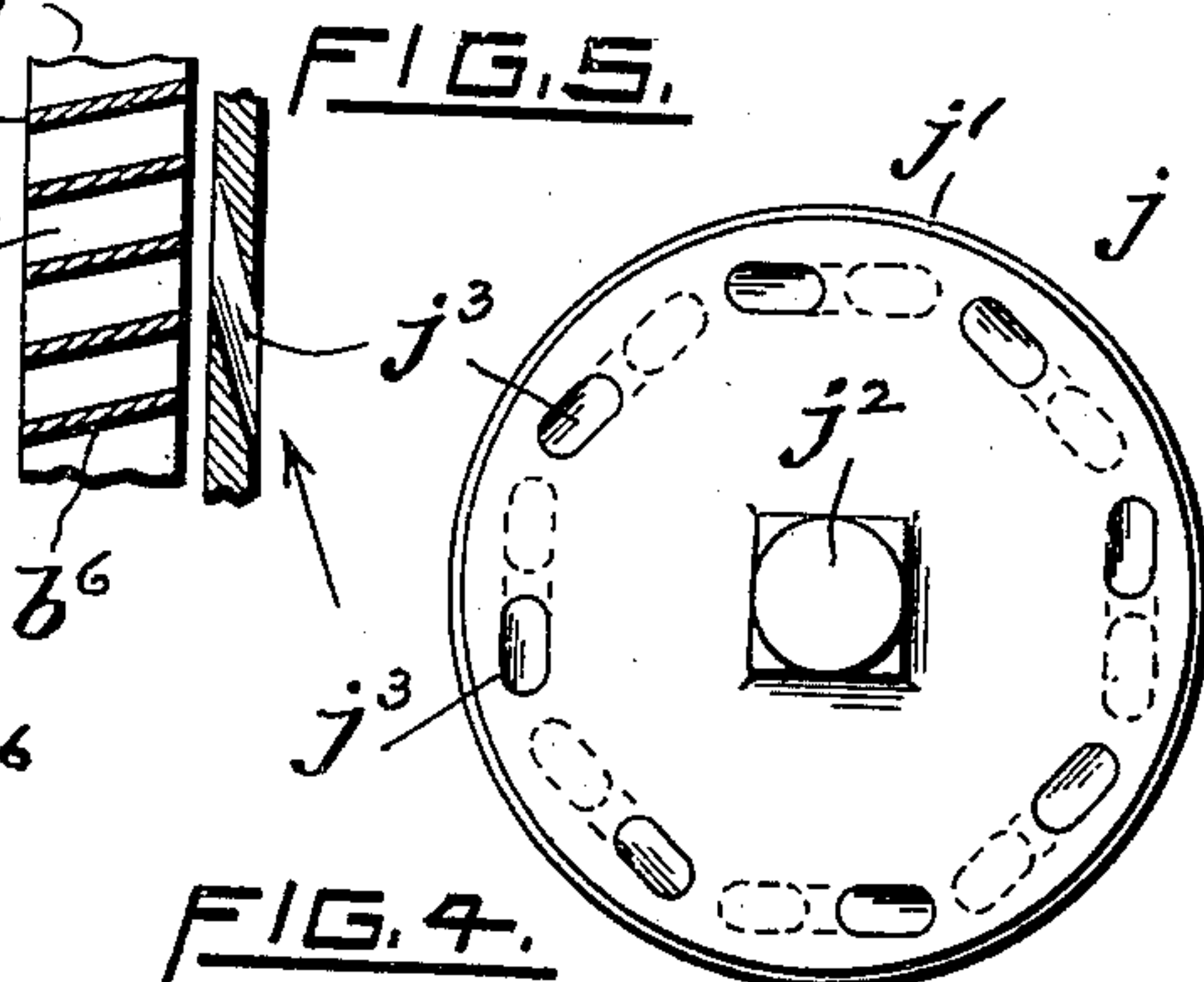
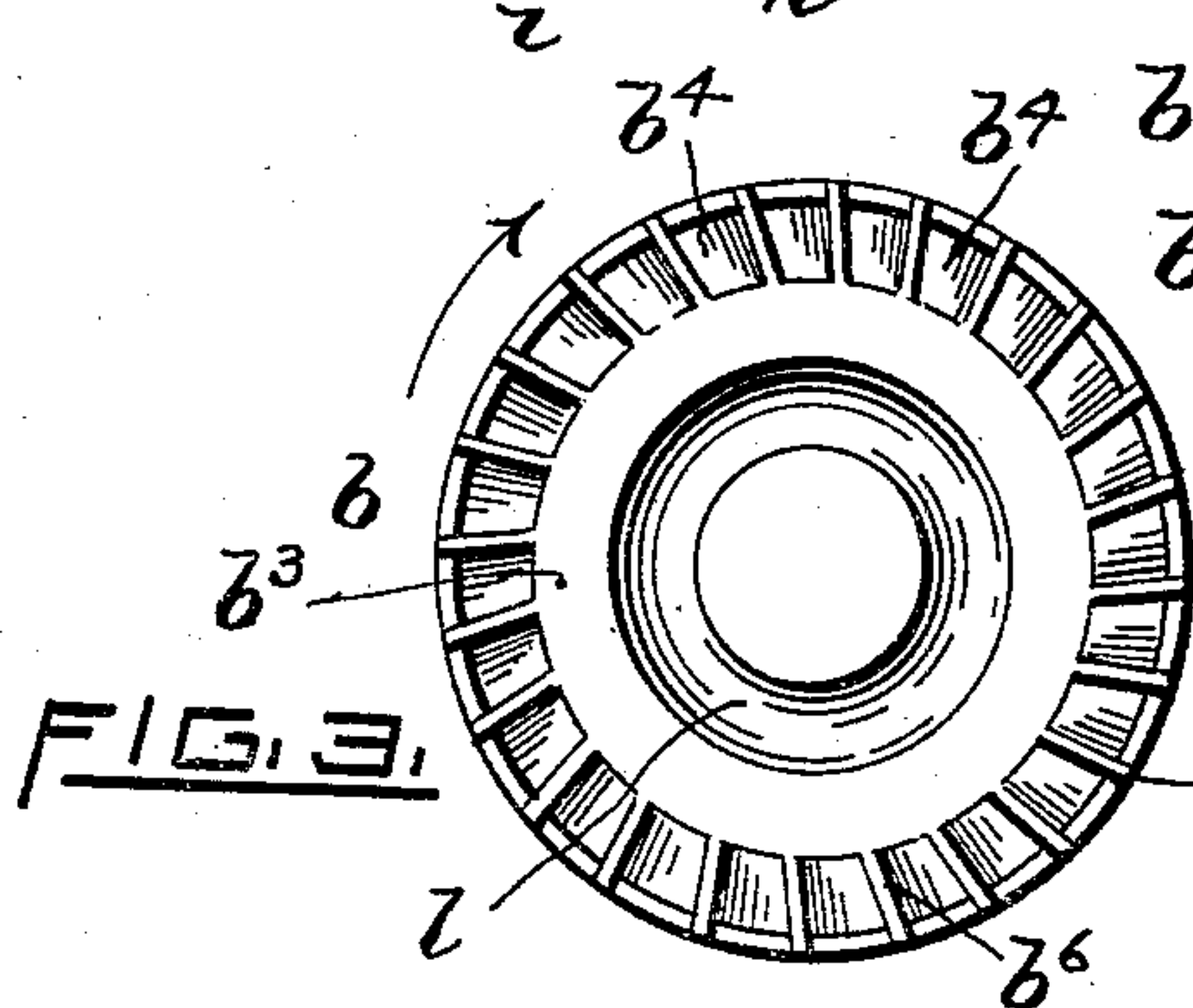
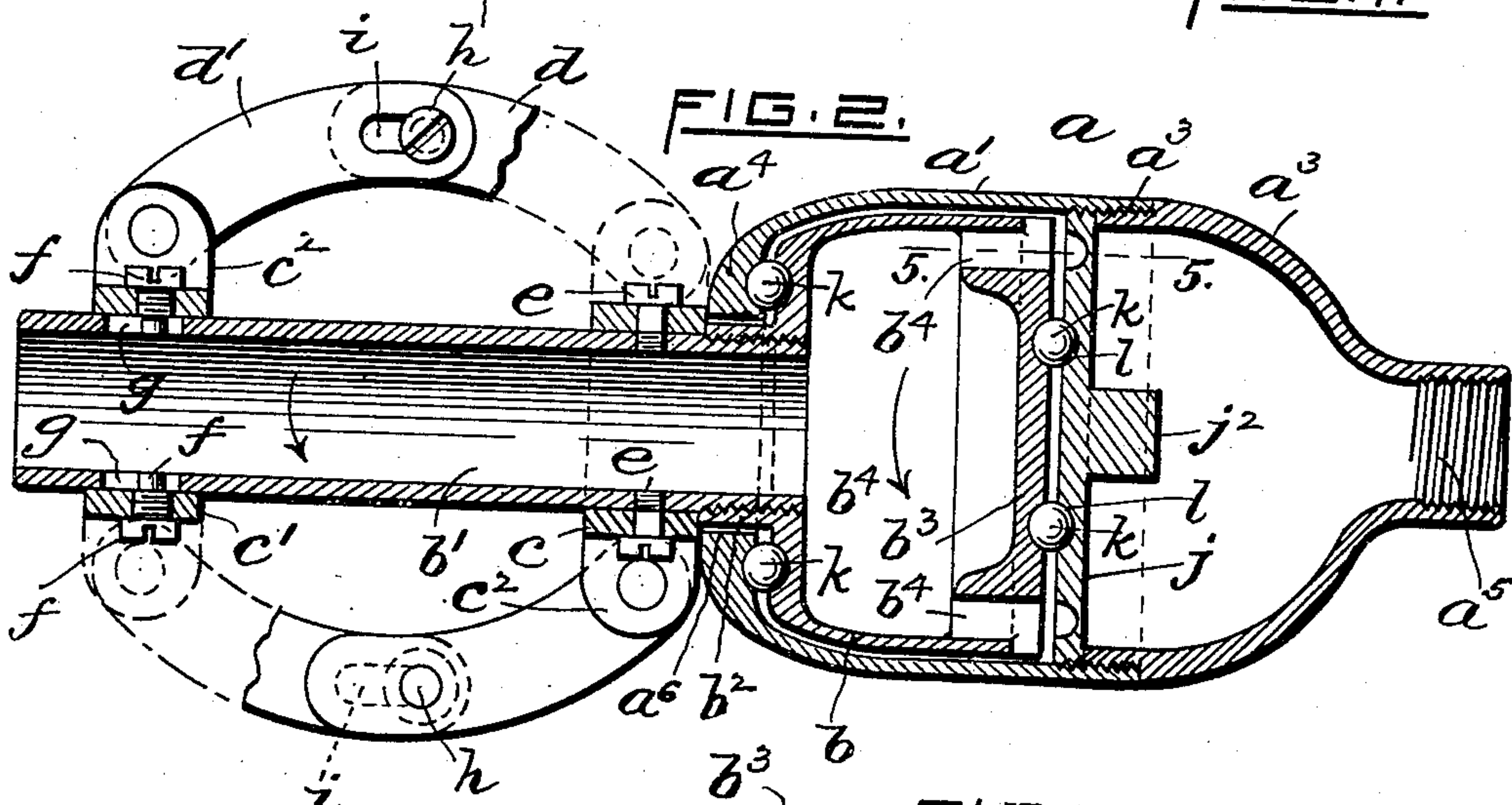
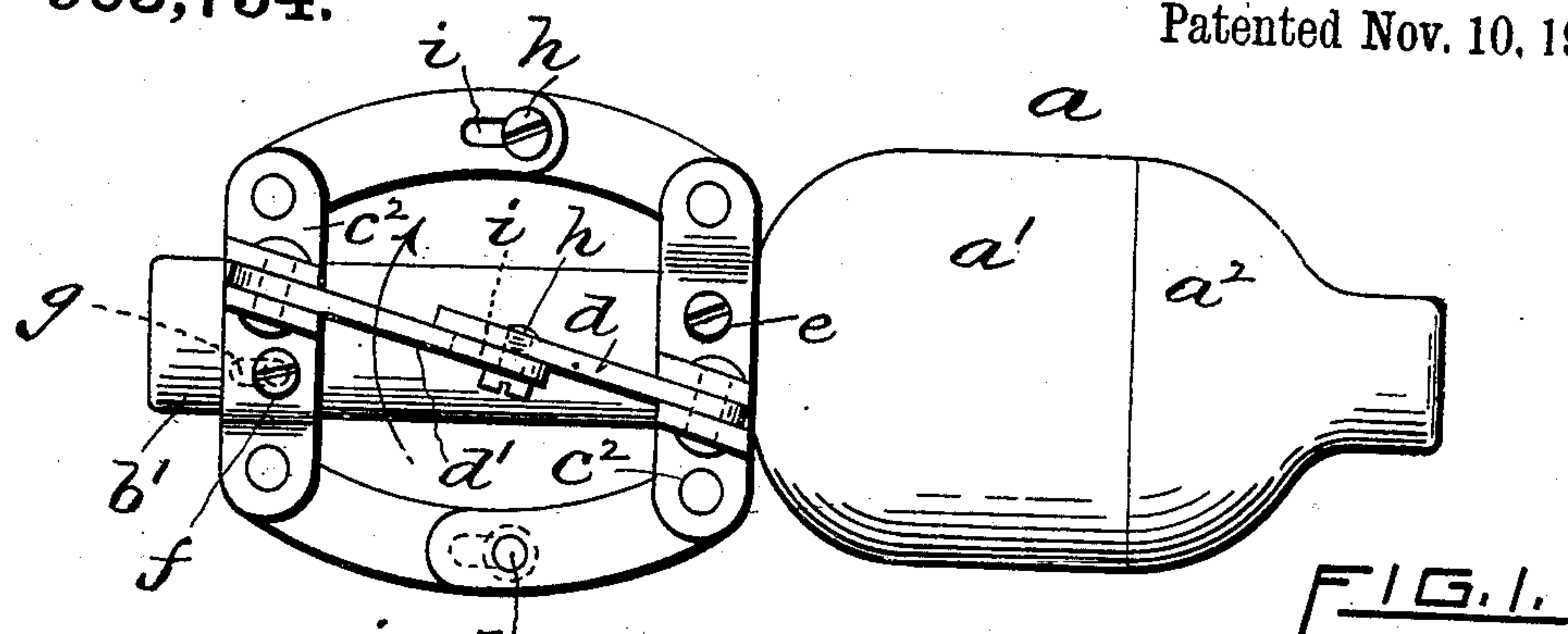


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F. J. MUIRHEAD, ADMINISTRATRIX.
BOILER TUBE CLEANER.
APPLICATION FILED MAY 26, 1908.

903,754.

Patented Nov. 10, 1908.



Witnesses:

Henry F. Duby.
George W. Bennett Jr.

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UNITED STATES PATENT OFFICE.

FRANCES J. MUIRHEAD, OF PROVIDENCE, RHODE ISLAND, ADMINISTRATRIX OF JOHN MUIRHEAD, DECEASED, ASSIGNOR OF ONE-THIRD TO HENRY A. DUBY, OF PAWTUCKET, RHODE ISLAND, AND ONE-THIRD TO ARSENE H. PERRY, OF PROVIDENCE, RHODE ISLAND.

BOILER-TUBE CLEANER.

No. 903,754.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed May 26, 1908. Serial No. 435,148.

To all whom it may concern:

Be it known that JOHN MUIRHEAD, deceased, late a subject of Great Britain, and resident of the city of Providence, in the county of Providence, State of Rhode Island, did invent certain new and useful Improvements in Boiler-Tube Cleaners, of which the following is a specification.

This invention relates to that class of tools for removing incrustations from the interior of boiler-tubes.

The invention consists of a tubular shaft adapted to be propelled by a rotary motor; collars mounted on said shaft; scraper-blades carried by said collars, said blades arranged in pairs, each pair of blades extending at an angle to the axial center of said shaft and each pair of blades having freedom of movement to expand, and thereby readily remove the scale and deposits from the tube to be cleaned.

In the accompanying sheet of drawings, Figure 1 represents a side elevation of the tool; Fig. 2, a longitudinal sectional elevation of the same; Fig. 3, a front end view of the turbine head; Fig. 4, a front end view of a stationary disk for the motor-casing; and, Fig. 5, a detail section taken in line 5.—5. of Fig. 2, showing the angular positions of the steam inlets of the stationary disk and blades of the motor.

Like reference characters indicate like parts throughout the several views.

Referring to Fig. 2, *a* designates the casing for inclosing the turbine head portion of the motor, and this casing is of cylindrical form and of a size to readily pass through the tube to be cleaned. This casing is made in two parts *a*¹ and *a*², and each part is made fast together by means of screw-threaded engagement, as at a point *a*³.

The part *a*¹ of the casing has a closed end *a*⁴, and the other part *a*² has a screw-threaded hub *a*⁵, to attach the tubular rod or handle through which steam enters to propel the tool.

The motor comprises substantially two members, a turbine head *b* and a tubular shaft *b*¹. The shaft *b*¹ has one end screw-threaded to engage fast within a threaded opening in a hub *b*² integral of the head *b*,

and this hub passes freely through a circular opening *a*⁶ formed in the closed end of the casing *a*.

Two collars or rings *c*, *c*¹ are mounted upon the motor-shaft *b*¹ and each ring has four integral bifurcated portions *c*², *c*² which are divided equidistant apart throughout the circle of said shaft and arranged as pivot centers for one end of scraper-blades *d*, *d*¹.

The ring *c* is made fast to the shaft *b*¹ by means of screws *e*, *e*, while the ring *c*¹ is free to slide upon said shaft, by means of the pins of the screws *f*, *f* that enter through slotted openings *g*, *g* formed in the latter.

The blades *d*, *d*¹, which are arranged in pairs, curve outwardly from the shaft *b*¹ and have their inner portion overlapping each other and held together by pins of the screws *h*, *h* made fast in the blades *d*, *d*, and which pins pass freely through slotted openings *i*, *i* formed in the blades *d*¹, *d*¹.

The slotted openings *g* and *i* permit freedom of movement for each pair of blades to expand and thereby readily remove the scale and deposits from the tube to be cleaned.

The turbine head *b*, which is of tubular form, fits loosely within the part *a*¹ of the casing, and the rear end of this head is closed by a disk *b*³ which is brazed to the wall of said head. The peripheral portion of the disk *b*³ is milled so as to provide a series of steam inlet openings *b*⁴, *b*⁴ which communicate with the chamber *b*⁵ of the turbine-head *b*, and these openings are divided by thin blades *b*⁶, *b*⁶ that extend radially from a point beyond the axial center of said head, as shown in Figs. 3 and 5.

The disk or partition-plate *j* is provided with an exterior screw-thread, as at *j*¹ in Fig. 4, to engage the threaded portion of the casing-part *a*¹, and said plate has a central flat sided integral head *j*², by means of which this member may be turned to hold fast in position upon said part *a*¹. The plate *j* is provided with a series of steam inlet openings *j*³, *j*³ formed near its peripheral edge, and each of these openings is drilled to extend at a right angle to the face of each turbine blade *b*⁶ of the motor, in the manner shown in Fig. 5, in order to increase the leverage and thereby obtain the greatest pro-

pulling effective force of steam pressure at this point to drive the motor.

Between the plate b^3 of the motor-head b , and stationary disk j of the casing-part a^1 , is interposed a series of antifriction-balls k, k , which are mounted in grooves l, l formed in said plate and said disk, and in like manner a second series of antifriction-balls k, k is introduced between the closed end of the motor-head b and closed end a^4 of the casing-part a^1 . Each series of balls k, k surround the axial center of the motor and are arranged to reduce the friction in the rotation of same.

By having the blades positioned at an angle to the axial center of the tool, they are enabled to shear off the scale or incrustations from the boiler-tube in a more effective manner, than would be the case where the blades or cutters extend longitudinally of the tool.

When each pair of blades is extended or in their operative position, shown in Figs. 1 and 2, the diametrical distance across said blades is greater than the diameter of the motor-casing a consequently, as the tool is propelled through the boiler-tube the pulverized scale cut from the latter is free to pass directly over said casing to the rear thereof. Furthermore, by having the motor constructed, as described, the steam pressure is caused to discharge ahead of the tool and free of contact with its blades, and thus each pair of blades is free to contract or expand

in operation upon the scale obstructions formed in the tube to be cleaned.

What I claim as new and desire to secure by Letters-Patent, is—

1. In a boiler tube cleaner, the combination of a tubular shaft open at both ends and adapted to be propelled by a rotary motor; collars mounted on said shaft; scraper-blades carried by said collars, said blades arranged in pairs, each pair of blades extending at an angle to the axial center of said shaft, the members of each pair of blades having at their adjacent ends a pin and slot connection and at their opposite ends a pivotal connection with said collars.

2. In a boiler tube cleaner, the combination of a shaft open at both ends, with two collars, one of which is rigidly secured to said shaft and the other movable longitudinally thereon by means of a pin secured thereto and movable in a slot in said shaft, and pairs of scraper blades pivoted to said collars and having adjacent ends of the members of each pair provided with a slot and pin connection.

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

FRANCES J. MUIRHEAD,
Administratrix of the estate of said John Muirhead.

Witnesses:

GEORGE W. BENNETT, Jr.,
HENRY A. DUBY.