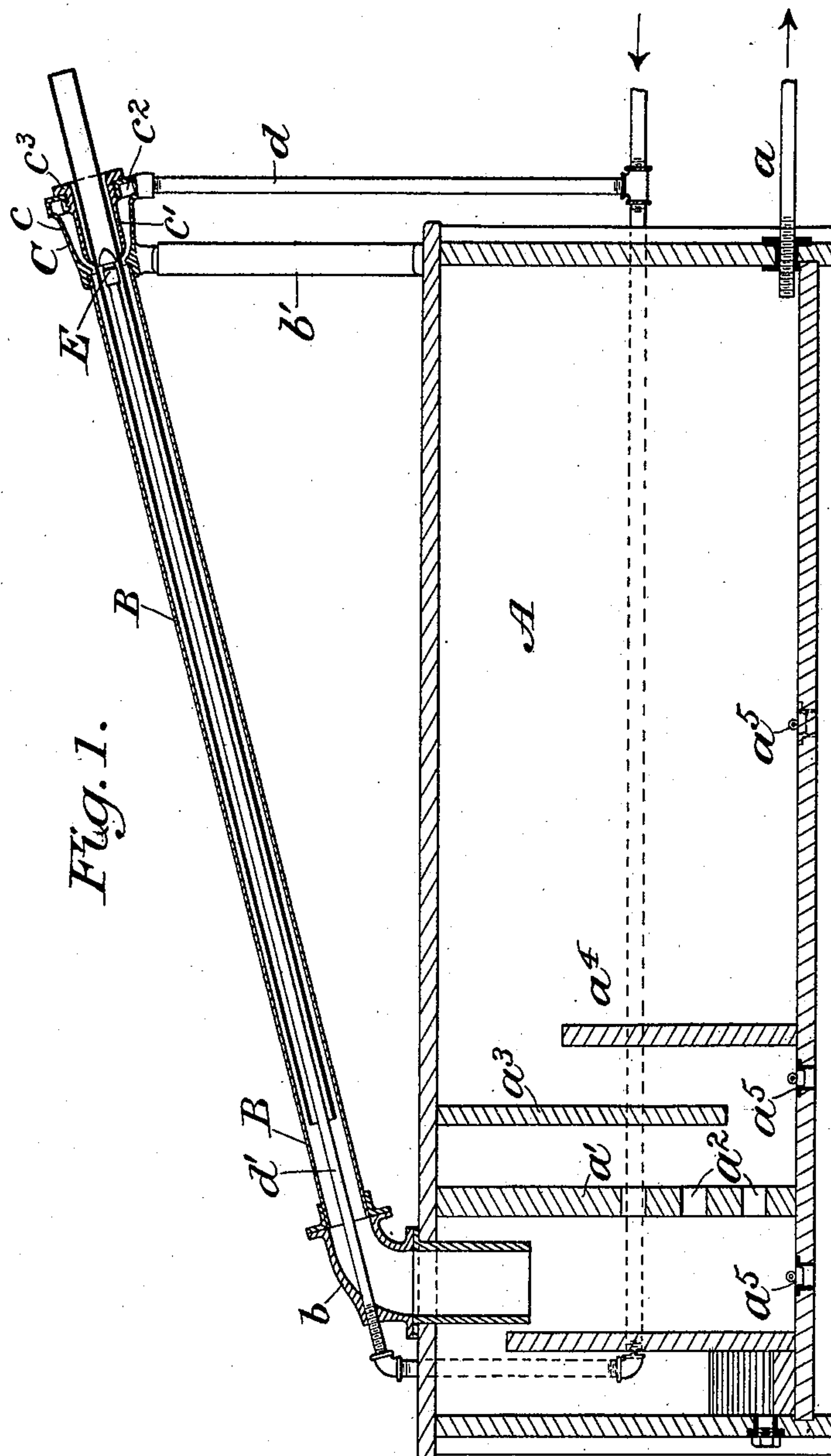
Patented Feb. 28, 1899.

F. BUBSER.
TUBE WASHING APPARATUS.

(Application filed July 21, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
A. N. Jesbira
F. M. Eggleston.

Inventor;
Fidel Bubser
by Redding, Fiddle Greeley
Attys

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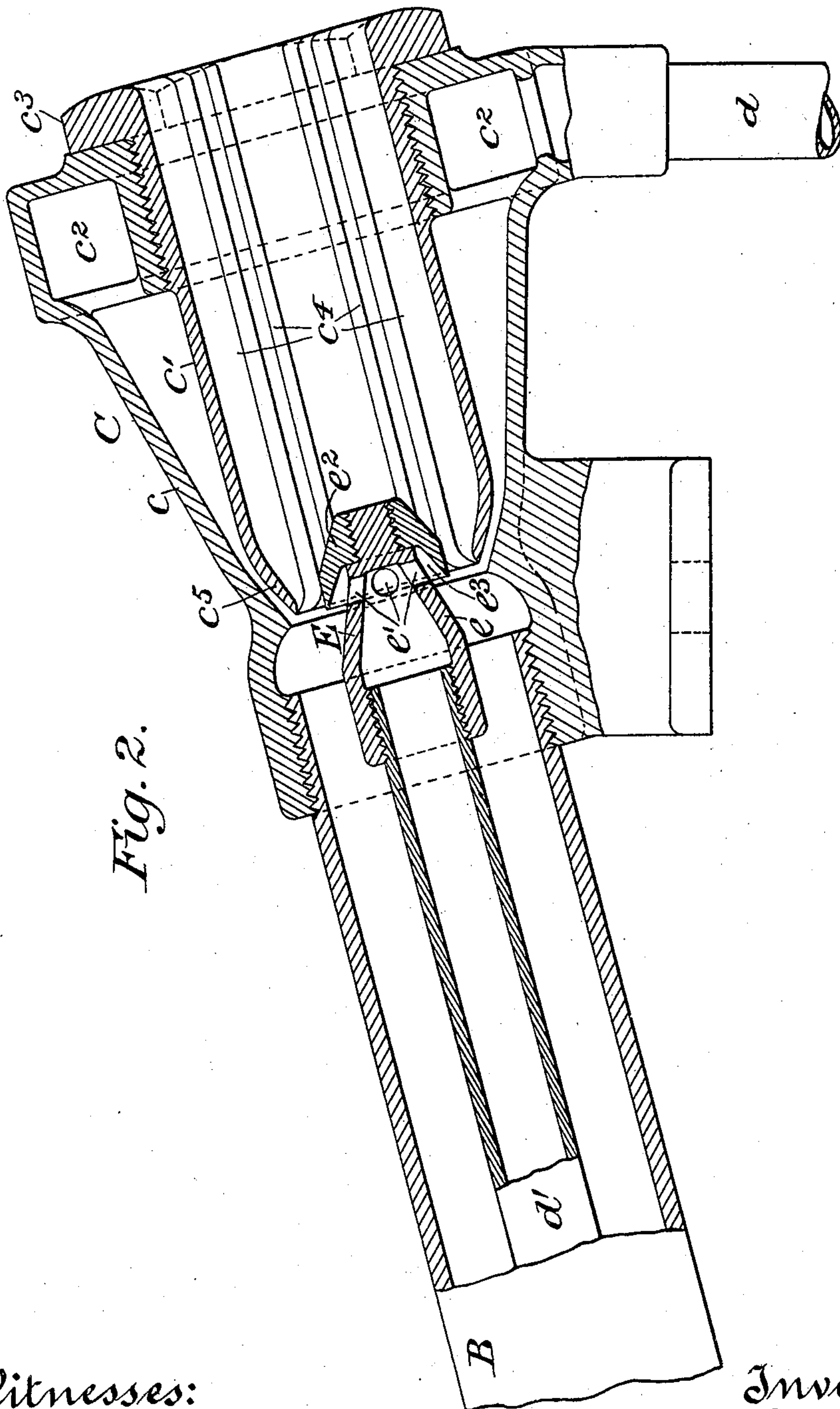


Fig. 2.

Witnesses:

A. A. Jesbra

F. M. Eggleston.

Inventor:

Fidel Bubser
by Redding Kiddell Greeley
Attys

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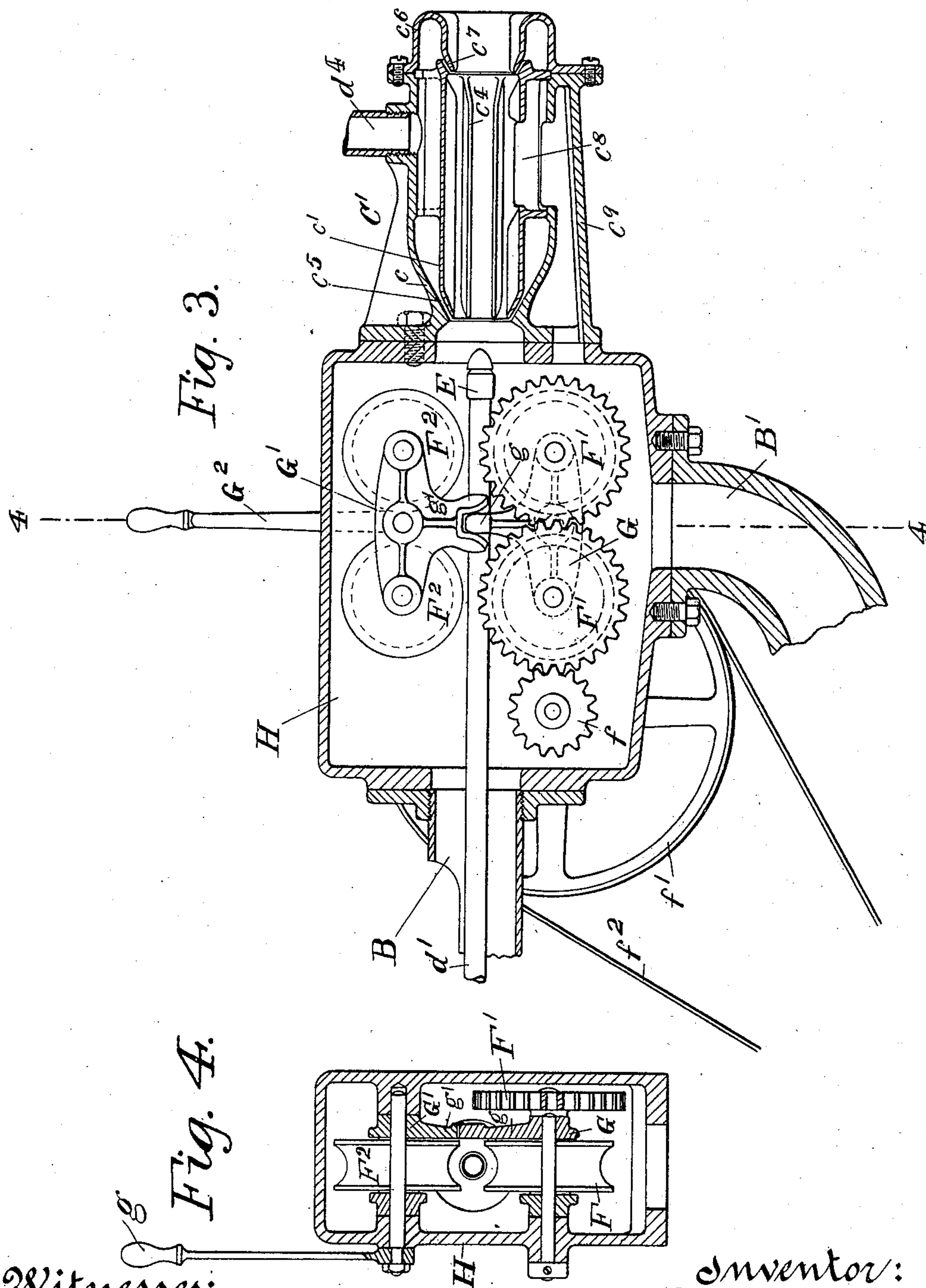
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3 Sheets—Sheet 3.



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A. N. Jespersen.
F. M. Eggleston.

Inventor:

Fidel Buhser
by Redding, Kiddle & Greeley
Attys

UNITED STATES PATENT OFFICE.

FIDEL BUBSER, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE POPE MANUFACTURING COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

TUBE-WASHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 620,224, dated February 28, 1899.

Application filed July 21, 1897. Serial No. 645,307. (No model.)

To all whom it may concern:

Be it known that I, FIDEL BUBSER, a citizen of the United States, residing in the city and county of Hartford, in the State of Connecticut, have invented certain new and useful Improvements in Washing Apparatus, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In the manufacture of metal tubes the tubes are generally covered with a thick coating of black oil and other substances, which must be removed before the tubes are used. Heretofore the washing of tubes has been done by hand at the cost of much time and labor and without any certainty of thoroughness, and it has been particularly difficult to effect the thorough cleansing of the inside of tubes of small diameter.

It is the object of this invention to provide an apparatus for washing tubes which can be used for tubes of either large or small diameter, which shall cleanse thoroughly both inside and outside all tubes subjected to its action, and shall perform its work quickly and cheaply. The form of apparatus which I have chosen as an illustration of one embodiment of my invention is shown in the accompanying drawings and will be fully described hereinafter with reference thereto.

In said drawings, Figure 1 is a view partly in elevation and partly in vertical section, showing the apparatus with a tube in position to be washed. Fig. 2 is a detail view in section and on a larger scale, showing more clearly a construction of the inside and outside nozzles hereinafter referred to. Fig. 3 is a view similar to Fig. 2, but showing a form of construction intended to more effectually clean the tubes and showing also means for advancing and withdrawing the tubes. Fig. 4 is a transverse section on the plane indicated by the line 4 4 of Fig. 3.

The tube-washing devices are preferably supported over a tank A, which receives the washing fluid after it leaves the tube. The fluid used may be of any suitable character. Hot water or soda-water or hot soda-water or any other suitable fluid may be employed, according to the character of the special work

to be done. In some cases it may be desired to use the washing fluid over again, and I have therefore indicated a connection *a* from the tank to a suitable circulating-pump, from which the fluid may be returned to the washing devices in the manner hereinafter described. I have also provided within the tank a quieting-screen *a'*, which consists of a partition extended across the tank and provided with a number of apertures *a''*, a scum-screen *a'''*, which is extended downward from the top of the tank to a line below the normal level of the fluid in the tank, and a sediment-screen *a''''*, which rises from the bottom of the tank. Plugs *a'''''* may be provided in the bottoms of the several compartments of the tank A to permit of a thorough cleaning out of the same when necessary.

As represented in the drawings, the main conductor B, having an internal diameter sufficiently large to permit it to receive tubes of any size up to the largest to be washed in the apparatus, is supported in an inclined position by an elbow *b* at one end and a standard *b'* at the other end; but it may be of any shape or length. At the upper end of the conductor B, and preferably having a screw-threaded or other detachable connection therewith, is fixed the outside nozzle C, through which the washing fluid is delivered under considerable pressure against the outside of the tube to be washed. As represented in Figs. 1 and 2 of the drawings, the outside nozzle comprises an outer shell *c*, substantially conical, and an inner shell *c'*. The outer shell is formed with a head *c''*, to which the fluid-supply pipe *d* is connected, and the inner shell *c'* may be screw-threaded into the head *c''* and may be provided with a polygonal flange *c'''*, so that the inner shell may be removed readily to be replaced by another when required. The shell *c'* is open from end to end and is provided interiorly with longitudinal ribs *c''''*, which serve to center the tube which is being washed and also permit it to be moved in and out readily. It will be obvious that the shell *c'* might be otherwise secured in place to permit its ready removal and that the outer shell *c* may also be secured or supported in any convenient manner or

so that it may be removed and replaced without difficulty whenever the size of the tubes to be washed is changed.

It will be observed that the fluid supplied through the pipe d to the head c^2 is directed outwardly and downwardly in a converging annular stream between the outer shell or funnel c and the inner shell c' , the extremity of the latter being preferably tapered inward somewhat, as at c^5 , to conform to the inwardly-tapering wall of the funnel c . The stream thus directed from the outer nozzle strikes the outside of the tube to be washed at an oblique angle, cutting the oil and other foreign matter from the tube to be washed and carrying it down through the inclined conducting-tube B into the tank A. A second fluid-supply pipe d' is carried up in the conductor B, and at its upper end, preferably somewhat below the outside nozzle C, terminates in an inside nozzle E, the supply-pipe d' and the nozzle E being of such diameter as to permit the tube to be washed to be slipped upon them easily. The nozzle E may be threaded upon the end of the tube d' and comprises a body portion e , which is tapered toward its upper end and is provided with ports e' and a cap or flange e^2 , which may be threaded upon the end of the body portion e , the inner surface e^3 of said conical cap or flange preferably flaring outwardly in substantial parallelism with the outer surface of the body portion e , so as to direct the fluid which issues through the ports e' outwardly and rearwardly against the inside of the tube to be washed in a diverging annular stream, which cuts the oil and other substances from the inside of the tube and washes all together down through the tube, from which it is delivered into the conducting-tube B or into the elbow b and thence into the tank A.

The interior nozzle is so located that it is readily accessible to be removed and replaced whenever it is desired to change the nozzle to suit a different size of tube. It is found, moreover, that when the outside and inside nozzles are located so that the two conical streams shall meet about midway between the two nozzles there is no choking of the funnel to cause the water to back up and overflow when there is no tube being washed, which would occur if the two streams which issue from the nozzles were not so related to each other. It is of course desirable that both nozzles shall be so restricted relatively to the size of the supply-pipe as to cause the fluid to be discharged with considerable pressure and velocity, so that the fluid shall impinge with considerable force against the walls of the tube to be washed, and thereby more effectually and more rapidly cut and carry away the oil and other substances.

As stated above, the fluid is preferably allowed to escape from the conducting-tube into the vat A, wherein, by means of the quieting-screen, the scum-screen, and the sediment-screen, the fluid is thoroughly

cleansed when it reaches the main part of the tank A and may be returned therefrom to the circulating-pump to be used over again.

It is sometimes the case that the tube to be washed has one end so much reduced in diameter that it will not pass over the inside nozzle E, with the result that if the apparatus be used as shown in Figs. 1 and 2 the outside of the tube for a distance of several inches from the end will not be thoroughly cleansed. On this account, therefore, the form of device shown in Fig. 3 is preferred, because it provides for the thorough cleansing of such tubes as those just referred to. In this form the tubes B and d' and the inside nozzle E are substantially as shown in Figs. 1 and 2. The outside nozzle C' is likewise adapted to direct a converging annular stream of fluid between the outer shell c and the inner shell c' against the outside of the tube to be cleansed. A secondary outside nozzle, however, is formed at the opposite end between the inner shell c' and the outer shell c or an extension c^6 thereof, as at c^7 , which also directs a converging annular stream against the tube to be cleansed. Both nozzles at c^5 and c^7 are supplied with fluid from a common supply-pipe d^4 , and it will be readily understood that the stream from the secondary nozzle at c^7 not only washes that part of the outer surface of the tube which is not reached by the stream from the nozzle at c^5 , when the inward movement of the tube is limited by reason of the constricted diameter of its end portion, but said nozzle at c^7 , when the tube has been moved well in, may direct its stream or a portion thereof into the inside of the tube and will therefore cleanse that portion of the inner surface of the tube which is not reached by the stream from the nozzle E. An opening may be formed at c^8 through the shell c' to permit the discharge of the fluid introduced through the nozzle at c^7 , a similar opening being formed through the shell c and a duct being formed at c^9 , by which the fluid is carried away to be discharged eventually through a pipe B'.

In said Figs. 3 and 4 is illustrated a mechanical device or feeding mechanism for advancing and withdrawing the tube. As there represented, two rolls, one of which is shown at F in Fig. 4, are carried upon short shafts mounted in bearings in the opposite ends of a rocker-frame G. Gears F' are secured to the shafts of the rolls and intermesh, one of said gears F' being engaged by a pinion f , which may be driven by a pulley f' and belt f^2 from any suitable motor or by any other suitable means. A corresponding rocker-frame G' affords bearings at its opposite ends for coöperating-rolls F², and its shaft is provided with an operating-lever G². An arm g from the frame G engages a corresponding arm g' from the frame G', so that the two frames are moved together, but in opposite directions by the movement of the lever G², and the corresponding rolls at one end or the

other are brought into contact with the tube to be washed or being washed to grip the same. It is evident that by the described gearing the lower rolls of each pair are driven
 5 in opposite directions, so that the tube is moved in or out and reversed at the will of the operator. The casing H incloses the feeding mechanism and has the conductors B and B' connected thereto, so that none of the fluid
 10 escapes except through the proper channels, and the gearing and rolls are themselves kept clean.

It will be understood, of course, that various changes may be made in the details of construction of the apparatus herein shown and described, as well as that any suitable kind of washing fluid may be employed, without departing from the spirit of my invention.

I claim as my invention—

20 1. An apparatus of the character described, comprising a fluid-supply pipe, a nozzle thereon having a cap or flange to direct a stream of fluid outward against the inside of a tube to be washed, and a substantially tubular head
 25 to support or guide the tube to be washed.

2. An apparatus of the character described, comprising a fluid-supply pipe, a nozzle thereon to direct a stream of fluid outward against the inside of a tube to be washed, and a conductor to receive and support or guide the
 30 tube to be washed.

3. An apparatus of the character described, comprising a fluid-supply pipe, a nozzle thereon to direct a stream of fluid outward against the inside of a tube to be washed, and a nozzle to direct a stream of fluid inward against
 35 the outside of the tube to be washed.

4. An apparatus of the character described, comprising a fluid-supply pipe, a nozzle thereon to direct a stream of fluid outward against the inside of the tube to be washed, a conductor to receive and support or guide the tube to be washed, a nozzle supported by said
 40 conductor to direct a stream of fluid inward against the outside of the tube to be washed, and a fluid-supply pipe connected to said last-named nozzle.

5. An apparatus of the character described, comprising a fluid-supply pipe, a nozzle thereon to direct a stream of fluid outward against the inside of a tube to be washed, a nozzle to direct a stream of fluid inward against the
 50 outside of a tube to be washed, and means to support said last-named nozzle and to supply fluid thereto.

6. An apparatus of the character described, comprising a fluid-supply pipe and an annular nozzle connected thereto to direct a stream

of fluid inward against the outside of a tube to be washed, said annular nozzle consisting
 60 of an outer shell having a head for connection to the fluid-supply, and a removable inner shell having longitudinal ribs to center and support or guide the tube to be washed.

7. In an apparatus of the character described, the combination of a tank, an inclined conductor supported upon said tank, a fluid-supply pipe supported centrally in said conductor, a nozzle on said supply-pipe to direct a stream of fluid outward against
 70 the inside of the tube to be washed, and a nozzle supported by said conductor to direct a stream of fluid inward against the tube to be washed.

8. An apparatus of the character described, comprising a fluid-supply tube, a nozzle thereon to direct the stream of fluid outward against the inside of the tube to be washed, an outside nozzle in proximity to said first-named nozzle to direct a stream of fluid inward against the outside of the tube to be
 80 washed, and a secondary outside nozzle more remote from the first-named nozzle.

9. In combination in an apparatus of the character described, the casing having openings through opposite walls, feeding mechanism inclosed within the casing, a nozzle located at one of the openings in the casing through which nozzle the article is fed, and means combined in said nozzle for directing
 85 a stream of liquid against the article to be washed and also against the feeding mechanism.

10. An apparatus of the character described, comprising a nozzle to direct a stream
 95 of fluid against the article to be washed, opposite pairs of feed-rolls geared to rotate in opposite directions, and means to cause one or the other of said pairs of rolls to grip the article to be washed.

11. An apparatus of the character described, comprising a nozzle to direct a stream of fluid against the article to be washed, rocking frames mounted and connected to rock together in opposite directions, means to rock
 100 one of said frames, feed-rolls mounted on opposite ends of said frames and gearing to drive in opposite directions the rolls carried by one of said frames.

This specification signed and witnessed this
 110 12th day of July, A. D. 1897.

FIDEL BUBSER.

In presence of—

HERMANN F. CURTZ,
 P. HAUSLING, Jr.