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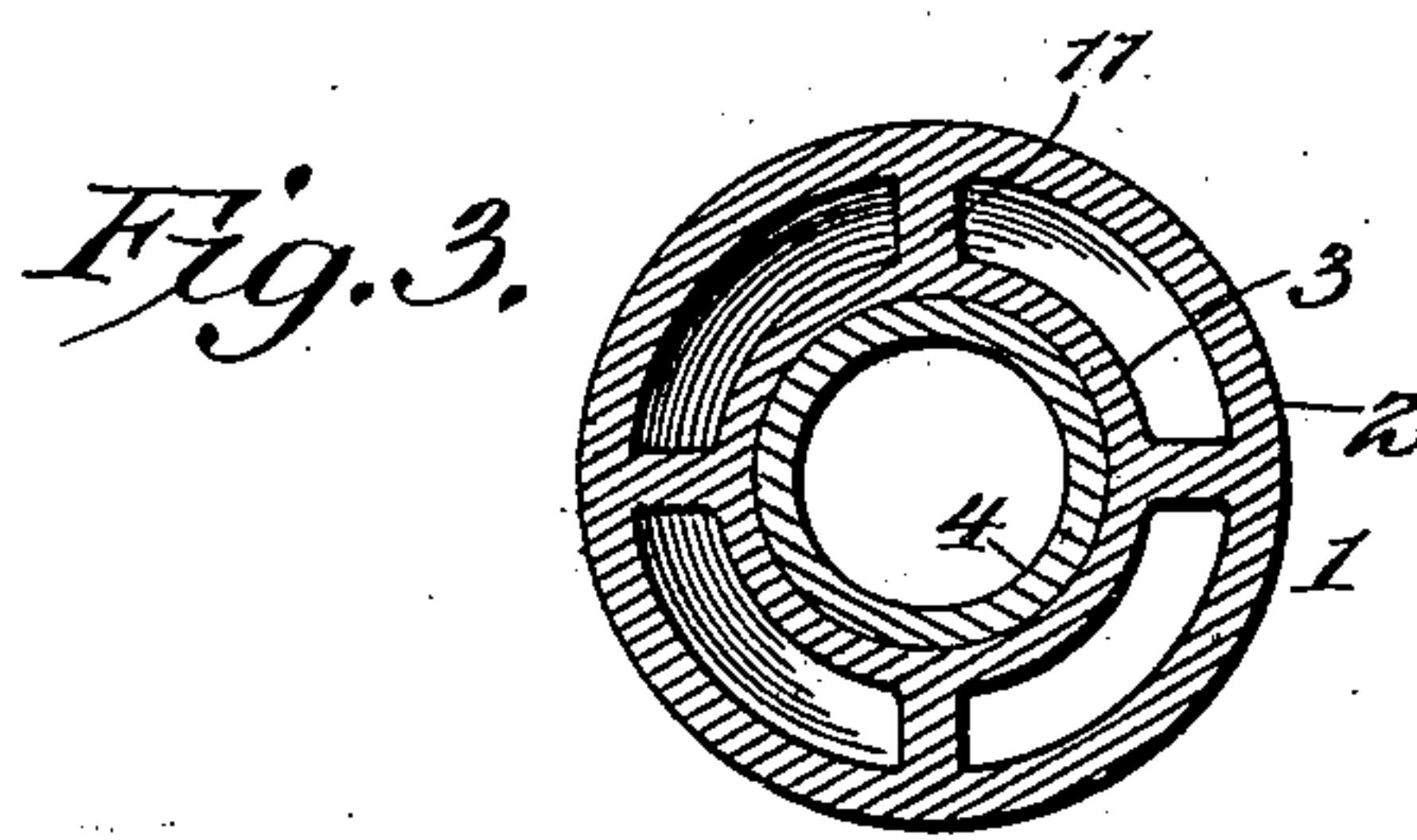
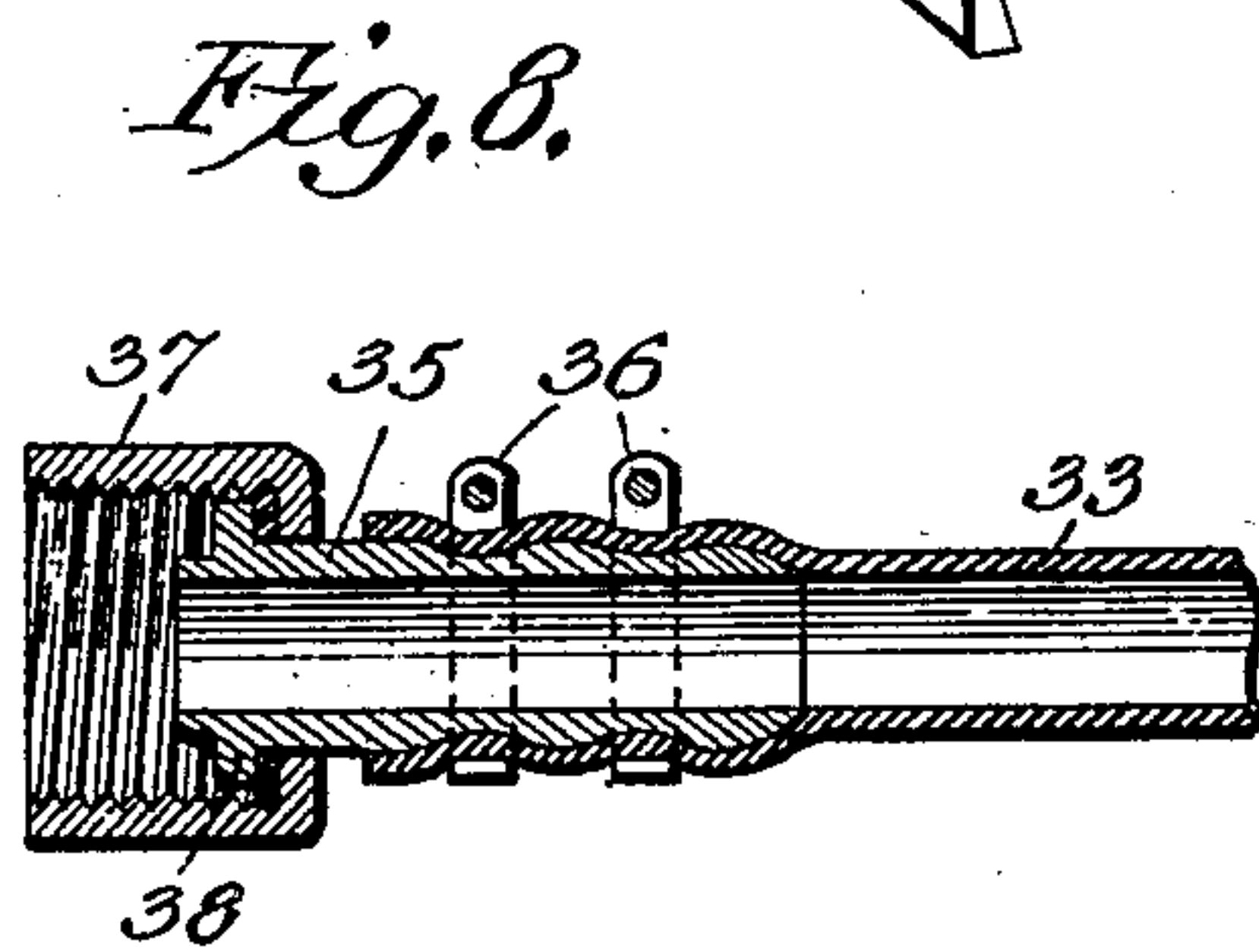
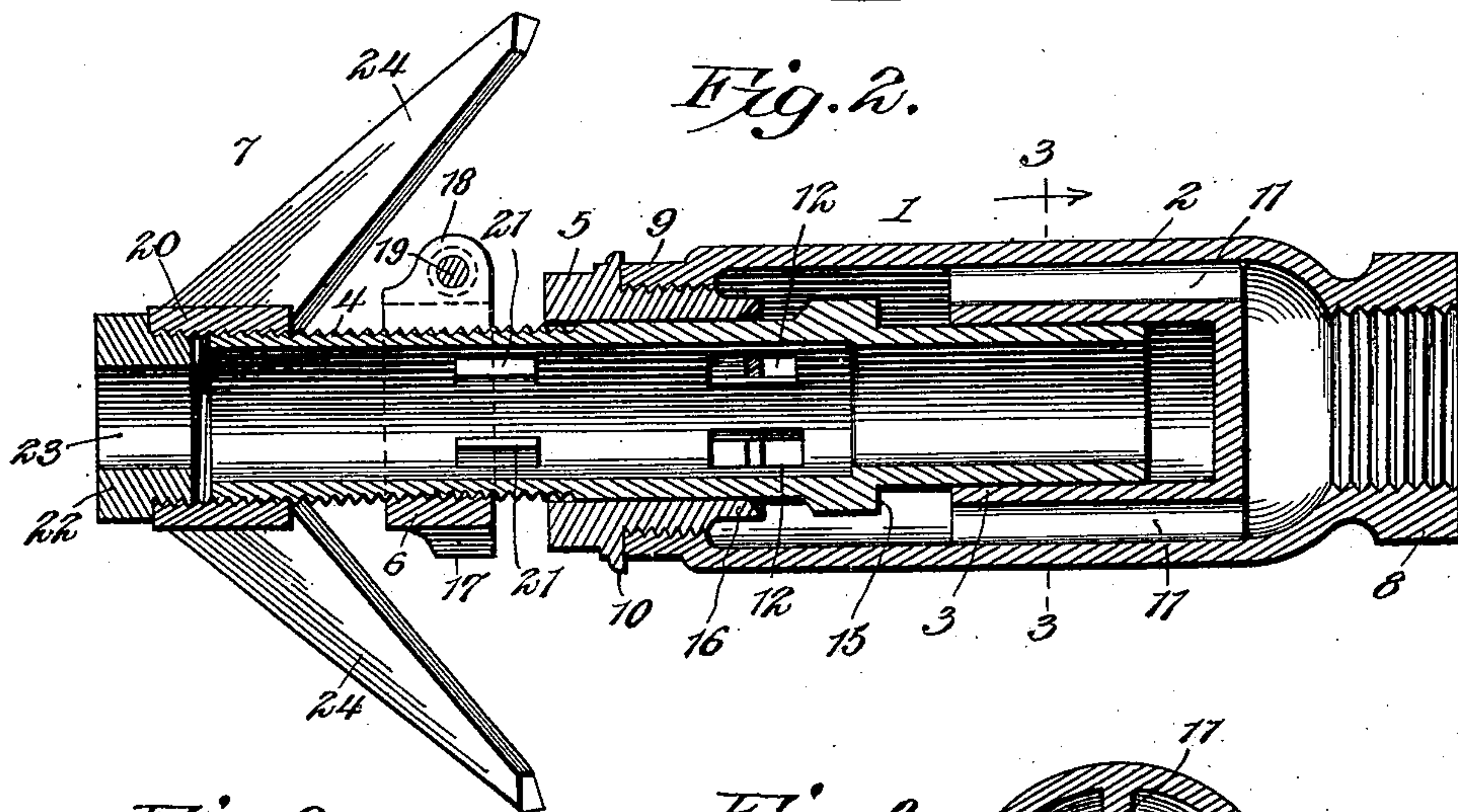
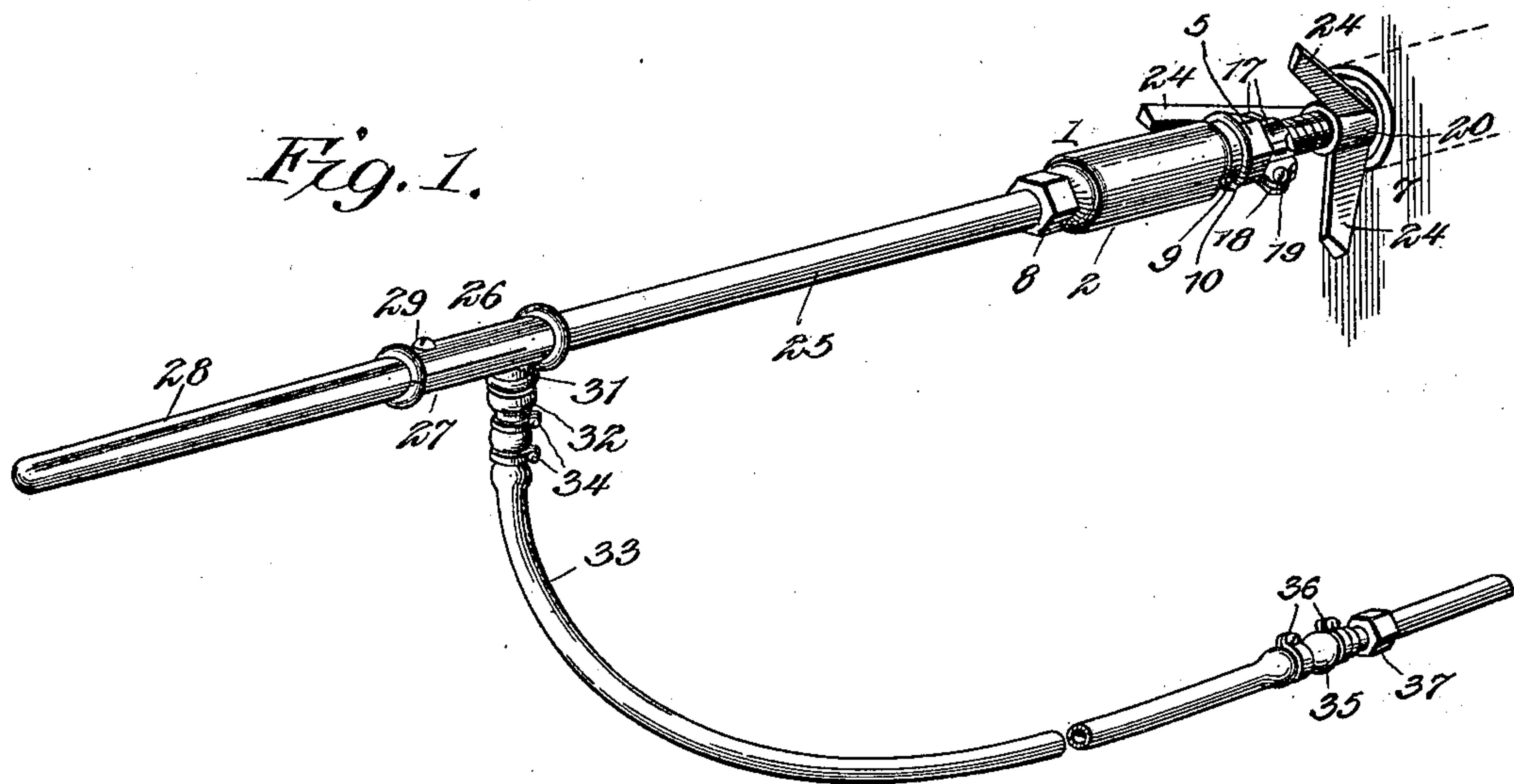
Patented Jan. 7, 1902.

M. SNYDER.  
BOILER TUBE CLEANER.

(Application filed May 22, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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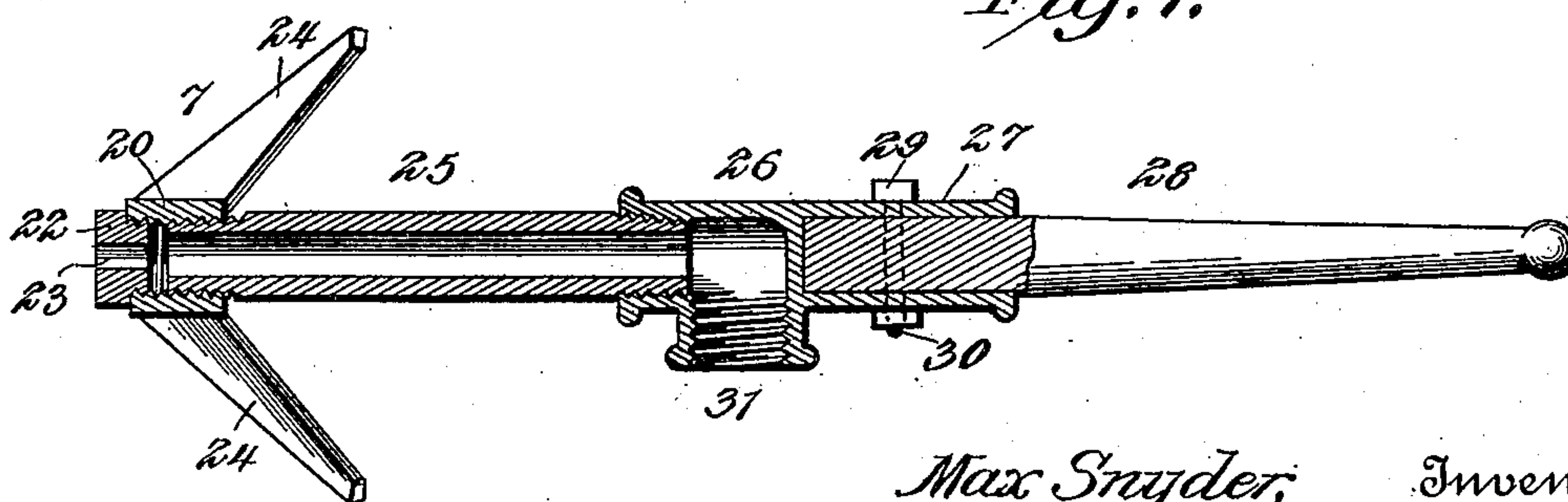
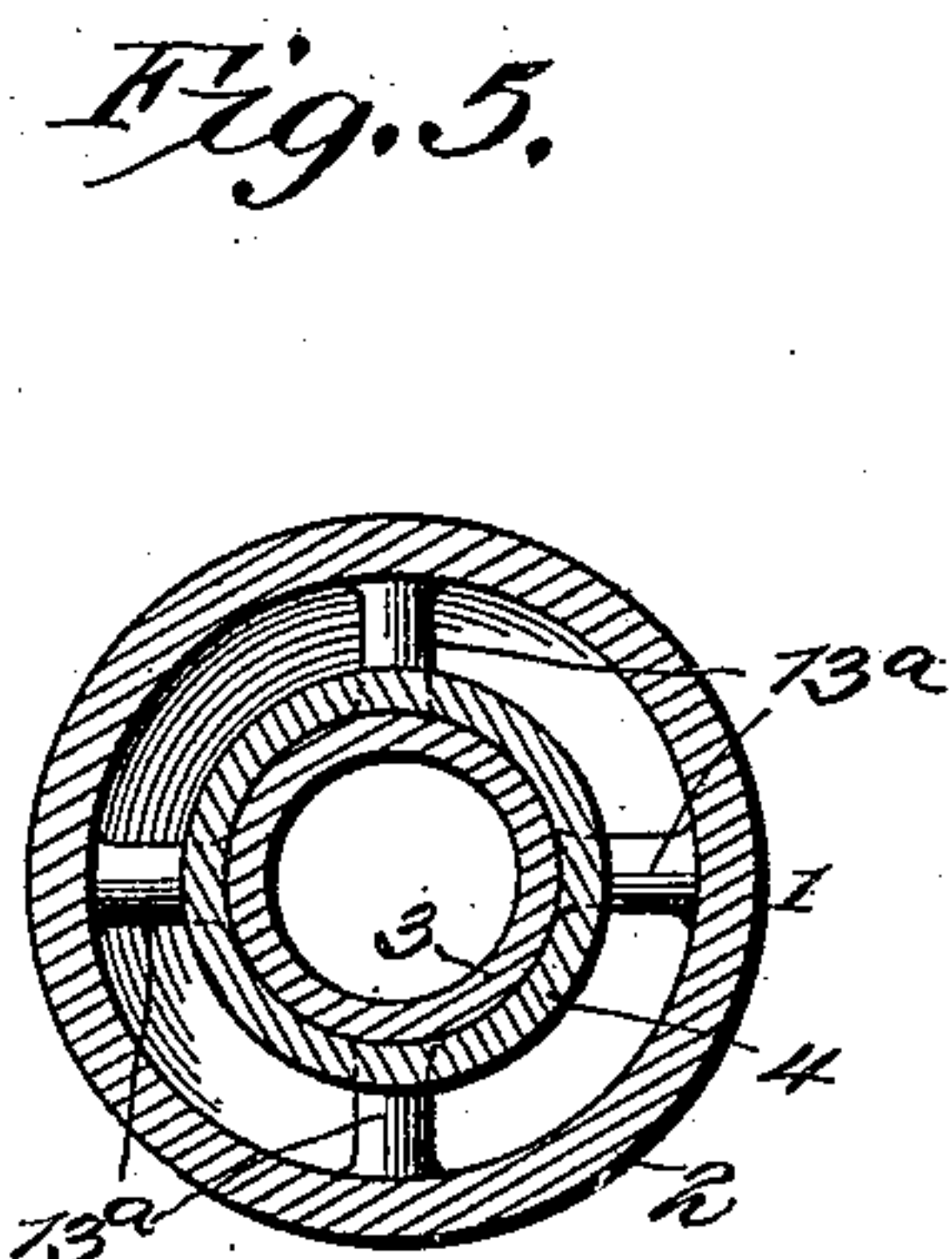
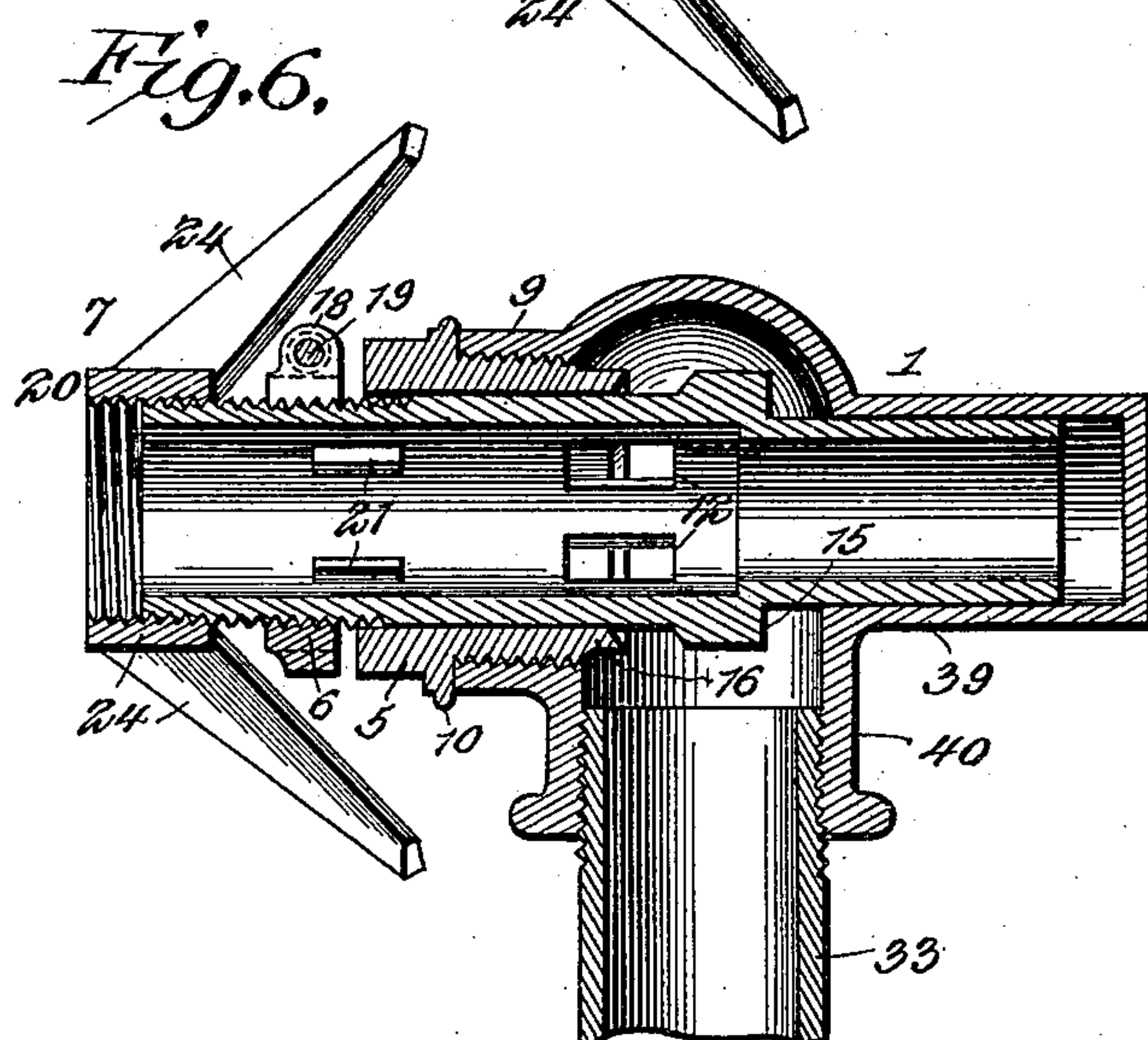
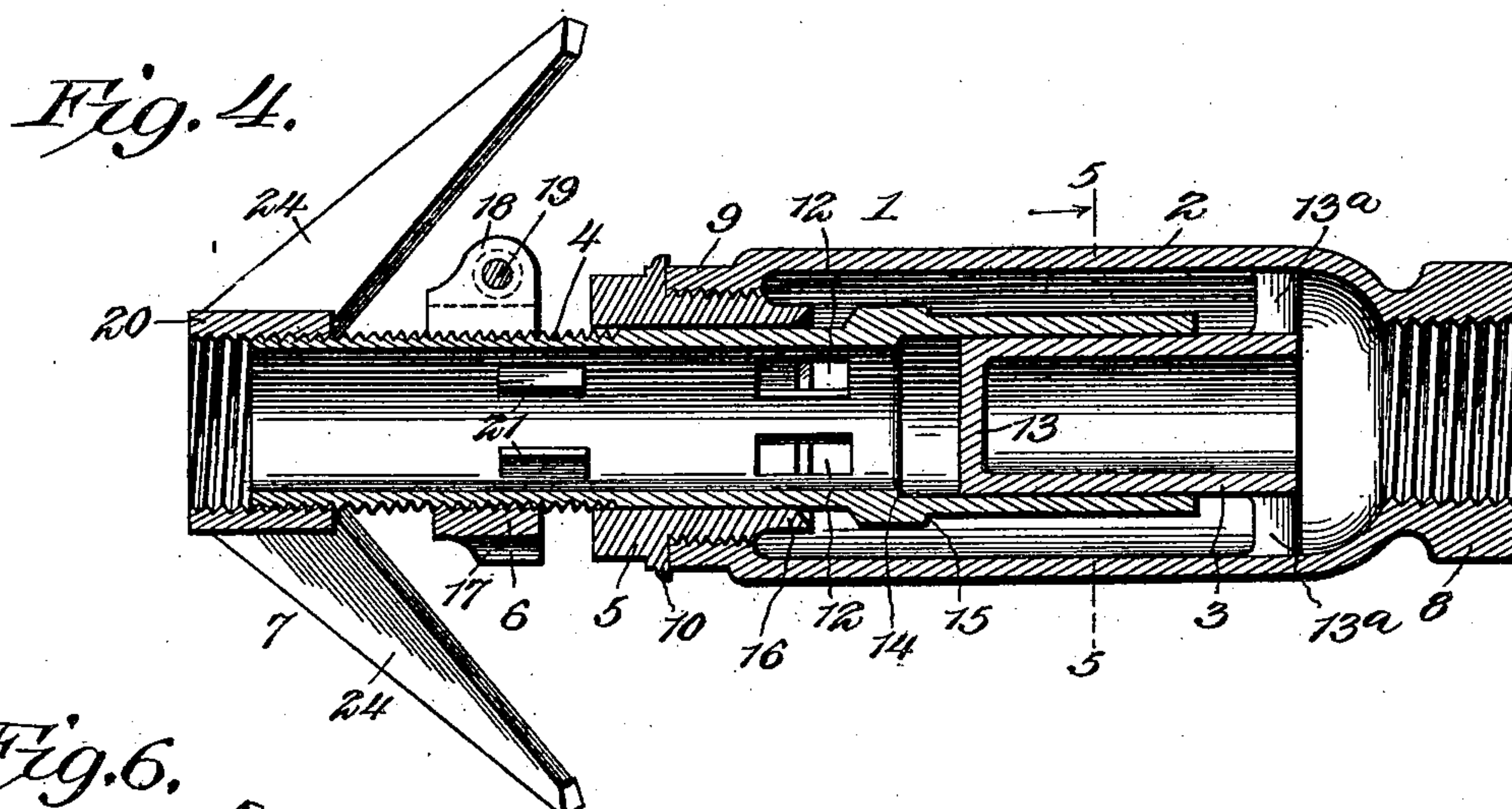
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(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

MAX SNYDER, OF BEATTY, PENNSYLVANIA.

## BOILER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 690,474, dated January 7, 1902.

Application filed May 22, 1901. Serial No. 61,429. (No model.)

*To all whom it may concern:*

Be it known that I, MAX SNYDER, a citizen of the United States, residing at Beatty, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Boiler-Tube Cleaner, of which the following is a specification.

This invention relates to boiler-tube cleaners, and more particularly to cleaners of that class wherein fluid under pressure, such as steam or air, is employed to remove accumulated soot, ashes, &c., from the interior of boiler-tubes.

The objects of the invention are to increase the efficiency of the cleaner, to remove accumulations, to lessen the labor required to operate it, to effect desired regulation of the amount of steam that is to escape through the cleaner, and generally to improve the construction and manner of arrangement of the parts of cleaners of this character, all with a view to increase in usefulness, simplifying the construction, and reducing the cost of production.

The object first stated is attained by the provision of a head of such character as to permit ingress into the tube of a volume of air approximately as large as that of the steam, whereby condensation of the steam on the tube is practically obviated, resulting in more rapid and thorough cleaning than where steam alone is relied upon for dislodgment and removal of the soot, &c.

The object second stated is attained by reducing the surface upon which the entering steam will act, thereby in proportion reducing the resistance of the head to being pushed inward by the operator for the purpose of allowing steam to escape to the flue.

The object third stated is attained by combining with the cleaner a regulating-nut, by means of which the area of the steam or escape ports or openings exposed may be increased or diminished at will.

The object fourth stated is attained by constructing the cleaner of as few number of parts as possible and assembling these in such manner as to be at once strong, compact, durable, and not easy of derangement in use.

Further and more specific details of construction and advantages arising from the

cleaner of this invention will hereinafter be fully pointed out and claimed.

In the accompanying drawings, forming a part of the specification, and in which like numerals of reference indicate corresponding parts, I have illustrated a few of the different ways in which my invention may be carried into effect, it being understood that the underlying principle inherent in this invention may be otherwise embodied without departing from the invention.

In the drawings, Figure 1 is a view in perspective exhibiting an organized cleaner in operative relation with a boiler-tube. Fig. 2 is a longitudinal vertical sectional view through the head shown in Fig. 1. Fig. 3 is a transverse sectional view taken on the line 3 3, Fig. 2, looking in the direction of the arrow thereon. Fig. 4 is a similar view of a slightly-modified form of head. Fig. 5 is a transverse sectional view taken on the line 5 5 of Fig. 4. Fig. 6 is a view of still another slightly-modified form of head. Fig. 7 is a view in elevation, partly in section, exhibiting the device when employed as a constant blower. Fig. 8 is an enlarged detail sectional view exhibiting the coupling by which the steam-pipe is connected with the steam-supply.

Referring to the drawings and to Fig. 1 thereof, 1 designates generally the head or body of the cleaner, comprising a shell or casing 2, a guide or socket 3, rigid with the shell, a hollow stem or spindle 4, constituting an automatic cut-off, a bushing-nut 5, a steam-regulating nut 6, and a stop or head 7.

The shell or casing 2 is a hollow structure, preferably circular in cross-section, and is provided at one end with a threaded octagonal or other shaped extension 8 and at its opposite end with an interiorly-threaded constricted portion 9, which is engaged by the bushing-nut 5, the nut having a shoulder 10 to bear against the end of the shell or casing to limit inward movement. The guide or socket 3 is cast integral with the shell or casing by means of fins 11, of which there are four shown in this instance, extending practically from end to end of the guide or socket; but it is to be understood that the number of these fins may be increased or diminished



without departing from the scope of my invention. The space between the socket and the inner wall of the shell or casing constitutes a passage-way for the steam, the steam  
 5 escaping through ports or openings 12, provided in the stem or spindle intermediate of its ends, whence it passes outward through the spindle and into the boiler-tube. As shown in Fig. 2, the part 3 constitutes a guide and  
 16 socket, as the rear portion of the hollow stem fits therein and is guided thereby. In Fig. 4 the part 3 constitutes a boss or guide, as in this latter case the rear end of the stem or spindle fits over and works upon the part, and  
 15 in order to prevent escape of steam through the guide 3 shown in this latter figure the end is closed by a solid wall 13. When the part 3 constitutes a hollow boss or guide, as just described, the fins are dispensed with  
 20 and the post is associated with the shell or casing by arms 13<sup>a</sup>, arranged at the rear end of the boss. The portion of the stem or spindle shown in Fig. 2 that engages the guide and socket 3 is of less diameter than that  
 25 engaging the bushing-nut, and between these two parts and contiguous to but at the rear of the ports 12 is arranged a circumferential flange 14, preferably integral with the spindle, the inner face 15 of this flange presenting a surface against which the steam  
 30 will impact, and thereby normally operate to project the spindle outward. By reducing the diameter of the portion of the stem or spindle that works in the socket 3 and increasing the diameter of that portion working  
 35 in the bushing-nut a larger area is presented for the steam to act upon, and in proportion to this increase in area will be the resistance presented by the stop or head to being forced  
 40 inward to permit the escape of steam through the spindle, while if the cross-diameter of the part working in the guide or socket is increased and that working within the bushing-nut 5 be reduced the reverse will be effected—that is to say, it will require less force  
 45 to move the head or stop 7 toward the shell or casing. By observing the proportion between the parts referred to the ease with which the device may be operated will be determined.  
 50

Arranged on the spindle between the head or stop 7 and the bushing-nut 5 is the steam-regulating nut 6, the same being provided for the purpose of controlling the escape of steam  
 55 through the ports 12 and into the boiler, the purpose being to obviate waste of steam, as where a comparatively small tube is being cleaned it will not require the same amount of steam as where a large one is being cleaned.  
 60 To effect this regulation of escape of steam, it will only be necessary to move the steam-regulating nut 6 toward the bushing-nut 5, thereby controlling the outward throw of the stem. Where the adjusting-nut is moved up  
 65 close to the head or stop 7, the stem will have such range of movement as entirely to clear the ports 12 from the inner portion 16 of the

nut 5, thereby allowing the escape through the ports of the full volume of steam. By moving the regulating-nut toward the bush-  
 70 ing-nut the throw of the stem will be shortened, so that upon the stem being moved inward only a portion of the length of the ports will be freed, and so on down to as fine an adjustment as may be desired. As shown  
 75 herein, the regulating-nut 6 is provided with flutes or arms 17, by which to permit of its being turned on the stem, and is also, by preference, split, the two members of the nut formed by the split being each provided with  
 80 a lug 18, through which passes a screw 19, operating to draw the members of the nut tightly around the spindle, and thereby hold the nut at the desired adjustment thereon.

The stop or head 7, before referred to, is a  
 85 three-armed structure, the arms being disposed toward the rear of the shell or casing and diverging outward, whereby to increase the range of usefulness of the head, so as to be used in relation with small or large tubes.  
 90 The arms are carried by a threaded collar 20, preferably integral with the arms, the collar having a threaded connection with the stem, as clearly shown in Fig. 2. In order to permit the head or stop to be screwed tightly  
 95 upon the stem, the interior of the stem is provided with two oppositely-disposed lugs 21, which are to be engaged by a flat piece of metal to be held by a wrench, so that, as will be obvious, the head may be turned without  
 100 imparting any motion to the stem. As shown in Fig. 2, only a portion of the threads of the collar of the stop or head are in engagement with the stem or spindle, the remaining  
 105 threads being engaged by a nut or bushing 22, the center orifice 23 of which is considerably smaller than the bore of the stem or spindle. This nut 22 may be employed where it is desired to increase the projectile force of the steam, as by providing this nut the  
 110 force of discharge of the steam is accentuated. It is to be understood that the nut 22 is not employed under all circumstances and may be omitted without changing the operation of the device. The arms 24 of the head or  
 115 stop are made as thin in cross-section as consistent with security of operation, thereby to present as small an obstruction to the intake of air into the tube along with the steam as practicable, and in order further to reduce  
 120 the obstruction presented by the arms these are made wedge-shaped in cross-section with the thin end toward the rear of the shell or casing. By this arrangement the surface presented to the incoming air is reduced to the  
 125 smallest possible area.

Connecting with the portion 8 of the shell or casing is one end of a tube or pipe 25, and on the other end of this pipe is secured a T-coupling 26, one member 27 of which, in line  
 130 with the pipe 25, is engaged by a wooden handle 28, by which the cleaner may be moved into engagement with tubes of the boiler, the handle being held in place within the mem-



ber 27 by a bolt 29, carrying a nut 30. The remaining member 31 of the T-joint is engaged by a hose-coupling 32, upon which is secured one end of a section of hose 33, the hose being held on the coupling 32 by bands or other suitable holding means 34. The other end of the section of pipe 33 carries another hose-coupling 35, which is likewise held assembled with the section of hose 33 by bands or other suitable fastening means 36. The coupling 35 carries a threaded collar 37, loosely assembled with the coupling 35 and held in place thereon by a flange 38, the collar 37 to be screwed onto the steam-supply pipe in a manner that will be readily understood.

The form of device shown in Fig. 4 is, with the exception of the arrangement of the guide or socket 3, a counterpart of that shown in Fig. 2. In Fig. 6, however, the guide or socket 3 as a separate element is dispensed with and the rear end of the casing is extended, as shown at 39, to constitute the guide or socket. Instead of having the steam enter the casing from the end, as shown in Figs. 1, 2, and 3, the casing is provided with a threaded offset 40, arranged at right angles to its length, and this offset is engaged by the steam-pipe 33. The means for operating the cleaner shown in this figure—that is to say, the handle, &c.—are the same as that shown in Fig. 1. Should it be desired to employ the device as a constant blower—that is to say, to dispense with the automatic cut-off comprised in the stem and casing—these parts will be removed and the head or stop will be screwed onto the end of the pipe 25, as shown in Fig. 7, and into the collar of the head or stop will be screwed the bushing 22. As shown in this figure the form of shell or casing is the same as that exhibited in Fig. 4; but it is to be understood that I may employ the form of shell or casing shown in Figs. 2 and 3 and still be within the scope of my invention.

The operation of the cleaner is as follows: The collar 37 being secured to a suitable steam-supply and the steam turned on, the steam immediately rushes through the coupling 32, through the pipe 25, into the shell or casing, around the guide or socket 3, and immediately projects the cut-off outward, thereby preventing escape of steam. The operator, holding the device by the handle 28, presses the head or stop against a boiler-tube, as shown in Fig. 1, thereby forcing the cut-off inward and permitting the steam to escape through the ports 12, out through the spindle, and into the tube. The inrush of steam sets up a vacuum at the front end of the tube, and this is filled by air rushing into the tube and passing therethrough along with the steam. As pointed out, by having the air admixed with the steam the tube is comparatively dry, so that the removal of the soot is rendered easy. When the tube has been cleaned and the stop or head 7 is moved out of engagement therewith, the stem or cut-off will instantly be projected outward, thereby pre-

venting escape of steam, the operation above described being repeated throughout the series of tubes. In using the device shown in Fig. 7 the escape of steam is continuous and is controlled from its steam-supply pipe.

From the foregoing description it will be seen that I have in a simple, efficient, and thoroughly practical manner provided for every contingency arising in the use of a boiler-cleaner. As shown and described, the parts are all of such simple construction that there will be practically no danger of breakage or derangement in use, and as the parts can be made in standard sizes should one part become broken it can be readily replaced and with but a slight expense.

It will be observed that the front face of the marginal flange 14, carried by the tubular stem 4, forms a valve to cooperate with the valve-seat portion 16 of the nut 5, while the rear face of said marginal flange forms a steam impact, whereby the valve is held normally seated so as to close the ports 12.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is—

1. A boiler-tube cleaner comprising a shell or casing having an inlet and an outlet, an endwise-movable hollow stem projected through the outlet and provided with an outer discharge end, an intermediate port, and an outer terminal tube-engaging head, and means for normally holding the stem at its outer limit with the port closed, said stem being inwardly yieldable under pressure to open the port.

2. A boiler-tube cleaner, comprising a shell or casing having an inlet, an outlet, and an internal valve-seat, an endwise-movable tubular stem working through the valve-seat, and projected outwardly through the outlet of the casing, there being an external marginal flange carried by the stem and directed to form a valve for cooperation with the valve-seat and also to form a steam impact, the intermediate portion of the tubular stem being provided with a port located between the marginal flange and the valve-seat, the stem also being inwardly yieldable under pressure to open the port, and a tube-engaging head provided upon the outer end of the stem.

3. A boiler-tube cleaner, comprising a shell or casing having an inlet, an outlet, and an internal valve-seat, an endwise-movable tubular stem working through the seat and having an outer open end projected beyond the casing, there being a port formed in the tubular stem and normally closed by the valve-seat, a tube-engaging head carried by the



outer end of the stem, and means for normally holding the stem at its outer limit by the pressure of the steam within the casing.

4. A boiler-tube cleaner, comprising a shell or casing having an inlet and an outlet, an endwise-movable tubular stem projected through the outlet and provided with an inlet-port, the outer end of the stem being open and provided with a tube-engaging head, and means for holding the stem at its outer limit with its port closed by the pressure of the steam within the casing.

5. A boiler-tube cleaner, comprising a shell or casing having an inlet and an outlet, an endwise-movable tubular stem projected through the outlet and provided with a normally closed port, the outer end of the stem being open and provided with a tube-engaging head, and means for yieldably holding the stem at its outer limit to close the port, whereby the stem is capable of being moved inwardly under pressure upon the head to open the port.

6. A boiler-tube cleaner having an endwise-movable tubular discharge-stem provided with an inlet-port and an outer open discharge end, means for yieldably holding the stem at its outer limit to close the port, whereby said stem is movable inwardly under pressure to open the port, and a tube-engaging head carried by the outer end of the stem.

7. A boiler-tube cleaner comprising a shell or casing provided at one end with a threaded extension, and at its opposite end with a threaded constricted portion, a tubular guide or socket arranged concentrically of the casing and held associated therewith by fins, the spaces between the fins and the inner side of the casing constituting steam-escapes, a spindle working in the socket and provided with an impact-surface and with escape-ports, a nut engaging the constricted portion of the casing, and having a portion cooperating with the ports to constitute a cut-off, a head carried by the spindle, and a nut adjustable on the spindle to regulate the escape of steam.

8. A boiler-tube cleaner comprising a shell or casing provided with a guide or socket, a hollow spindle movable in the socket and provided with escape-ports, a nut in engagement with the casing in which the spindle works and is guided, the inner portion of the nut constituting a cut-off with relation to the ports, a collar adjustable on the spindle, and a head detachably connected with the spindle, the head comprising a collar carrying a plurality of rearwardly-diverging arms.

9. A boiler-tube cleaner comprising a shell or casing having an interiorly-arranged guide or socket, a hollow spindle movable in the socket and provided with escape-ports, a nut carried by the casing and having its rear portion adapted normally to overlap the ports whereby to cut off the escape of steam there-through, a nut on the spindle exteriorly of the casing to limit the inward movement of the spindle, and a head carried by the spindle.

10. A boiler-tube cleaner comprising a shell

or casing, a hollow spindle working within the casing, a head carried by the spindle, and a split nut on the spindle exterior to the casing, the nut being provided with extended arms or flutes, and means for clamping the nut securely on the spindle.

11. A boiler-tube cleaner comprising a shell or casing, a hollow spindle movable therein and provided with escape-ports, a nut carried by the casing and having its rear portion constituting a cut-off when the spindle is projected outward, a nut carried by the spindle to regulate the inward movement thereof, the nut being provided with means for clamping it on the spindle, thus to hold it at the desired adjustment, and an armed head carried by the outer end of the spindle.

12. A boiler-tube cleaner comprising a shell or casing, a spindle movable therein and provided with escape-ports, means for controlling the outward throw of the spindle, and a nut on the spindle for controlling the inward throw of the spindle, the nut being split and provided with orificed bosses, and a screw passed through the bosses to clamp the members of the nut securely around the spindle.

13. A boiler-tube cleaner, comprising a shell or casing having an inlet and an outlet, an endwise-movable tubular stem projected through the outlet, and provided with an inlet-port, means for regulating the inward and outward movements of the stem, and a tube-engaging head carried by the outer end of the stem.

14. In a boiler-tube cleaner, the combination with a shell or casing having an inlet and an outlet, of an endwise-movable tubular stem projected through the outlet, and provided with an inlet-port, the outer end of the stem being open and provided with a tube-engaging head, means for yieldably holding the stem at its outer limit, and a handle carried by the rear end of the casing.

15. A boiler-tube cleaner comprising a shell or casing, a spindle movable therein and provided with escape-ports, means for controlling the inward and outward throw of the spindle, a head carried by the spindle, and a bushing-nut carried by the head, the orifice in the bushing-nut being of less diameter than the bore of the spindle thereby to accentuate the force of the escaping steam.

16. A boiler-tube cleaner, having a tubular discharge member, a tube-engaging head carried by the outer end of the tubular member and having a bore in communication therewith, and a reducer removably fitted in the bore of the head.

17. A boiler-tube cleaner, having a tubular discharge member, a tube-engaging head carried by the outer end of said member and having a bore in communication with the interior thereof, and a reducer-plug removably fitted in the outer end of the bore of the head and having a discharge-opening of smaller diameter than that of the head.

18. A boiler-tube cleaner, having a tubular



discharge member, a tube-engaging head embodying a collar which is internally threaded and applied to the outer end of the tubular discharge member, the outer end of the collar being projected beyond the tubular member, and an externally-threaded reducer-plug removably fitted in the outer projected end of the collar and having a bore of less diameter than that of the collar.

10 19. A boiler-tube cleaner, comprising a shell or casing having an inlet and an outlet, an endwise-movable tubular stem projected through the outlet, and provided at its outer end with a tube-engaging head, there being  
15 an intermediate marginal steam-space about the stem, a marginal impact-flange upon an intermediate portion of the stem and lying within the steam-space, and the stem also having an inlet-port located in advance of the  
20 impact-flange.

20 20. In a boiler-tube cleaner, the combination with a shell or casing having an inlet and a contracted outlet, of an endwise-movable tubular stem projected through the contracted  
25 ed outlet and provided with a port which is

normally closed by said contracted outlet, an external marginal flange carried by the tubular stem and in rear of the port, said flange terminating short of the walls of the casing, and having its front face constructed for normal engagement with the inner end of the contracted outlet and its rear face constructed to form a steam impact, and a tube-engaging head carried by the outer open end of the tubular stem.

21. In a boiler-tube cleaner, a tubular discharge member having an open outer end, and a tube-engaging head carried thereby and comprising a collar adjustably embracing the open end of the discharge member and carrying rearwardly-directed and outwardly-inclined arms.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MAX SNYDER.

Witnesses:

EUGEN. ERB,  
JOHN V. TONER.