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TUBE CLEANER FOR WATER TUBES IN STEAM BOILERS.  
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945,125.

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Fig. 1.

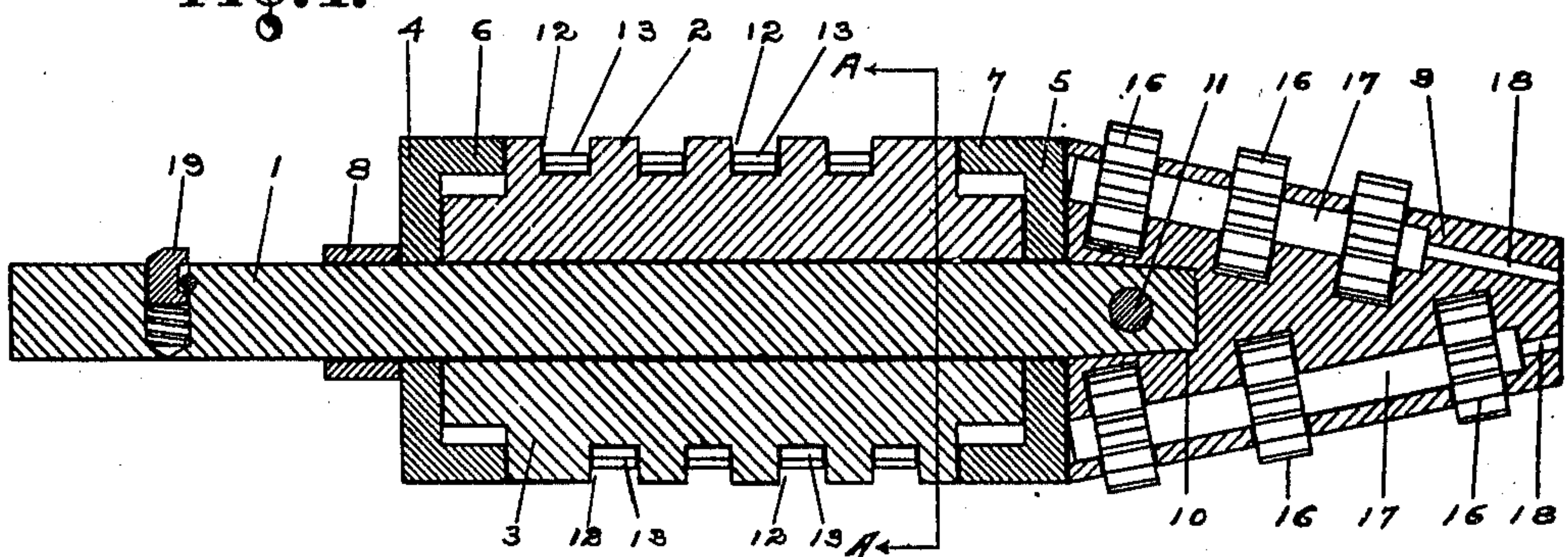


Fig. 2.

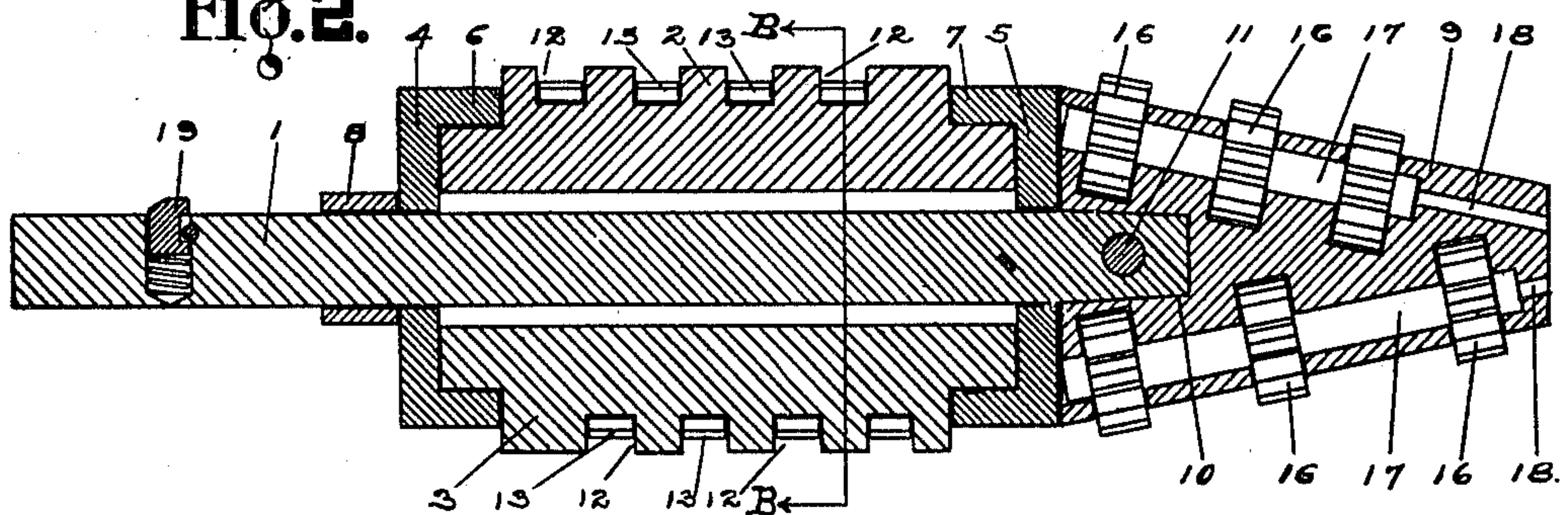


Fig. 3.

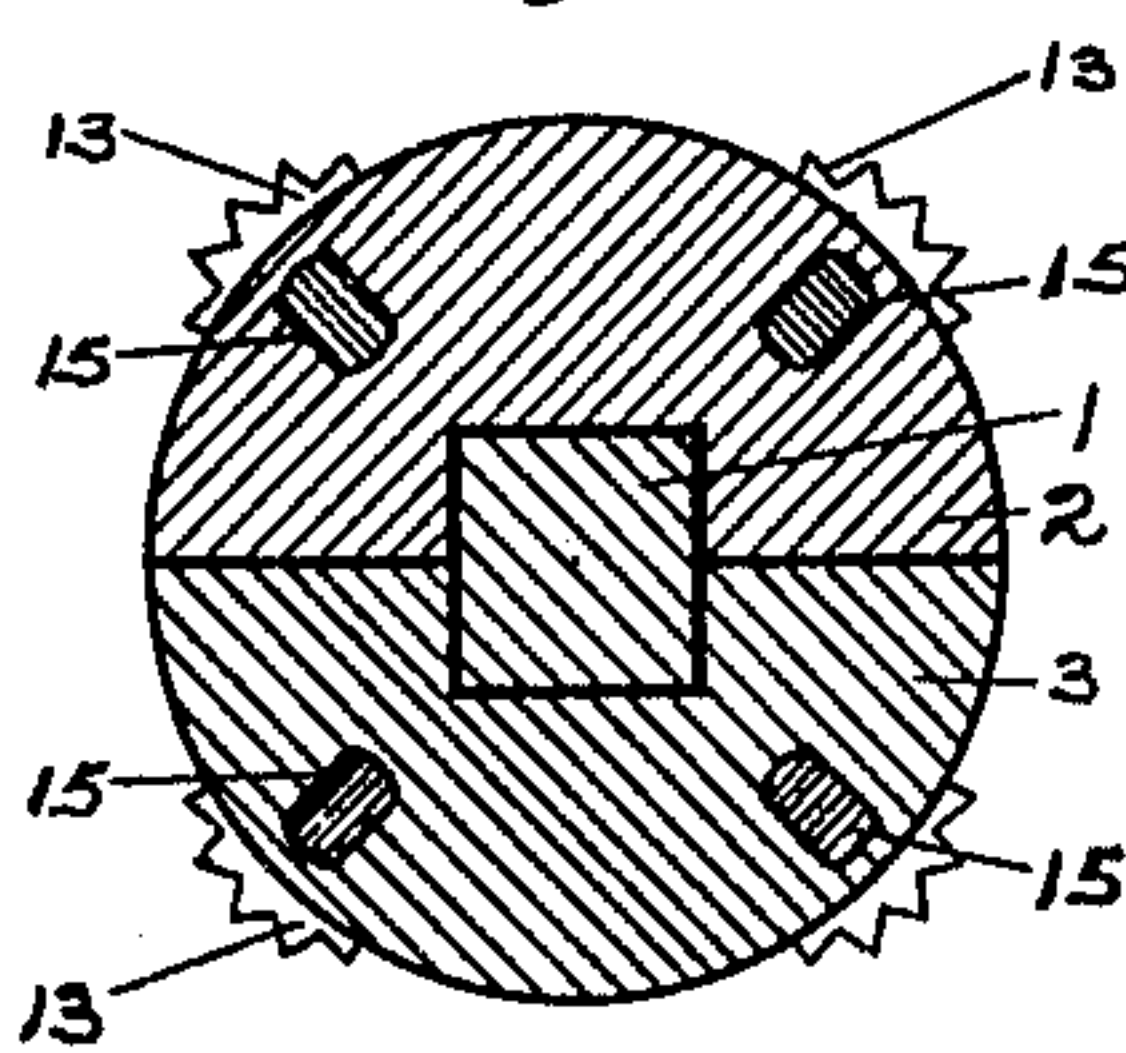


Fig. 5.

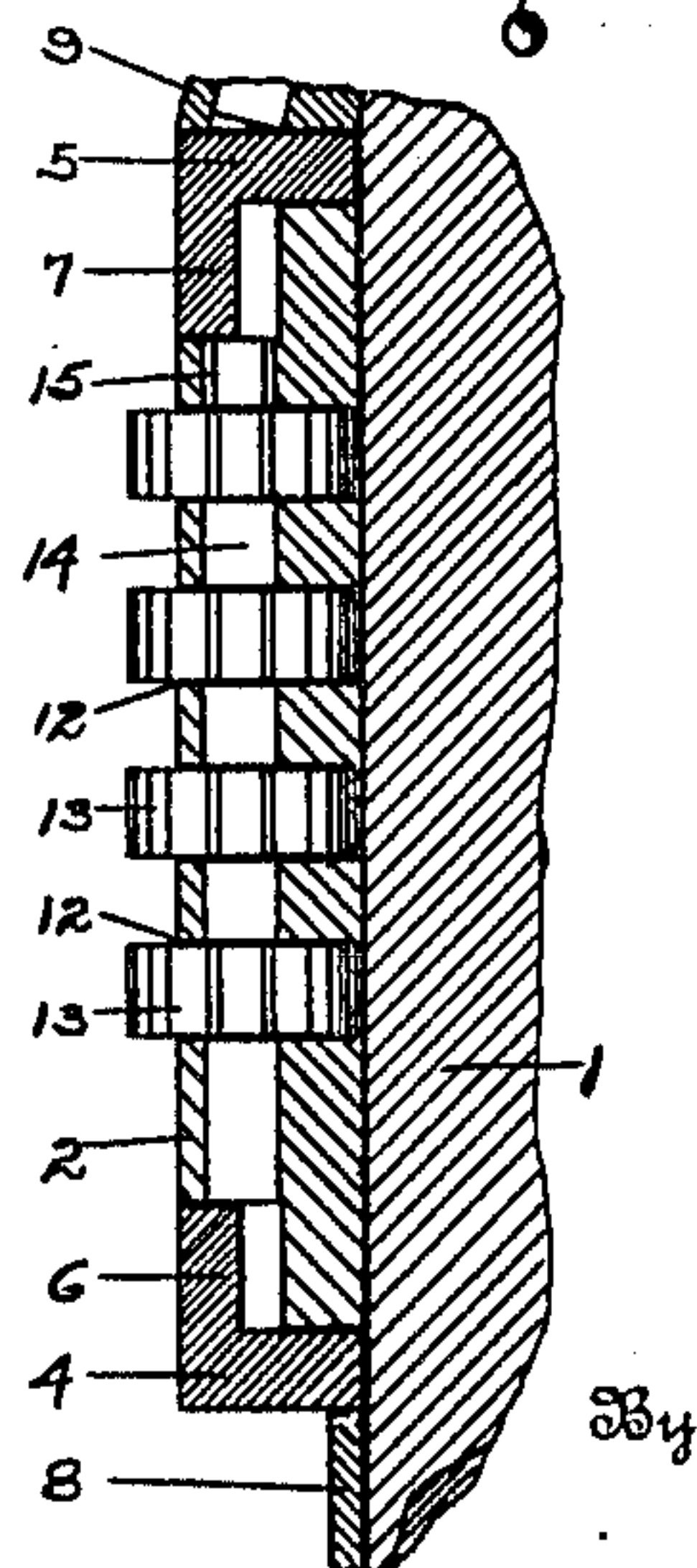
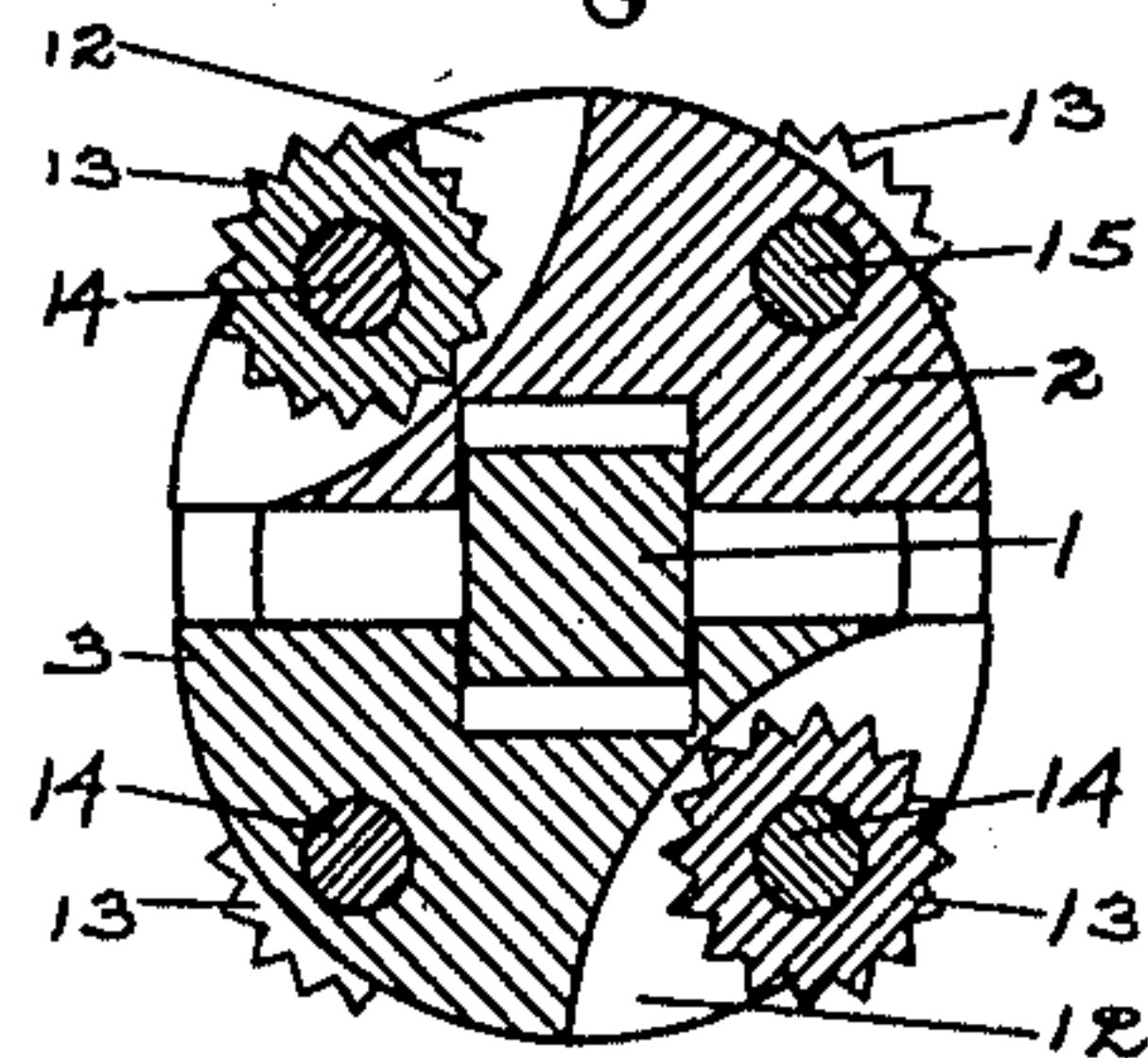


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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TUBE-CLEANER FOR WATER-TUBES IN STEAM-BOILERS.

945,125.

Specification of Letters Patent.

Patented Jan. 4, 1910.

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*To all whom it may concern:*

Be it known that I, ELMER E. HAUER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Tube-Cleaners for Water-Tubes in Steam-Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to tube cleaners and more particularly to a cleaner head for removing the incrustations from the tubes of water tube boilers. The work required of such tools is very severe requiring strength and durability to give any considerable length of service; and further they must be of such construction as to attack the scale with sufficient force to be effective without injuring the tubes. To meet these conditions I have devised a head the body portion of which is divided longitudinally into radially movable sections, supported, driven and guided in their radial movement by a central shaft. The cutters are mounted in the body sections and means are provided to limit the radial movement of the sections. This gives a very compact and novel construction with radially movable cutter carrying body sections of maximum weight affording by reason of their great relative weight and guidance under rotary and centrifugal force, a most efficient action of the cutters upon the scale.

With these and other objects in view my invention consists of the constructions and combinations hereinafter described and set forth in the claims.

In the accompanying drawings Figure 1 is a longitudinal section of a cleaner head embodying my invention, the radially movable body sections being shown at the limit of their inward movement, Fig. 2 is the same except that it shows the radially movable body sections at the limit of their outward movement, Fig. 3 is a cross section on line A A of Fig. 1, Fig. 4 is a cross section on the line B B of Fig. 2 and Fig. 5 is a fragment of a longitudinal section showing the spindles upon which the cutters rotate.

Like numerals represent the same parts in the several views.

In the drawings a shaft 1 preferably square in cross section, forms the support for a body portion which is longitudinally

divided into radially movable sections 2 and 3, having a central longitudinal aperture conforming in size and shape to the shaft as particularly shown in Figs. 1 and 3. End plates 4 and 5 mounted on the shaft 1 have inwardly extending flanges 6 and 7 adapted to engage the respective ends of the body sections 2 and 3 and limit their radial movement. A collar 8 shrunk or otherwise secured to the shaft against the rear plate 4; and a cone shaped block 9 with its base abutting the forward end plate 5 has a recess 10 to receive the forward end of the shaft 1, and a pin 11 riveted or otherwise secured in a hole extending transversely through the shaft and block secures the parts in place. A plurality of transverse openings 12 are provided in each of the body sections 2 and 3 and cutter wheels 13 are mounted in said openings to rotate on spindles 14 as shown in Figs. 4 and 5, said spindles extending through longitudinal perforations in the body sections with their ends abutting on the flanges 6 and 7 of the end plates 4 and 5, the forward ends 15 of the spindles and the perforations therefor being oblong in cross section as shown in Figs. 3 and 5 to keep the spindles from rotation. It will be seen the shaft is adapted not only to support and drive the head but also forms a guide for the body sections in their radial movement. I have shown the cone block 9 with recesses in which the cutter wheels 16 are mounted on spindles 17 inserted in perforations that extend from the base of the cone as shown; and when the block is removed from the shaft the spindles can be driven out by a bar inserted through the openings 18. A spring detent 19 to engage a transverse recess in a socket of an actuating mechanism or any other suitable means may be employed to engage and disengage the shaft 1 from its actuating mechanism. The shaft being attached to suitable driving mechanism the head is introduced into a tube and cutters mounted in the cone block attack the scale in progressively enlarged circles; and as the head is advanced the body sections with their cutters press outwardly by centrifugal force and by reason of their weight, made possible by the construction described, the efficiency of these cutters is greatly increased.

In both the body sections and the cone block the cutter wheels are first placed in



their proper recesses and the spindles upon which they rotate are then inserted from the rear ends of said sections and block. The end plates are then slipped upon the shaft with the body sections between the same, the rear end plate resting against the collar fixed on the shaft. The cone block is then placed abutting on the forward end plate and the pin inserted through the block and shaft holds the entire structure in place; and by simply removing the pin it may all be taken apart.

Having thus described my invention I claim:

1. In a rotary tube cleaner, a body portion divided longitudinally into non-pivoted radially movable sections, each section having a recess forming a central longitudinal aperture in said body, a shaft extending through said aperture and having interacting parts with the walls thereof to support and rotate said body, cutters mounted in said body and means to limit the radial movement of said sections, substantially as described.
2. In a rotary tube cleaner, a shaft, angular in cross section, a body portion divided longitudinally into radially movable sections, each section having a recess forming a central longitudinal aperture in said body of like shape in cross section as the shaft, through which said shaft extends and engages the walls thereof to support and rotate said body, cutters mounted in said body and oppositely disposed members adapted to limit the radial movement of said sections, substantially as described.
3. In a rotary tube cleaner, a shaft, angular in cross section, a body portion divided longitudinally into radially movable sections and having a central longitudinal aperture of like shape in cross section as the shaft, through which said shaft extends and engages the walls thereof to support and rotate said body and guide the sections in their radial movements, cutters mounted in said body and means to limit the radial movement of said sections, substantially as described.
4. In a rotary tube cleaner, a body portion divided longitudinally into radially movable sections, each section having an aperture ex-

tending longitudinally therethrough with a plurality of openings arranged at intervals transversely thereto, a spindle adapted to be held against rotation in each of said apertures, cutter wheels in each of said transverse openings mounted on said spindles, end plates to hold said spindles in place and further adapted to limit the radial movement of the sections and a support for said body, substantially as described.

5. In a rotary tube cleaner, a body portion divided longitudinally into radially movable sections, each section having a recess forming a central longitudinal aperture angular in cross section, a shaft of like shape in cross section extending through said aperture, each of said body sections also having an aperture extending longitudinally therethrough with a plurality of openings arranged at intervals transversely thereto, a spindle adapted to be held against rotation in each of said last named apertures, cutter wheels in said transverse openings mounted on said spindles, means to limit the radial movement of said body sections, said means being further adapted to hold said spindles in place, substantially as described.

6. In a rotary tube cleaner, a driving shaft, a body portion longitudinally divided into radially movable sections carried by said shaft, and plates to engage the respective ends of said body sections adapted to limit their radial movement, a cone block, a plurality of cutters mounted in said body sections and in said cone block, the cutters of the sections being arranged parallel to the axis of the head and the cutters of the cone block at an angle to said axis, an abutment fixed to the shaft against which one end plate rests, means engaging the other end plate to secure the body sections on the shaft, said means including a pin to secure the cone block on the shaft which when removed releases all the parts except said abutment, substantially as described.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

ELMER E. HAUER.

Witnesses:

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