

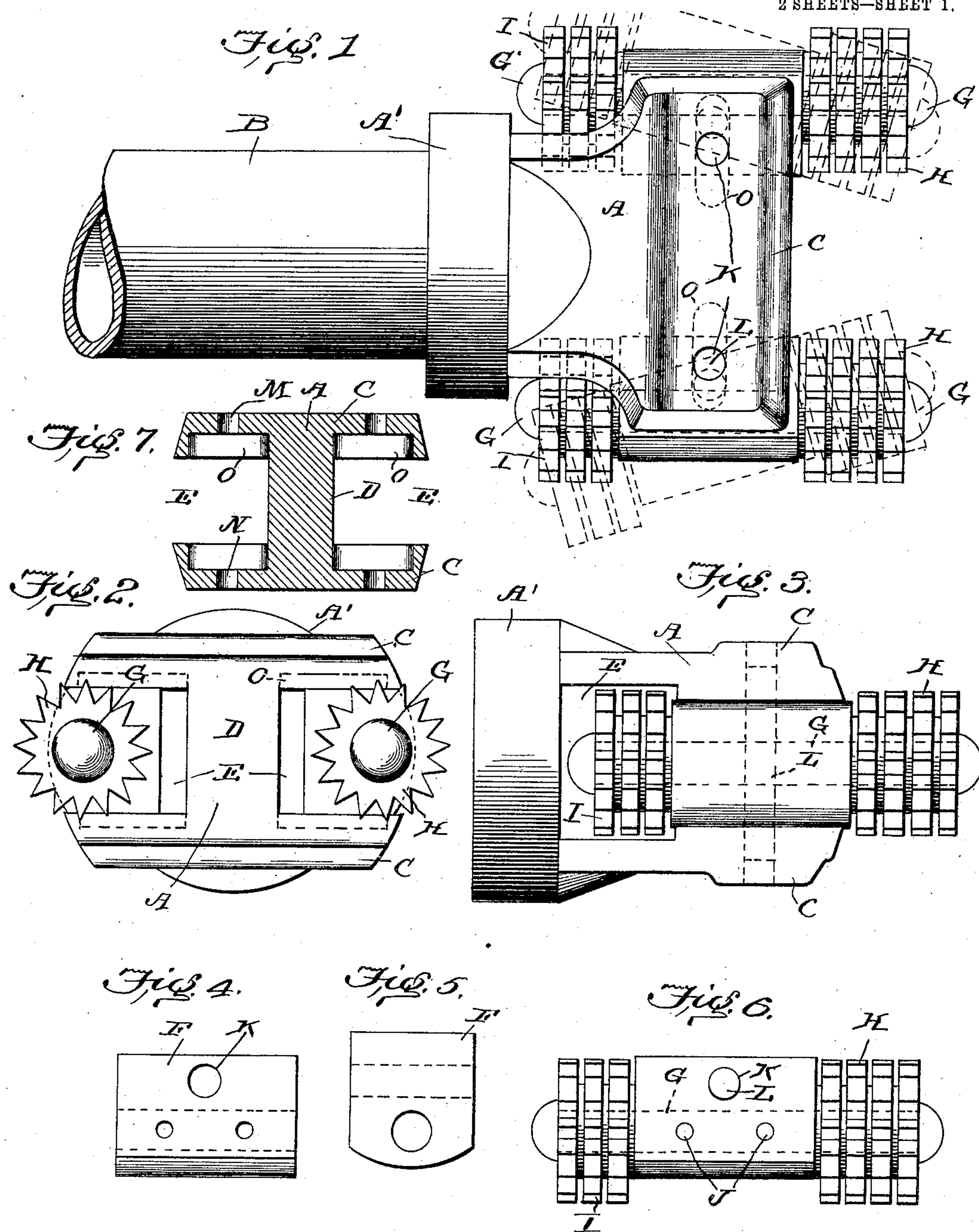
No. 789,192.

PATENTED MAY 9, 1905.

H. F. WEINLAND.
BOILER TUBE CLEANER.

APPLICATION FILED JAN. 28, 1904.

2 SHEETS—SHEET 1.



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Inventor
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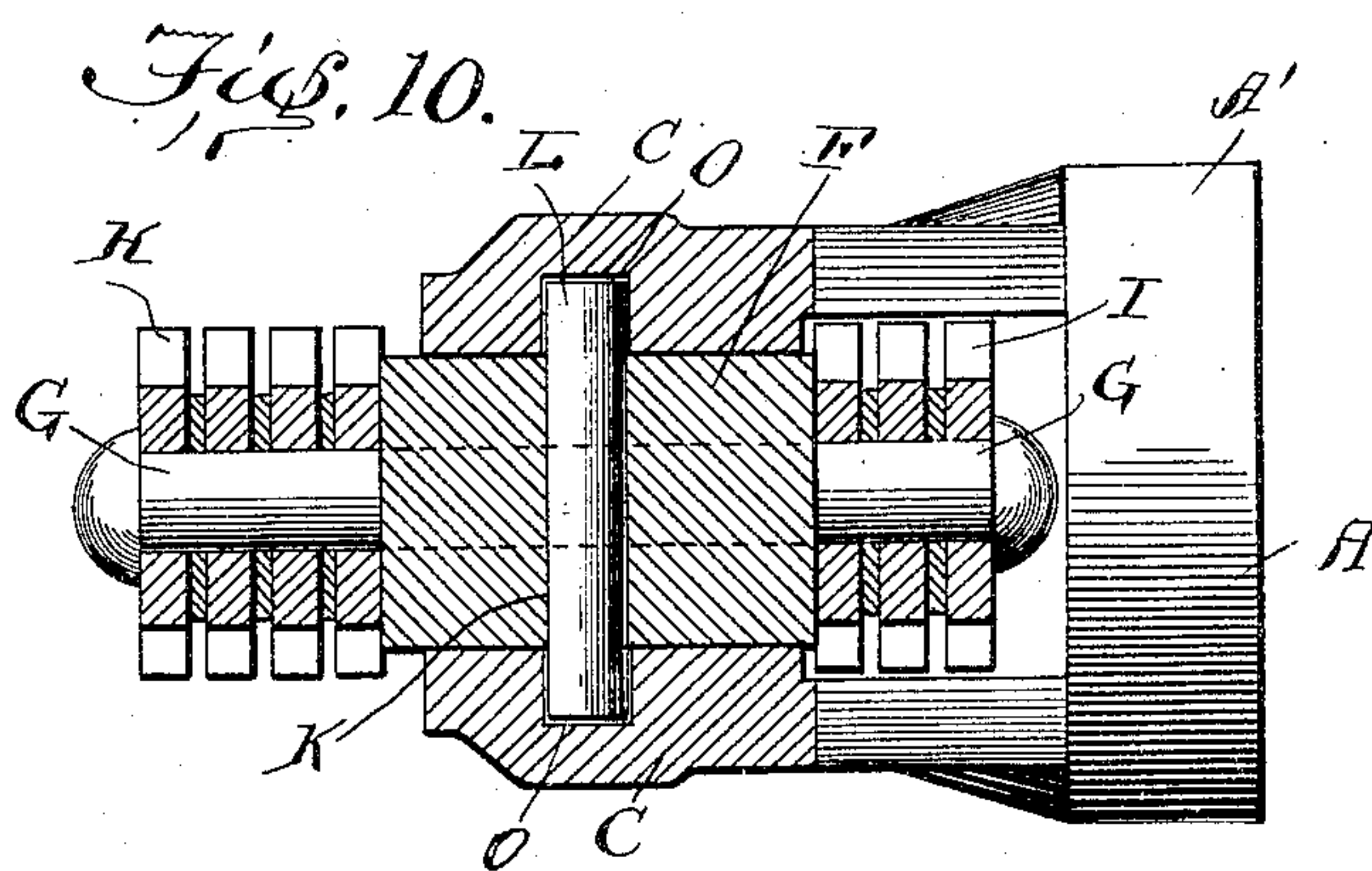
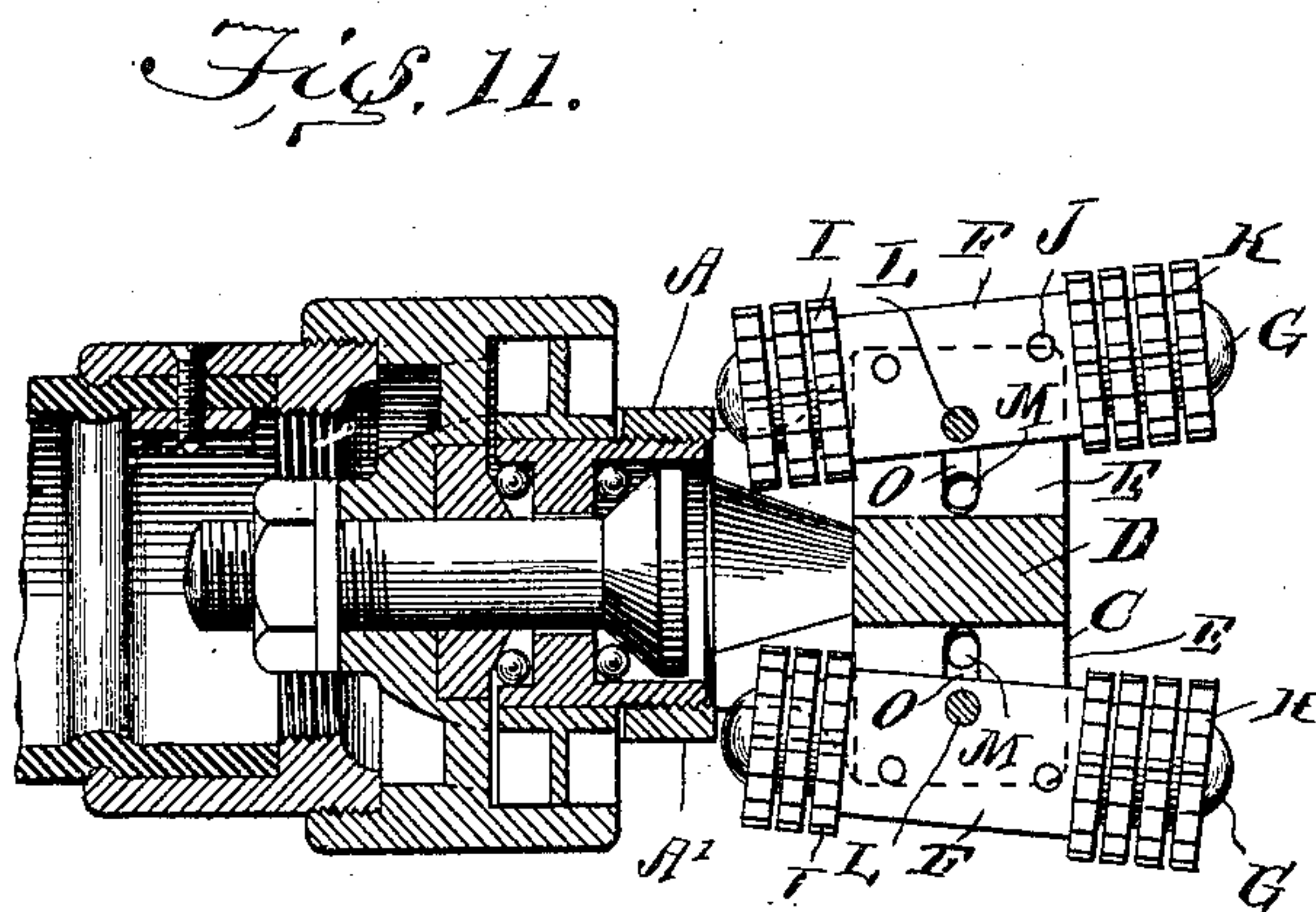
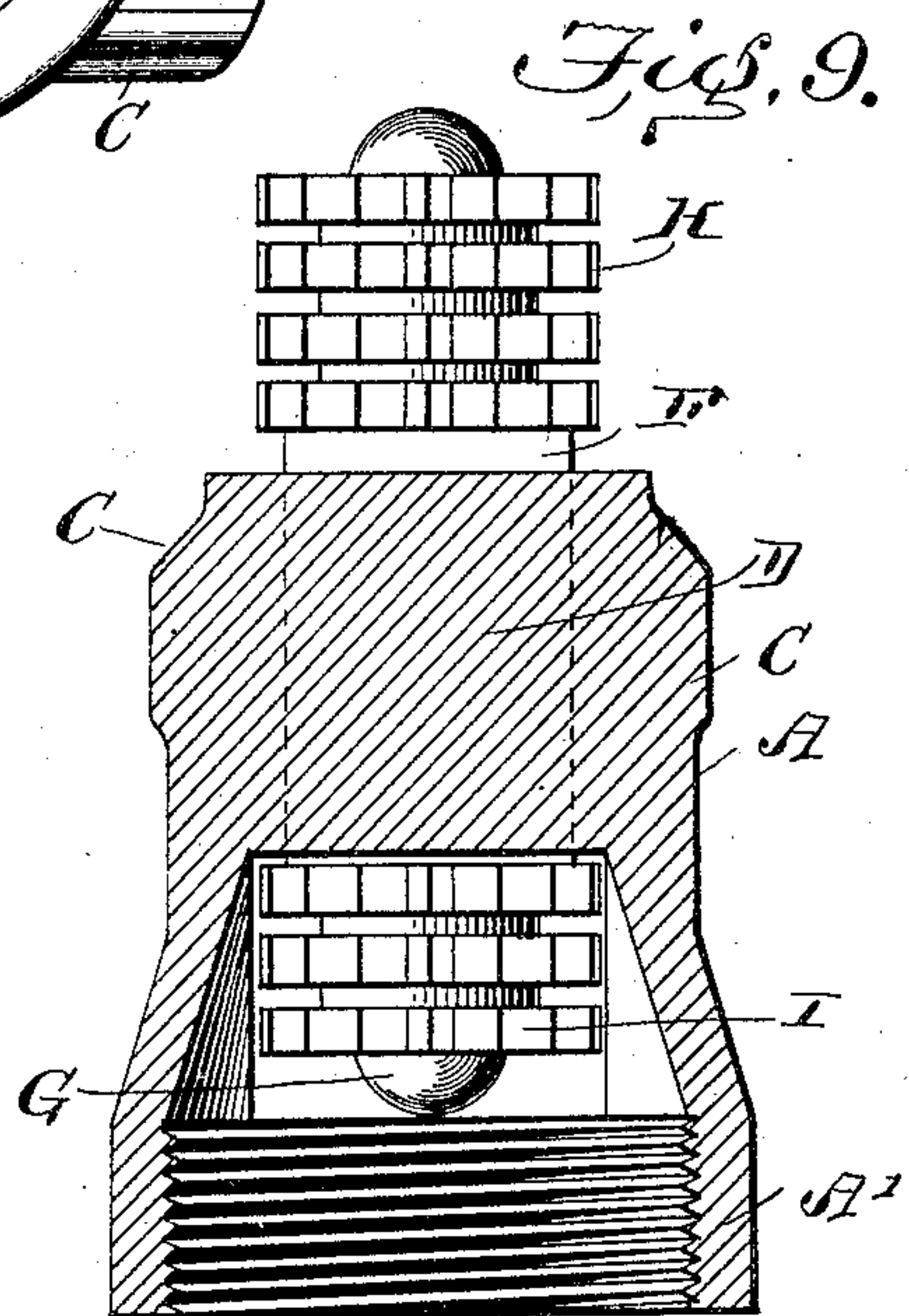
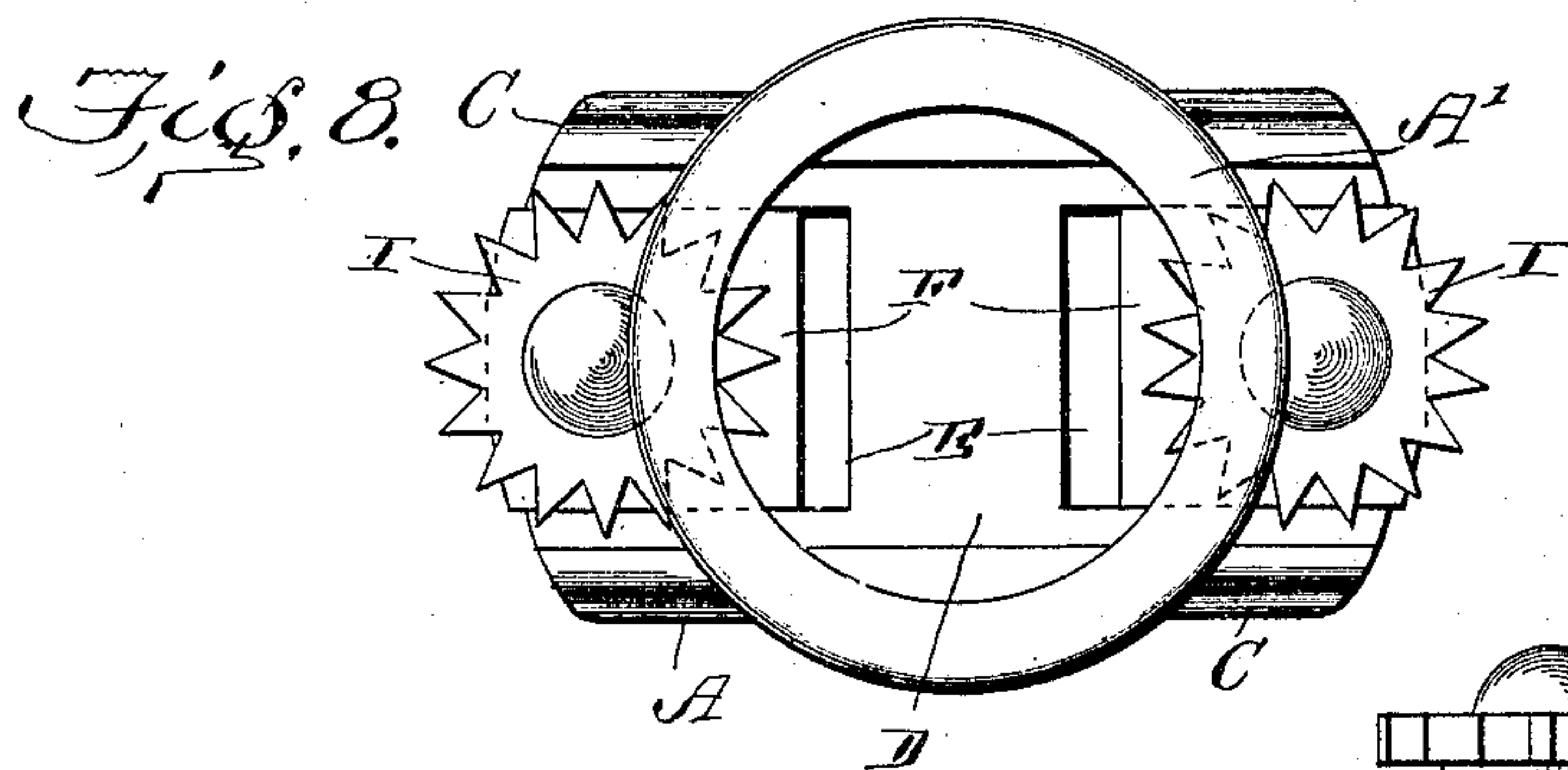
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HENRY F. WEINLAND, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE
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A CORPORATION OF OHIO.

BOILER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 789,192, dated May 9, 1905.

Application filed January 28, 1904. Serial No. 191,030.

To all whom it may concern:

Be it known that I, HENRY F. WEINLAND, 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 Boiler-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in boiler-tube cleaners, and more particularly to that class of cleaners known as "rotatory" cleaners, adapted to be rotated at a relatively high speed and having the cutter mounted upon centrifugally-acting arms.

The invention in its broadest form consists in a cleaner of this type comprising a head and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided between its ends with a pivot on which the arm is free to swing and each arm being provided with cutters mounted on its opposite ends.

The invention further comprises a cleaner of this type wherein the movement of the forward ends of the arms about the pivot exceeds that of the rear ends, the pivot being placed behind the longitudinal center of gravity of the arms and cutters, so that a greater amount of work will be effected by the cutters on the forward ends of the arms, which first meet the incrustation, than by the cutters on the rear ends of the arms, which attack the incrustation after a part of the same has been removed.

The invention further consists in certain features, which will be hereinafter described, and more specifically pointed out in the claims.

The cleaner thus constructed is very effective, as I have ascertained in practical use with it. It is rotated at a high speed by any suitable means or motive power—such as, for instance, by being attached to a revolving turbine water-wheel of the character known in this art and which operates by water-pressure or by belt and power connections.

In the accompanying drawings, forming a

part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 is a side elevation of my improved boiler-tube cleaner. Fig. 2 is a front elevation thereof; Fig. 3, a side elevation of the same; Fig. 4, a plan view of the central part of one of the cutter-arms; Fig. 5, an end view of the same; Fig. 6, a plan view of the cutter-arm and the several cutters mounted thereon; Fig. 7, a detail transverse sectional view of the head, taken longitudinally of the grooves in which the pivot-pins slide; Fig. 8, a rear elevation; Fig. 9, a central longitudinal section; Fig. 10, a sectional view on the line *xx* of Fig. 1 looking in the direction of the arrows; and Fig. 11, a view showing a head connected to a turbine-motor, which latter is shown in section.

The letter A designates the head of my boiler-tube cleaner, to the band A' of which may be attached a turbine-motor wheel, as shown in Fig. 11, or to which is attached a pipe or shaft B, as shown in Fig. 1, by which connection is made with such form of power appliance as may be utilized to supply rotary motion to the tool, which is to be at a high speed in order to make the cutters fully effective in their action against the incrustation which they are to remove from the interior of the boiler-tubes. This head is constructed with an upper and lower plate C, united near their middle portion by a web or body of metal D, leaving at either side thereof and between the plates C spaces or recesses E, in which are mounted the arms which carry the cutters. These arms are composed of a central portion F in the nature of a block and of bearing-pins G, which extend therefrom and on which are mounted the forward set of cutters H and the rear set of cutters I, the cutters being freely rotatable on these pins and having teeth or deep serrations formed on their exterior. These pins may be attached to the central portions of the arms in any desired way, as by extending there-through and being held by pins or other fastening devices J. The portions F of the arms

are provided with an opening or hole K to receive the pivot-pin, upon which they swing and by which they are connected to the plates C in a manner to permit of their sliding radially in and out in the spaces or recesses E. These pivot-pins are shown at L and are passed through openings M in the upper plate C, while they may be driven back by inserting a punch or instrument in the opening N in the lower plate C. The inner faces of the plates C are grooved out, as shown at O, so that the ends of the pins may slide radially in and out. These grooves form ways in which the pins may travel. Thus it will be seen that the arms are mounted in the head, first, pivotally, and, secondly, slidably and that the pivotal movement may take place at any part of the sliding movement, so that whether the arms are in the extreme outer position or some more central position they may still swing on their pivots. As suggested by the dotted lines in Fig. 1, the arms are swung on their pivots, so that their forward ends will somewhat approach each other in order to lessen the distance between the arms and enable them to be introduced into a tube having more or less thickness in the incrustation. The thicker the incrustation the smaller the clear space within the tube. Hence the use of the pivotal action for inserting the forward ends of the arms initially into the incrustated tubes. When so inserted and the tool is given rotary motion, the forward cutters begin at once to cut their way into the tube. In doing this they reduce the thickness of the incrustation more or less until the rear sets of cutters enter, when they, too, begin their cutting action and reduce the scale or incrustation. As the action proceeds the cutter-arms move outwardly by centrifugal action, so that as the tool is advanced through the tube and by the time the rear sets of cutters get through with the incrustation left by the forward sets the arms have slid outwardly enough to allow the cutters, especially the rear sets, to reach the inner wall of the tube. The result of it all is that while the tool readily enters the incrustated tubes it also, by its provision of pivoted and slidable arms, works its cutters clear through the incrustation and out to the wall of the tube, so as to leave them clean and smooth.

I regard myself as the first to produce a boiler-tube cleaner in which the arms are provided with cutters at their forward and at their rear ends and are pivoted at an intermediate point, the arms being also mounted to slide radially with respect to the head. Each of these movements—that is, the pivotal movement from the intermediate point on the arms and the sliding movement—has its function, while the two movements together have also their function, as indicated.

It should also be noted that the pivot of each arm is located behind the longitudinal cen-

ter of gravity of the arm and cutters, this being due in the particular construction shown to the fact that a greater number of cutters are mounted on the front end of the arm than on the rear end thereof, so that when the cutters are of equal weight, as is usually the case, that portion of the arm and cutters which lies in front of the pivot has a moment or tendency toward outward movement greater than that portion lying back of the pivot. It arises from the excessive moment of the forward cutters that the part of the incrustation which is the hardest and thickest is attacked by those cutters which act thereon with the greatest force—to wit, the forward cutters—the rear cutters, which act with less force, serving to remove the remainder of the incrustation and acting in a sense as finishing-cutters. This increased moment of the forward cutters need not necessarily be produced by an excess of weight in front of the pivot, but may be produced in any suitable manner.

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

1. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided with cutters mounted on its opposite ends, substantially as described.

2. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided with cutters mounted on its opposite ends, said cutters being free to rotate relatively to said arms, substantially as described.

3. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided with cutters mounted on its opposite ends, said cutters being free to rotate independently of each other relatively to said arms, substantially as described.

4. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided at its opposite ends with a set of toothed cutters, the cutters of each set being free to rotate independently of each other, substantially as described.

5. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided with cutters mounted on

its opposite ends, the pivot being placed behind the longitudinal center of gravity of the arms and cutters, substantially as described.

5 6. A rotatory boiler-tube cleaner comprising a head, and centrifugally-acting arms free to slide radially with respect to the head, each arm being provided with a pivot between its ends on which the arm is free to swing, each arm being provided with a set of cutters
10 mounted on its opposite ends, the cutters of the front set exceeding in number and weight the cutters of the rear set, substantially as described.

15 7. A rotatory boiler-tube cleaner comprising a head provided with transverse plates forming radial slots, said plates being provided with guideways, centrifugally-acting arms mounted to slide radially in said slots, each arm being provided between its ends
20 with trunnions fitting and sliding in said guideways and forming a pivot on which said arm is free to swing, and cutters mounted on each arm on opposite sides of the pivot, substantially as described.

25 8. A rotatory boiler-tube cleaner comprising a head provided with transverse plates forming radial slots, said plates being provided with guideways, centrifugally-acting arms mounted to slide radially in said slots,
30 each arm being provided between its ends with trunnions fitting and sliding in said guideways and forming a pivot on which said arm is free to swing, and cutters mounted on each arm on opposite sides of the pivot, said cutters being serrated and free to rotate relatively to said arm, substantially as described.
35

9. A rotatory boiler-tube cleaner comprising a head having transverse plates forming radial slots, said plates being provided with

parallel grooves forming guideways with terminal stops, centrifugally-acting arms mounted to slide radially in said slots, openings in said plates and arms, and pivot-pins adapted to pass through the openings in the plates into the openings in the arms, the ends of said
40 pins engaging said grooves, said arms being provided with cutters on their ends, substantially as described.

10. In a tube-cleaner, the combination, with suitable rotating means, of a head having radial slots, each slot having opposed guiding-surfaces, an arm arranged in each slot with trunnions bearing on said guiding-surfaces, upon which trunnions said arm is pivoted, and cutters carried by each arm, substantially as
55 described.

11. In a tube-cleaner, the combination, with suitable rotating means, of a head having radial slots, each slot having opposed guiding-surfaces, an arm arranged in each slot with
60 trunnions bearing on said guiding-surfaces, upon which trunnions said arm is pivoted, a shaft mounted in each arm, and cutters carried by each shaft, substantially as described.

12. In a tube-cleaner, the combination of a shaft-carrying head having radial slots, each slot having opposed guiding-surfaces, an arm arranged in each slot with trunnions bearing on said guiding-surfaces, upon which trunnions said arm is pivoted, a shaft mounted in
70 each arm, and cutters carried by each shaft, substantially as described.

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

HENRY F. WEINLAND.

Witnesses:

E. O. HAGAN,

GERTRUDE D. YOUNG.