

No. 656,446.

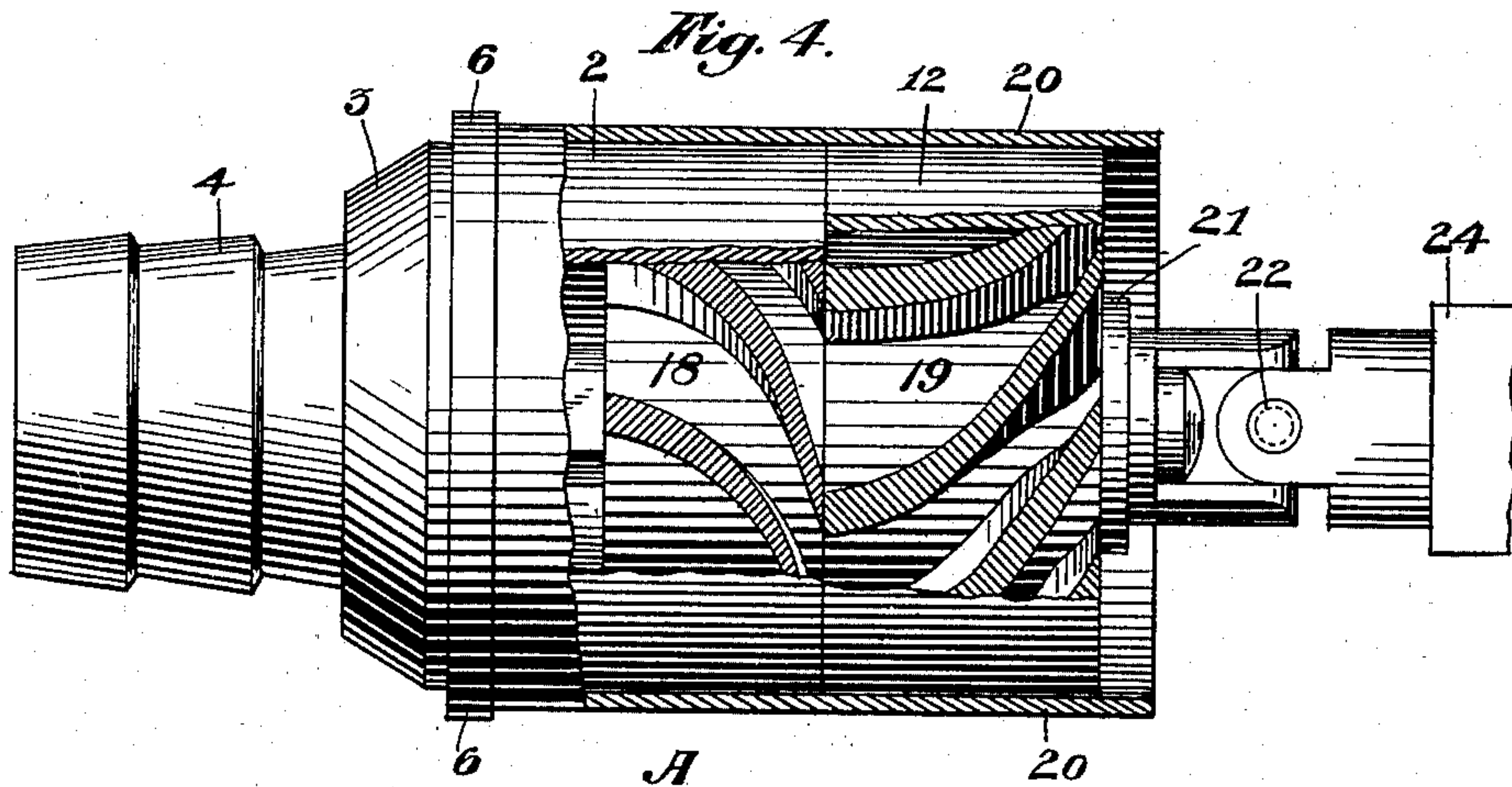
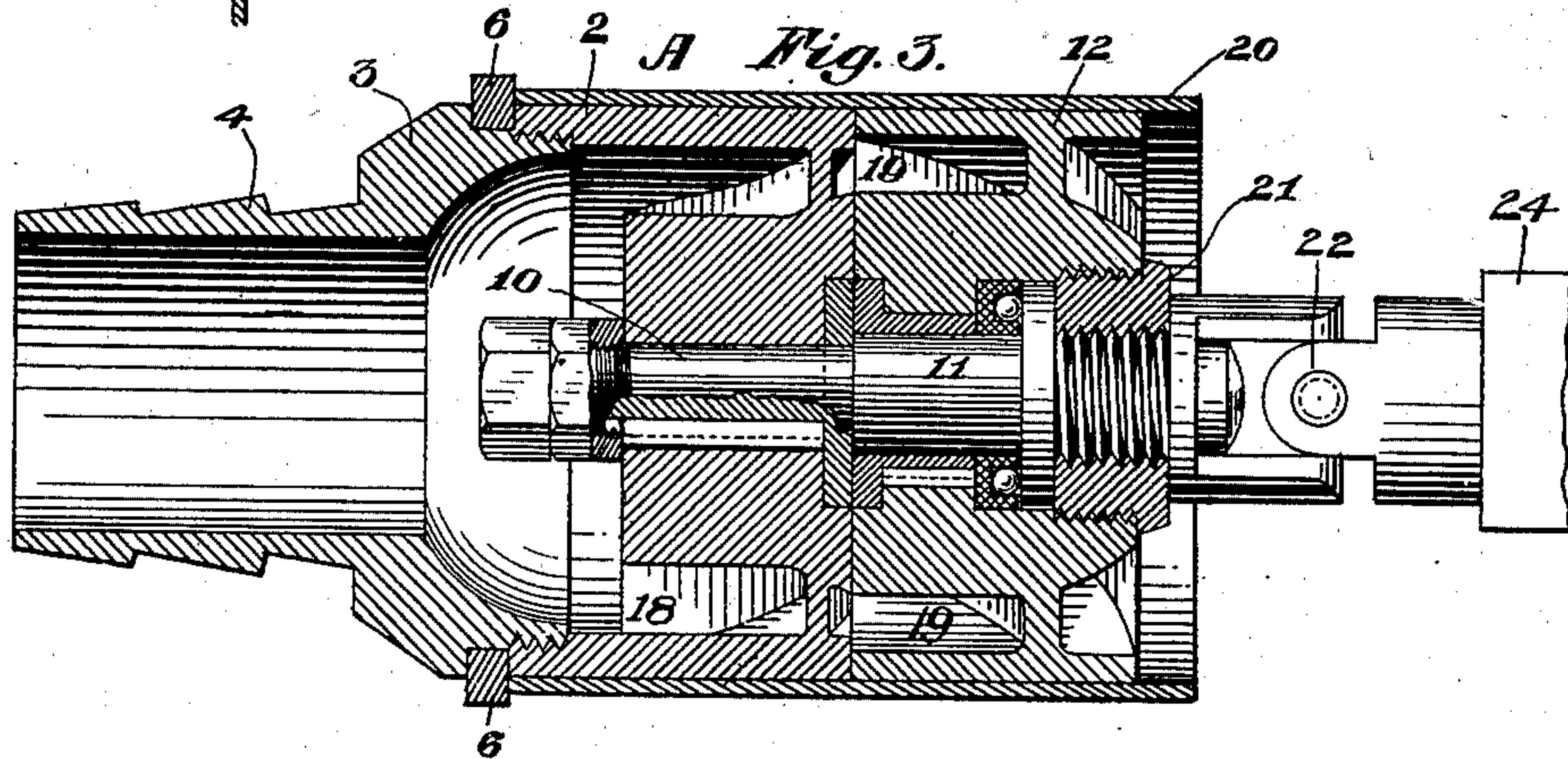
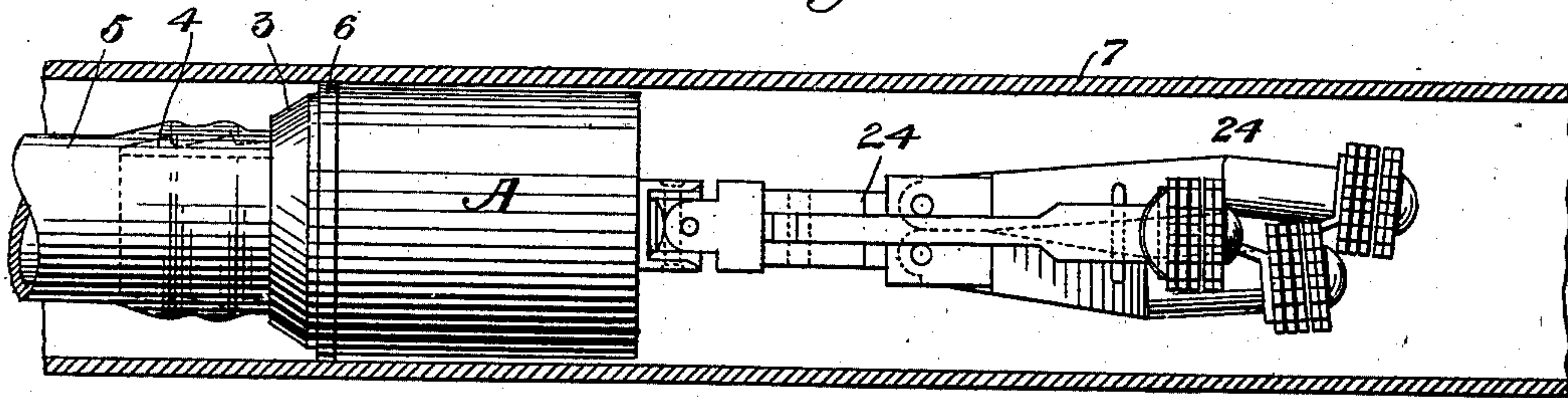
Patented Aug. 21, 1900.

W. S. ELLIOTT.
TUBE CLEANING APPARATUS.

(Application filed Nov. 4, 1898.)

(No Model.)

Fig. 1.



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UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

TUBE-CLEANING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 656,446, dated August 21, 1900.

Application filed November 4, 1898. Serial No. 695,448. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. ELLIOTT, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented or discovered a new and useful Improvement in Tube-Cleaning Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming
10 part of this specification, in which—

Figure 1 is a view in side elevation of a rotary motor in tandem connection by a flexible joint with a scale-removing tool located within a surrounding boiler-tube. Fig. 2 is
15 a view in elevation, on a reduced scale, illustrating the means employed for graduating the travel. Fig. 3 is a central longitudinal section through the motor on an enlarged scale. Fig. 4 shows the motor with part of
20 the cylindrical water-shield removed and the outer shell of the stationary and rotating turbine wheels partially broken away.

My present invention relates to the art of tube-cleaning apparatus, and refers more
25 particularly to the means for imparting rotatory motion to a centrifugally-acting tool and to the manner of connecting the driving and driven elements thereof by means of a universal coupling. In mechanism of this
30 class the disintegration and removal of the adhering scale is accomplished by means of a series of rapid blows, and I have found that the best results are secured by the action of flexibly-mounted cutting devices rotated at
35 high speed within the tube, and for the purpose of securing greater freedom of action and better results, especially in bent or curved tubes, I have found it desirable to attach the cutting-tool to the traveling driving-motor by
40 a universally-adjustable intervening coupling.

Referring now to the drawings, A represents the motor, which may be of any desired or preferred construction. In the present
45 instance I have illustrated a fluid-actuated turbine having a non-rotating portion 2, to the rear end of which is attached by screw-threads the hollow cap 3, having an extension 4, to which is to be secured a hose 5, by which
50 fluid under pressure is conveyed to the motor in its forward travel through the tube.

At any convenient point on the motor is

secured a gage-ring 6, of a diameter somewhat larger than that of the motor and but slightly less than that of the tube 7, within which it
55 operates, the purpose of which ring is to indicate to the operator whether or not the scale has been altogether removed in advance of the ring, as it is manifest that the forward travel of the motor will be arrested by any
60 scale still adhering to the tube, and the operator by withdrawing the motor and tool may subject such part to further action. For the purpose of affording a ready means of indicating the position of the tool and its distance
65 of travel from the entering end of the tube I have placed graduating-marks 23 upon the hose, which may be of any desired character and distance apart, such marks being arranged relatively to any desired portion of
70 the tool—as, for instance, the gage-ring 6—and these marks will indicate to the operator at exactly what position the turbine and tool are located in the tube. It will thus be seen that in case any adhering scale remains in
75 the rear of the tool it will be detected by the operator, who will then draw back the tool, so as to again operate on such part.

Mounted in the center of the head 2 is a spindle 10, upon the outer end 11 of which is
80 rotatably mounted the turbine 12 in such a manner as to permit of its easy rotation thereon.

The head and turbine are provided with the usual passages 18 19, so disposed as to
85 secure the best results from passage of the current with the freest exhaust, and for the purpose of confining the current and preventing lateral leakage from the middle joint I have provided a sheathing 20, tightly secured
90 to the head 2 and extending beyond the outer end of the turbine, which makes a neat rotating fit within such sheathing.

Secured in the outer end of the turbine is an internally-threaded bushing 21, into which
95 is screwed or otherwise secured one end of a universal flexible coupling 22, to the other end of which is attached by suitable means the head 24 of the scale-removing tool. This tool may be of any desired construction that
100 is adapted to remove the scale by rotary action, and I have secured good results from a tool provided with arms pivoted at their inner ends and having cutting devices at their ex-

tremities, although I do not desire to be limited to such construction, as it is obvious that any suitable tool that will operate under high rotary speed may be used to advantage.

In operation the motor and its attached tool are introduced at one end of the tube and gradually advanced by means of the hose 5, cleaning away the scale and discharging it through the tube in advance of the tool in its progress, while the flexibility of the coupling permits of considerable deflection of the parts, insuring thorough contact with all parts of the surface and permitting the device to be operated around bends and curves of a considerable degree with better results. A further material advantage of the flexible coupling is in the easement afforded to the tool in case of unequal hardness of the scale in different portions of the tube or of any local obstruction tending to produce lateral or torsional strain. By reason of the flexibility of the coupling the motor will readily maintain its central position and the deflection will be confined to the tool.

What I claim is—

1. A boiler-tube cleaner, comprising a tool-head having a smaller diameter than the interior of the tube and having pivoted thereto a freely-swinging arm provided with a scale-removing peripheral cutter, a rotary fluid-actuated motor adapted to travel through the tube, said motor and said tool-head each having a meeting portion disposed in the longitudinal central line of the motor and head, and each of said meeting portions formed as a member of a universal coupling

whereby the head is both rotated and caused to gyrate independently and uncontrolled within the tube.

2. A boiler-tube cleaner comprising a tool-head having a smaller diameter than the interior of the tube and having pivoted thereto a series of freely-swinging arms provided with scale-removing peripheral cutters, a rotary fluid-actuated motor adapted to travel through the tube, said motor and said tool-head each having a meeting portion disposed in the longitudinal central line of the motor and head, and each of said meeting portions formed as a member of a universal coupling whereby the head is both rotated and caused to gyrate independently and uncontrolled within the tube.

3. The combination of a fluid-actuated motor, having a scale-removing tool connected to and driven thereby, and a conductor-pipe secured to the motor and provided with graduating-marks to indicate the position of the tool in the tube being cleaned; substantially as described.

4. The combination of a fluid-actuated motor, having a scale-removing tool connected thereto, a gage-ring secured to the motor and a conductor-pipe extending to the motor and provided with graduating-marks to locate the position of the tool in the tube; substantially as described.

In testimony whereof I have hereunto set my hand.

WILLIAM S. ELLIOTT.

Witnesses:

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C. M. CLARKE.