No. 635,163. Patented Oct. 17, 1899.

W. S. ELLIOTT.

TURBINE MOTOR.

(Application filed Dec. 10, 1897.)

(No Model.)

Fig. 1.

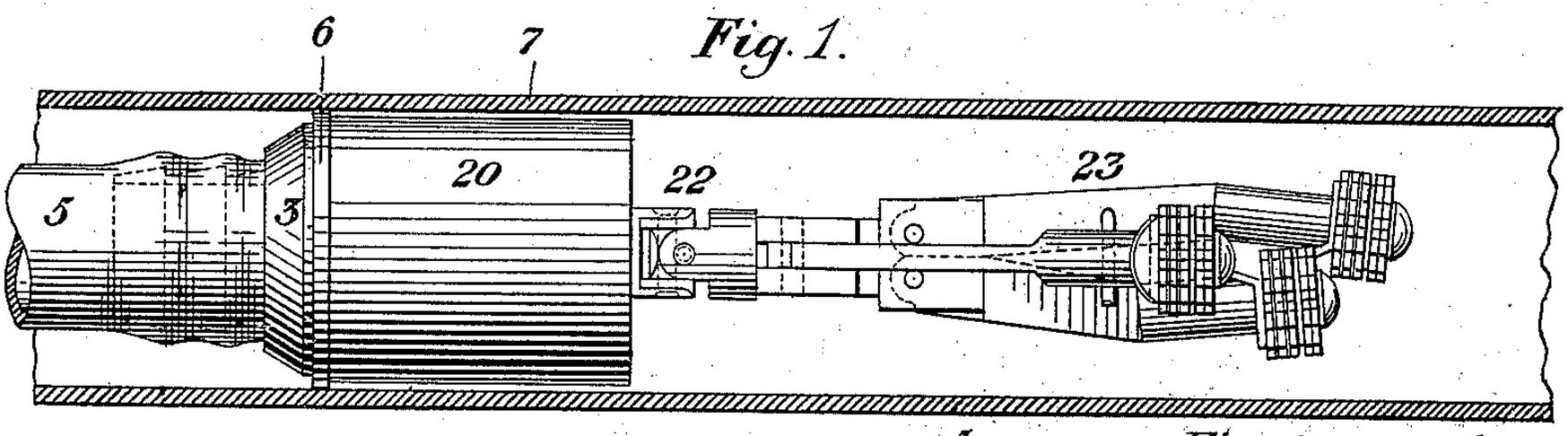


Fig. 1a.

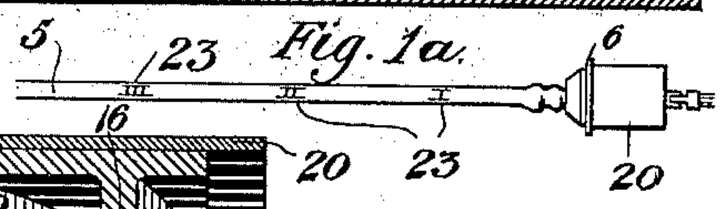


Fig. 2.

Fig. 3.

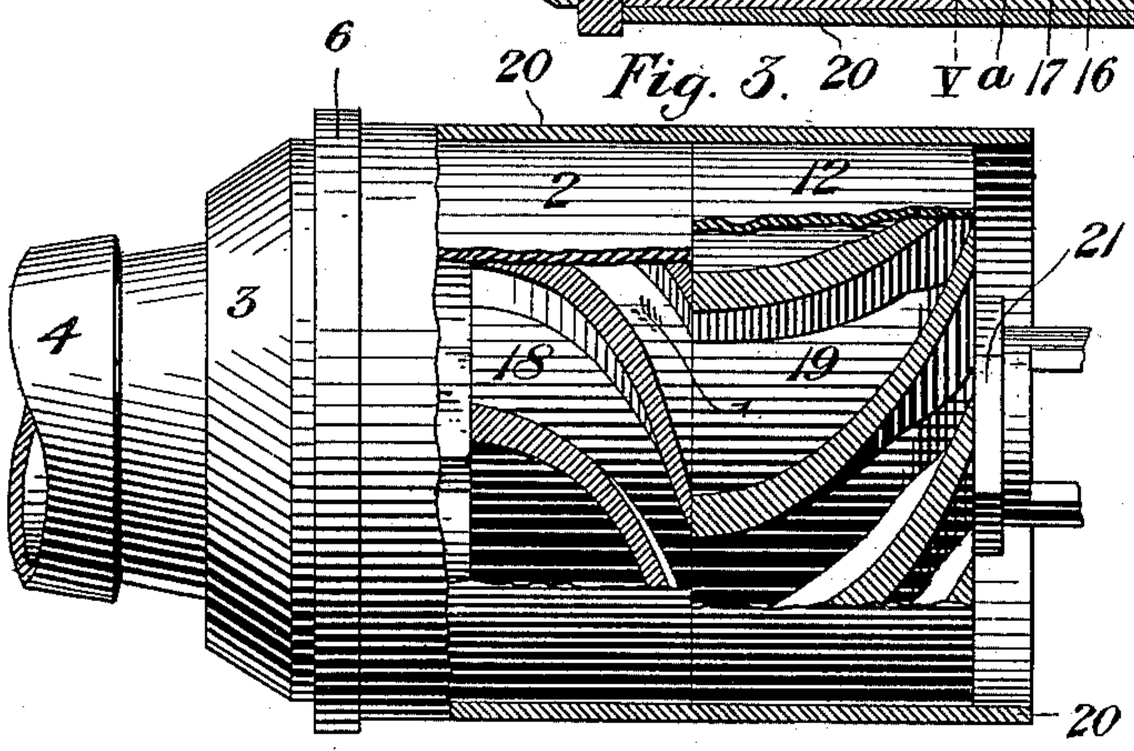


Fig. 4.

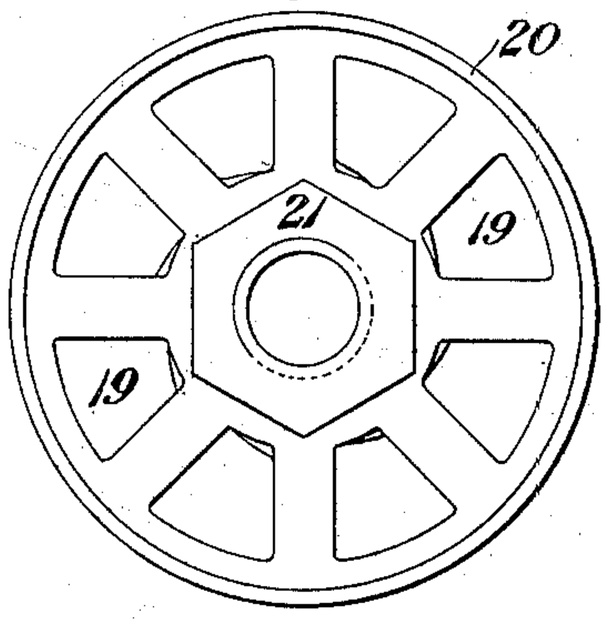


Fig. 6.

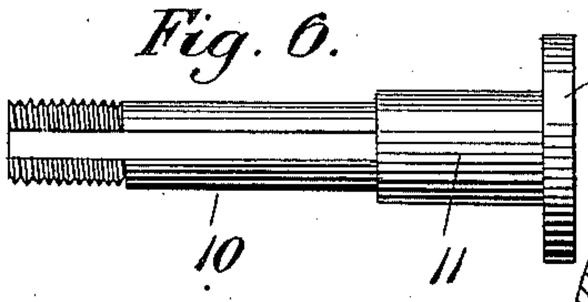
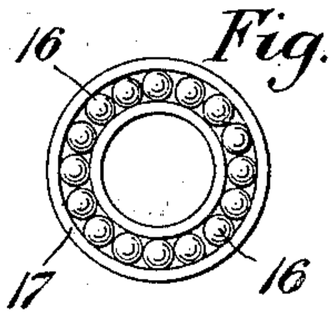


Fig. 5.

Fig. 7.



Witnesses:
L. J. Edwards
Watson Large.

Inventor:
William S. Elliott
by O. M. Clarke
his attorney.

UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

TURBINE MOTOR.

SPECIFICATION forming part of Letters Patent No. 635,163, dated October 17, 1899.

Application filed December 10, 1897. Serial No. 661,362. (No model.)

To all whom it may concern:

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

Figure 1 is a view in side elevation of my improved turbine motor in tandem connection with an approved form of centrifugally-acting scale-removing tool within a surrounding boiler-tube. Fig. 1ª is a view in elevation, on a reduced scale, illustrating the means employed for graduating the travel. Fig. 2 is a central longitudinal section through the motor on an enlarged scale. Fig. 3 shows the motor with part of the cylindrical water-shield removed and the outer shell of the stationary and rotating turbine wheels partially broken away. Fig. 4 is a view of the front end of the motor. Fig. 5 is a cross-sectional view on the line V V of Fig. 2. Fig. 6 is a detail view, in side elevation, of the central spindle. Fig. 7 is a plan view of the ball-race.

My invention relates to the class of fluid-actuated motors embodying the principles of the turbine wheel, and is particularly designed to be used in combination with a suitable tool for removing scale from the interior of boiler-tubes, the operation requiring a rotatory motion at high speed for the purpose of actuating the tool. For this purpose it is desirable that the motor and tool be coupled together and passed throughout the length of the tube, and to this end the motor is purposely made very compact and is provided with means for reducing the friction, controlling the exhaust, and indicating the action of the tool, as shall be hereinafter described.

Referring now to the drawings, 2 represents the non-rotating head of the motor, to the 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. Between the head 2 and cap 3 is clamped a gage-ring 6 of a diameter somewhat larger than the diameter of the motor and but slightly less than that of the tube 7, within which it 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 scale still adhering to the tube, and the operator by withdrawing the motor and tool may subject such part to further action. Mounted in the center of the head 2 and held in position by a key 8 and nuts 9 is a spindle 10, upon the outer enlarged end 11 of which is rotatably mounted the turbine 12, and between the head 2 and turbine 12, inserted in each, respectively, are the bearing-disks 13 14, of hardened metal, which form a bearing. At its outer end the spindle 10 is provided with a flanged head 15, between which and the central body portion of the turbine is interposed a row of balls 16, having a bearing in a circular race 17, inserted in the turbine, whereby the end thrust is brought to bear against the head 15.

It will be seen that the disk 14 is provided with a reduced collar 14′, encircling the enlarged neck 11 of the spindle 10, which collar is keyed to the turbine 12 by key *a* and abuts against the inner face of the ball-race 17. By this construction it will be seen that the disk 14 may be easily removed and renewed in case of wear without removal of any of the other parts comprised in the turbine wheel proper. The disk 13 is also as easily replaced upon withdrawal of the spindle 10. By means of the disks 13 14 and such ball-bearing the friction and wear of the parts are reduced to a minimum and the efficiency increased.

The head and turbine are provided with the usual passages 18 19, so disposed as to 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 to the head 2 and extending beyond the outer end of the turbine, which makes a neat rotating fit within such sheathing.

The outer end of the turbine is provided with an internally-threaded bushing 21, screwed into position and bearing upon the flanged head 15 with sufficient pressure to regulate the accurate action of the balls 16. This bushing forms a part of the motor and

serves as a socket for the inner end of a coupling 22, which may be flexible, as shown, or rigid, according to the character of the work and tool employed.

For the purpose of illustrating the application of the motor to practical use I have shown it coupled to a scale-removing tool 23, provided with pivoted arms having at their outer ends toothed cutters adapted to strike and disintegrate the scale under rapid rotation due to centrifugal force. It is obvious that other tools may be employed to good advantage, and I do not desire to be limited to this construction of tool, as I have simply illustrated it to show the application of the motor.

In action the hose 5 is connected to any source of pressure-supply, preferably of water, and the end of the tool is inserted in the pipe and by its action, as described, will cut its way through the scale throughout the length of the tube, being gently advanced by the operator by means of the connecting-hose, and the exhaust-water and cuttings will be carried by the current forwardly through the tube.

The advantages of my invention will be appreciated by those skilled in the art, as it furnishes an efficient, cheap, and easy means for accomplishing the ends in view and may be utilized in other ways or may be varied to suit different requirements of use without departing from my invention, since I desire to include within its scope all such changes and variations as will suggest themselves to the skilled mechanic.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A fluid-actuated motor comprising a stationary head provided with oblique internal passages extending through and entirely within the integral body thereof, a central spindle secured in the head and having a front extension, a rotatable head mounted on the spindle and provided with oblique passages entirely within the integral body thereof adapted to register with the passages in the stationary head, an inclosing sheath secured to the stationary head and surrounding the rotatable head, and a threaded bushing secured to the rotatable head and adapted to provide a coupling for a tool attachment, substantially as set forth.

2. A fluid-actuated motor comprising a stationary head provided with oblique internal passages extending therethrough, a removable central spindle secured in the head and having a front extension provided with a flange, a rotatable head mounted on the spindle, with intervening ball-bearings between it and the flange, and provided with oppositely-arranged oblique internal passages arranged to register with the passages in the stationary head, and an inclosing sheathing secured to the stationary head and inclosing the rotatable head; substantially as described.

In testimony whereof I have hereunto set my hand this 17th day of November, 1897.

WILLIAM S. ELLIOTT.

Witnesses:
PETER J. EDWARDS,
C. M. CLARKE.