

(No Model.)

2 Sheets—Sheet 1.

H. F. HALL.
TUBE CLEANER.

No 578,922.

Patented Mar. 16, 1897.

FIG. 1.

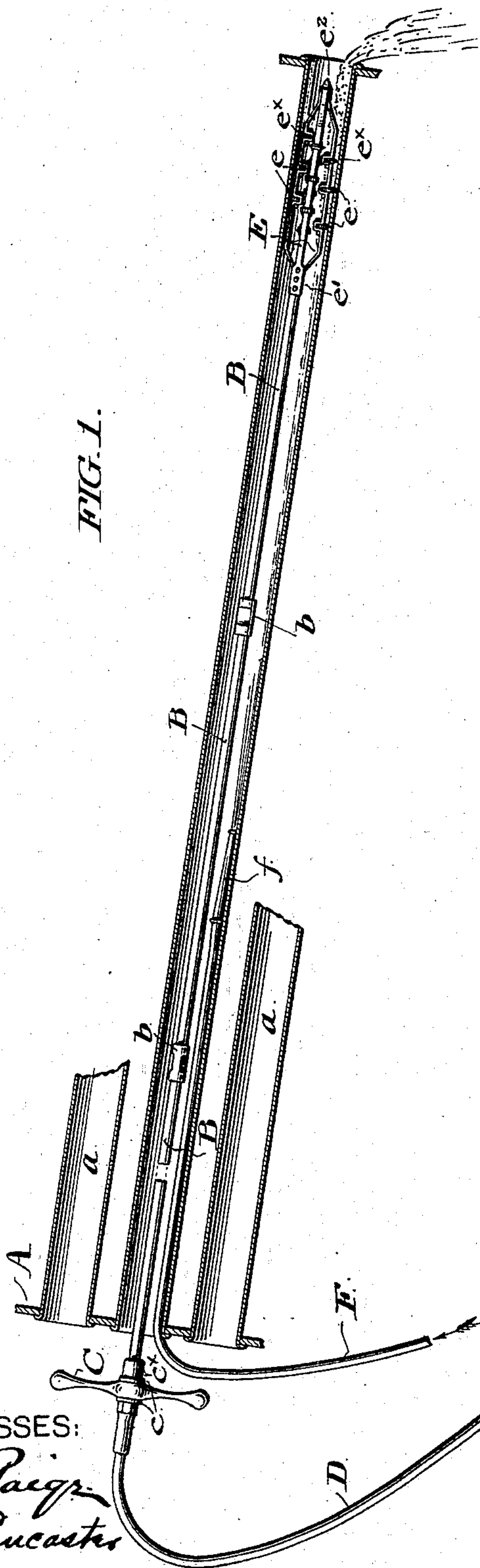


FIG. 2.

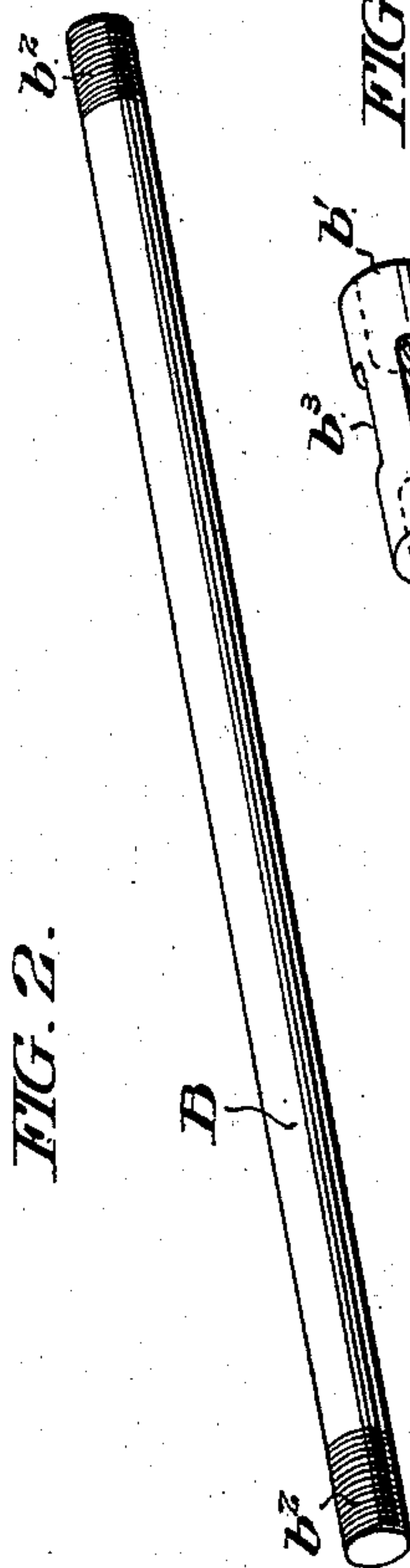
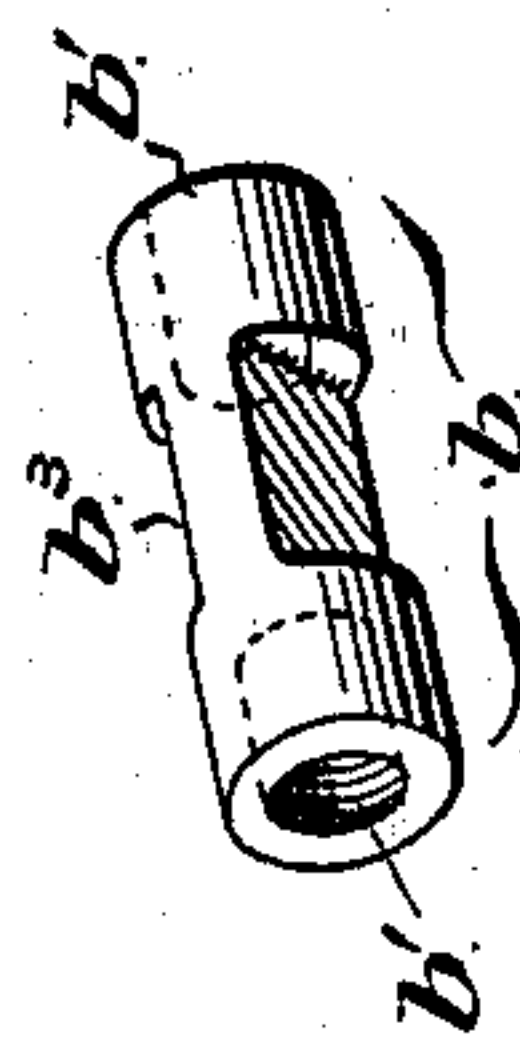


FIG. 3.



WITNESSES:

N. E. Paige
Josh. K. Lancaster

INVENTOR:

Harris F. Hall,
By his Attorney,
Wm. C. Strawbridge
or
Borisall Taylor

(No Model.)

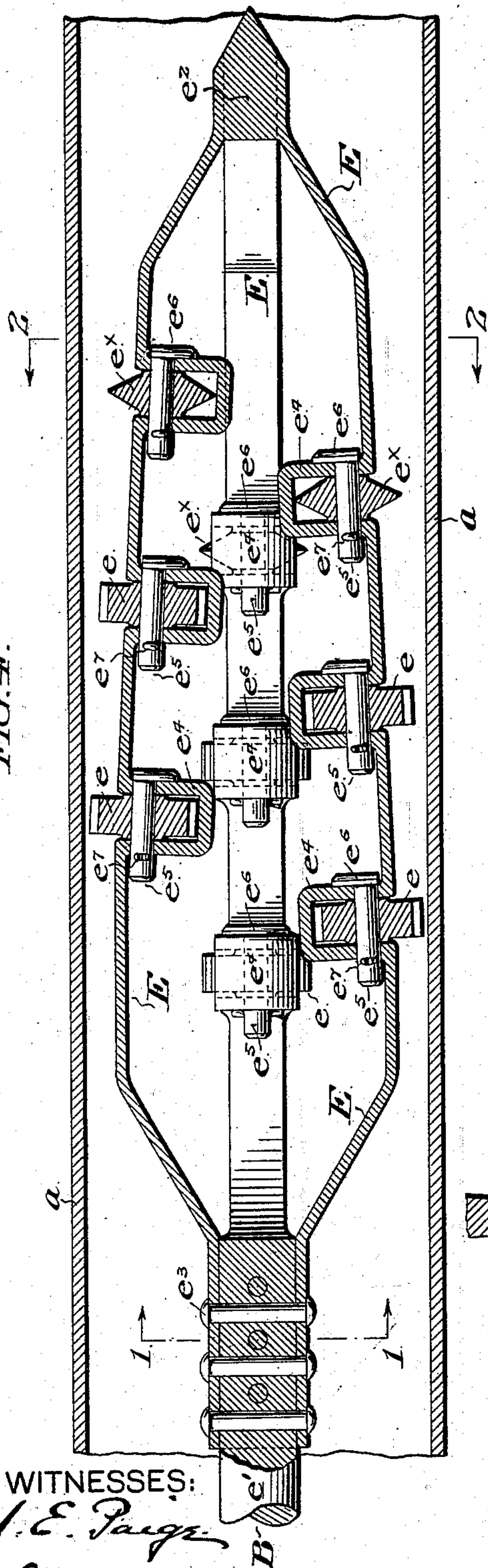
2 Sheets—Sheet 2.

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FIG. 4.



WITNESSES:

V. E. Paige
Thos. K. Lancaster

FIG. 7.

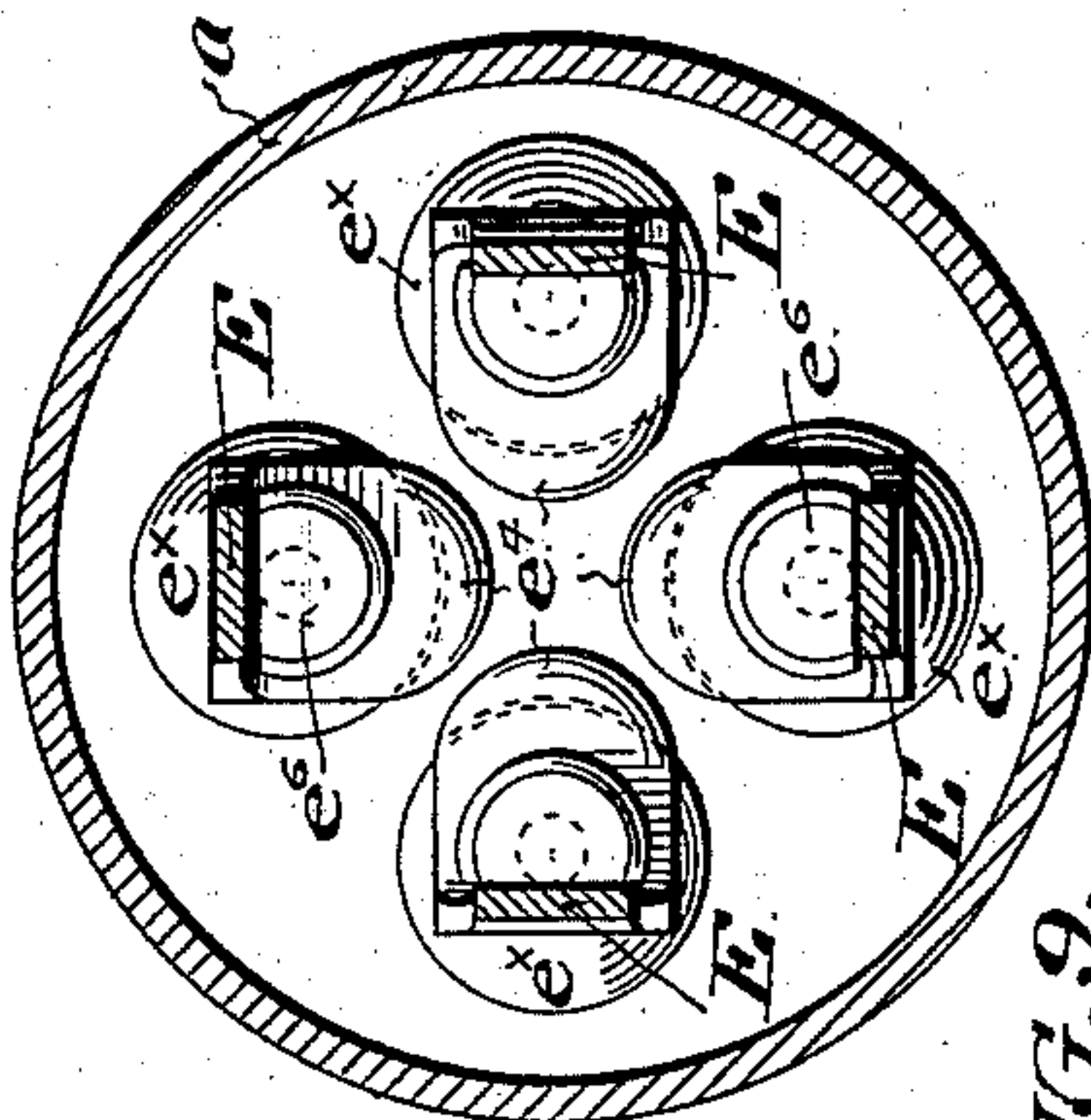


FIG. 6.

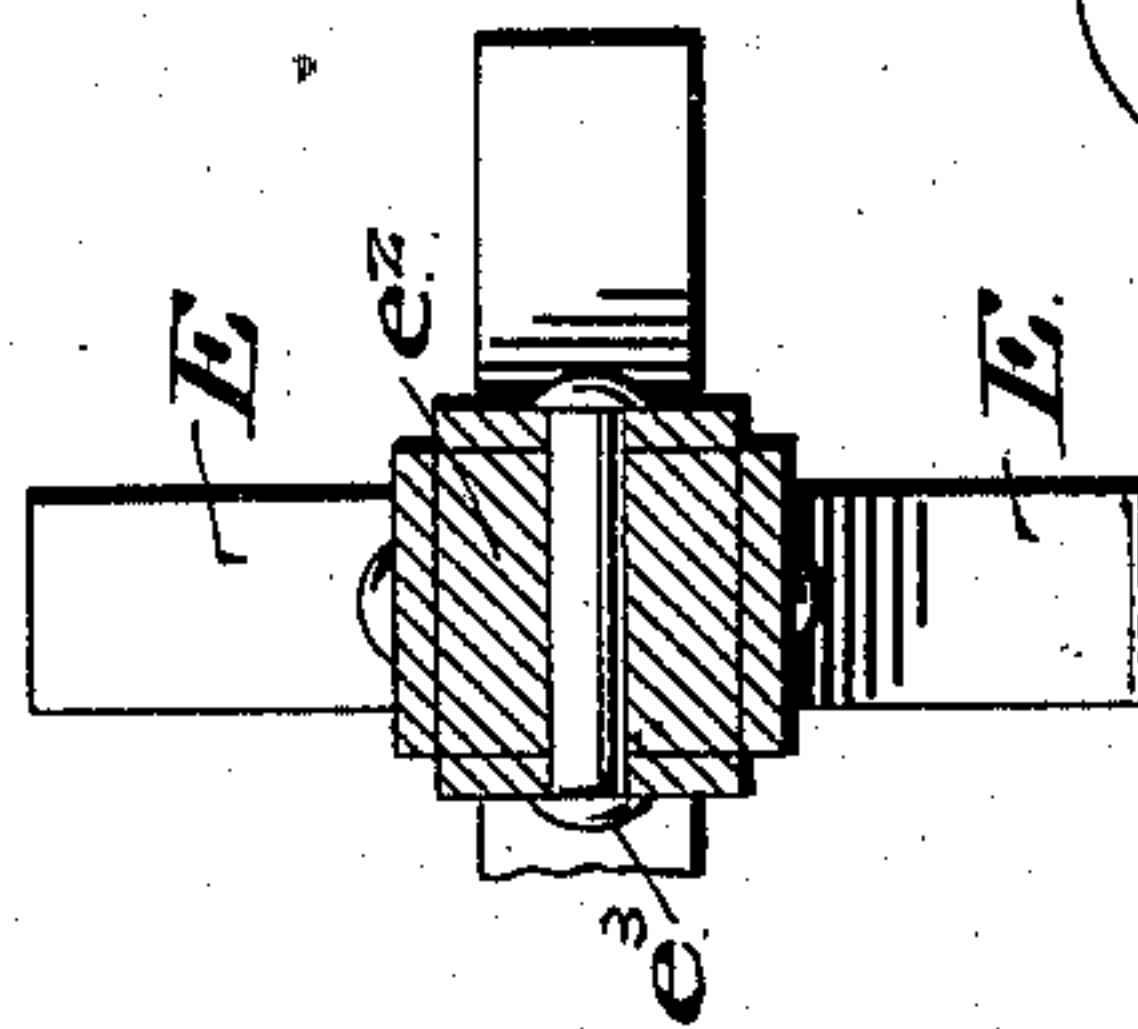


FIG. 5.

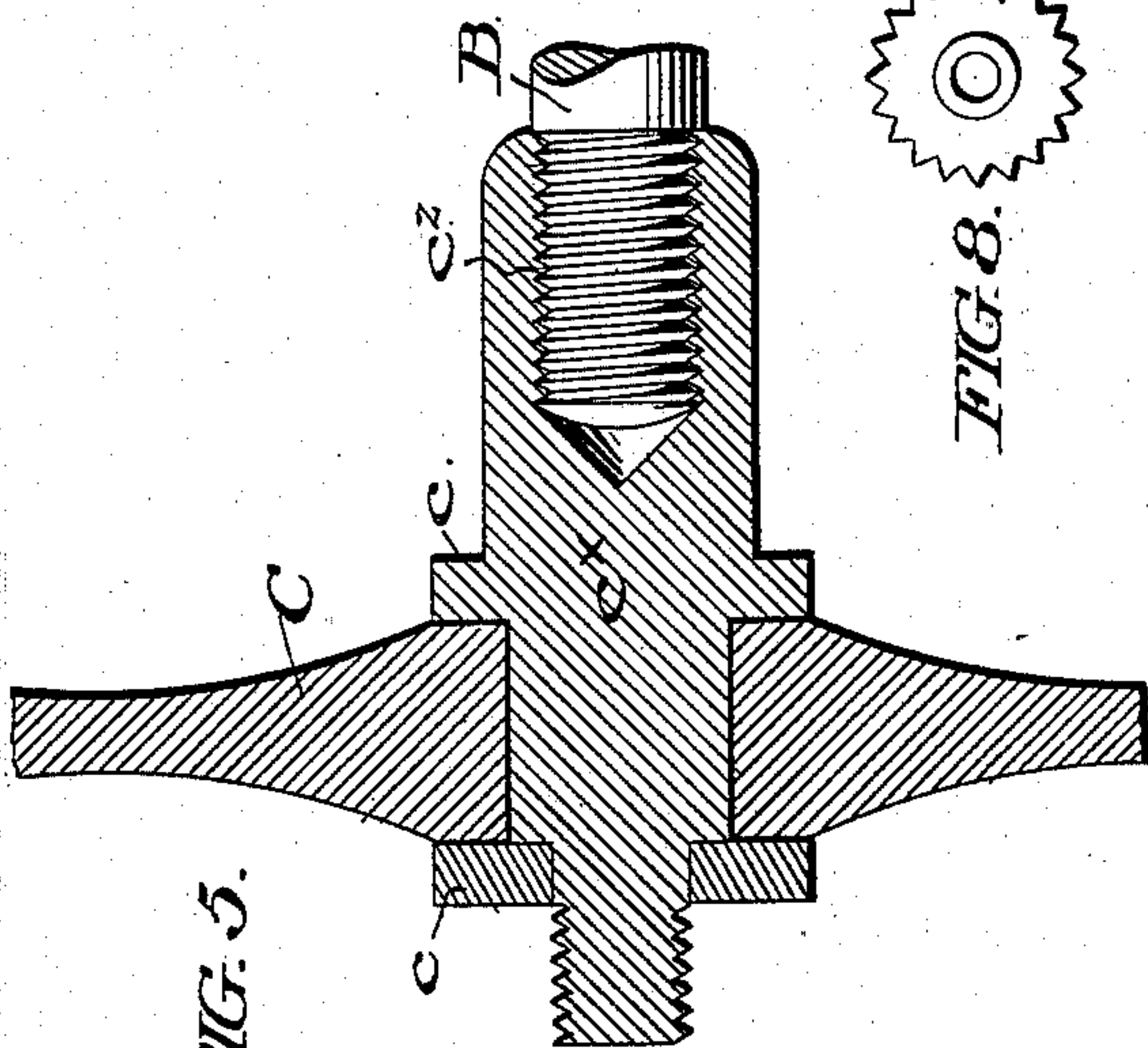


FIG. 9.

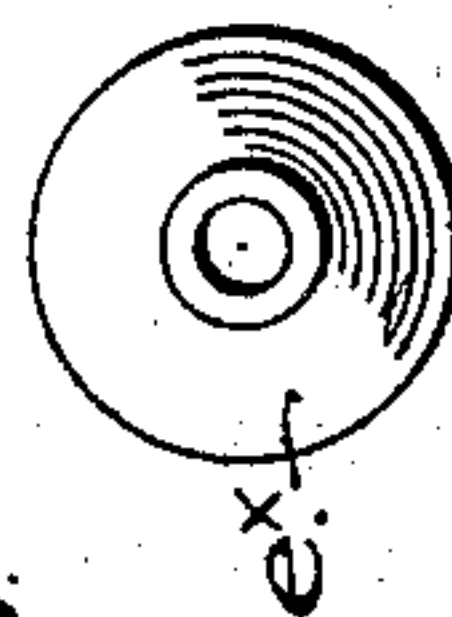
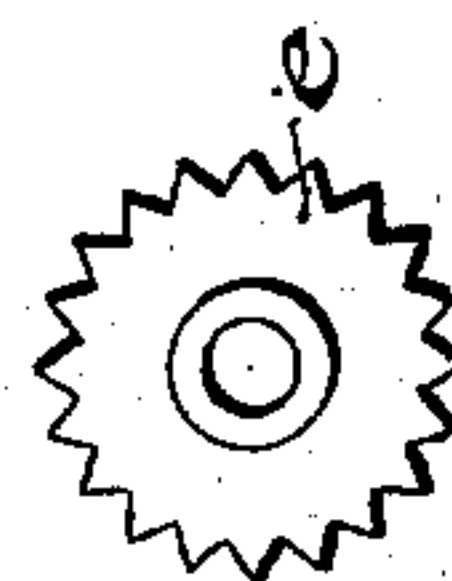


FIG. 8.



Harris F. Hall,

INVENTOR:

By his Attorneys,
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UNITED STATES PATENT OFFICE.

HARRIS F. HALL, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF
TO NICHOLAS B. TRIST, OF PITTSBURG, PENNSYLVANIA.

TUBE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 578,922, dated March 16, 1897.

Application filed August 4, 1896. Serial No. 601,610. (No model.)

To all whom it may concern:

Be it known that I, HARRIS F. HALL, a citizen of the United States, residing at Jersey City, in the State of New Jersey, have invented certain new and useful Improvements in Tube-Cleaners, of which the following is a specification.

My invention relates in general to the class of devices which are employed for cleaning the interiors of boiler and other tubes, and its object is the construction of an efficient and durable device adapted to effect rapid and thorough cleaning of tubes and flues of different lengths and varying diameters.

A tube cleaner embodying my improvements is represented in the accompanying drawings and hereinafter described, the particular subject-matter claimed as novel being definitely recited in the claiming clauses.

In the accompanying drawings,
Figure 1 is a side view partially in elevation and partially in section, of so much of a boiler as is necessary to an understanding of the invention, and of my cleaner shown applied to one of the tubes.

Figure 2 is a view in perspective of a section of the driving rod.

Figure 3 is a similar view of a coupling for the sections of the driving rod.

Figure 4 is a longitudinal, vertical, side, sectional, elevation of the cleaning head proper.

Figure 5 is a similar view of the manipulating handle which is applied between the driving rod and the flexible driving shaft.

Figure 6 is an end elevational view, sectional in the plane of the dotted line 1-1 upon Figure 4, of a convenient means for attaching the carrying bars to the driving rod.

Figure 7 is an end, sectional, elevation, in the plane of the dotted line 2-2 of Figure 4, through the tube cleaning head.

Figure 8 is an end elevational view of a serrated cleaning roller.

Figure 9 is a similar view of a knife-edged cleaning roller.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings,
A represents so much of the tube-sheet of a boiler, and *a* so much of a series of tubes, as are sufficient to typify a boiler.

B are a series of detachable sections of rods or tubes which together compose the driving rod of my cleaner, as an entirety.

Of these sections any preferred number, in any desired lengths, may be employed, and they are adapted to be coupled to form a driving rod of any desired length, by, for instance, such a coupling as is indicated by the letter *b*, in Figure 3, and which is conveniently formed as a cylindric union having threaded sockets *b'* at each end adapted to take over the threaded extremities *b²* of the sections of the driving rod and effect a connection between them.

Intermediate of its length each coupling is conveniently provided with a flattened portion *b³* for the application of a wrench to effect its rotation in applying it to the rod sections.

At the outer or distant end of the driving rod as an entirety, is applied the cleaning mechanism proper, hereinafter described and termed the cleaning head.

At the inner or near end of the driving rod is applied the manipulating handle C, Figures 1 and 5, by the aid of which the device as an entirety is forced in or drawn out of the tube.

The handle is preferably simply a finger cross-bar adapted to be grasped by the operator, and, as indicated in Figure 5, it is loosely mounted or swiveled between two collars *c c* on a connector *c^x*, to the outer end of which the driving rod is applied by any preferred means, conveniently by a screw-attachment *c²* as shown in Figure 8, and to the inner end of which, in any kindred or preferred manner, is attached the flexible driving shaft D, which may be of any well-known type and driven to its desired rotation in either direction by any preferred motor which I have not deemed it necessary to illustrate.

Obviously, by the movement of the manipulating handle the driving rod may be moved longitudinally of the tube while being rotated by the aforesaid flexible shaft.

The cleaner or cleaning head proper, the details of the construction of which are particularly illustrated in Figures 4, 6, 7, 8, and 9, is, as stated, applied to the front end of the driving rod, and is composed of a series of longitudinally-extending carrying bars E,

each of which is equipped with a plurality of cleaning rollers $e e^x$.

In the construction represented there are four carrying bars, respectively disposed by opposite pairs in right-angularly-related planes, all of which at their inner ends are attached to the outer extremity e' of the forward section B of the driving rod,—and at their outer ends are similarly attached to a uniting head e^2 , which may, if desired, be a boring bit.

A good mode of applying the carrying bars to the uniting head and outer extremity of the driving rod, is by flattening these members upon four sides, as shown in Figures 4 and 6, and employing alternately disposed connecting bolts or rivets e^3 .

Other means of connection may, however, manifestly be resorted to.

As each of the carrying bars and its applied cleaning rollers is of the same construction as every other, a description of one will suffice,—it being understood, however, that in the mounting of said bars and rollers, the rollers are staggered so as, by adjacent rollers, to bear a continuous spiral relationship throughout the combined series.

Each carrying bar is sprung up from its region of rear attachment to the driving rod, to any preferred extent, and is then extended forward in such manner as to be disposed at an acute angle with respect to the common axis of all of the bars, so that an imaginary plane uniting said bars would possess a substantially conical form with the base toward the rear.

Each bar, at selected points in its length, is provided with a given series of roller housings, conveniently by being itself bent to form said housings, which are designated e^4 .

In each housing is secured a shaft or axle e^5 for a roller, and said shafts are preferably provided with heads e^6 , which, viewed from the end, present the form shown in Figure 7, that is to say are cut off upon one side in such manner as to permit of the application of the shaft and head close up against the inner face of the carrying bar of which its housing is a member. This prevents the rotation of the shafts.

Accidental retraction of the shafts is prevented by the application to each of a pin e^7 , or other preferred securing device.

In the construction shown there are in all twelve cleaning rollers, three applied to each carrying bar,—and, of each series of three, the advance roller e^x is preferably a cutting or knife-edged roller, as shown in Figure 9, and the two rear rollers are preferably serrated-edged or grinding rollers, as shown in Figure 8.

I do not limit myself to this precise arrangement either as to number or character of rollers, but simply illustrate it as a good construction.

As will be understood by reference to Figures 1, 4, and 7, the arrangement of these rollers

as an assemblage is a conico-spiral arrangement, so to speak.

The tube cleaner proper is to be made of any preferred diameter and length, to adapt it to the particular tubes to the cleaning of which it is to be applied.

As I have already explained, I do not limit myself to any particular detail of mechanical construction of the various parts which together compose my cleaning apparatus as an entirety.

Having thus described my invention, I contemplate employing in connection with it a water-carrying pipe F provided with a discharge nozzle f , which may be introduced into the tube for the time being in process of being cleaned, and serve to introduce a sufficient volume of water to wash out the tube.

Having thus described my invention, I claim:—

1. A tube cleaner embodying in combination:—a flexible driving shaft,—means for occasioning the rotation of said shaft,—a rigid driving rod connected with and driven by said shaft,—a cleaning head connected and rotating with the outer end of the driving rod,—and a manipulating handle swiveled with respect to, and for controlling the longitudinal movement of, the driving rod and cleaning head,—substantially as set forth.

2. A tube cleaner embodying in combination:—a flexible driving shaft,—means for occasioning the rotation of said shaft,—a rigid driving rod connected with and driven by said shaft,—a cleaning head connected and rotating with the outer end of the driving rod and provided with circumferentially disposed cleaning rollers,—and a manipulating handle swiveled with respect to, and for controlling the longitudinal movement of, the driving rod and cleaning head,—substantially as set forth.

3. A cleaning head for a tube cleaner, composed of a plurality of longitudinally-extending carrying bars all connected together at both of their respective corresponding extremities, and each provided with a series of roller housings,—in combination with a plurality of cleaning rolls applied to said housings,—substantially as set forth.

4. A cleaning head for a tube cleaner, composed of a plurality of longitudinally-extending carrying bars all connected together at both of their respective corresponding extremities, and each provided with a series of roller housings,—in combination with an advance series of knife-edged cleaning rolls and a rear series of serrated cleaning rolls,—substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 14th day of July, A. D. 1896.

HARRIS F. HALL.

In presence of—

J. BONSALE TAYLOR,
JAS. MILLIKEN.