No. 675,800. Patented June 4, 1901.

C. W. STEELE.

MOTOR.

(Application filed June 8, 1900.)

(No Model.)

Fig. 1

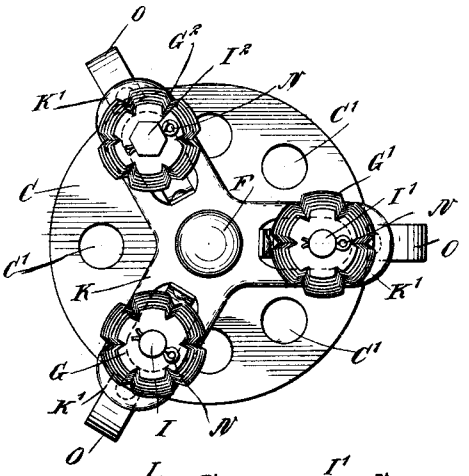
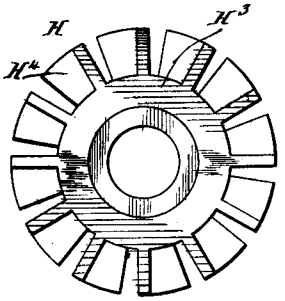


Fig. 3



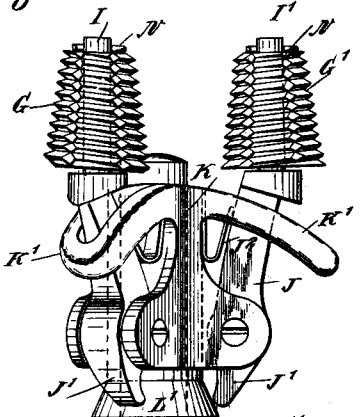


Fig. 4

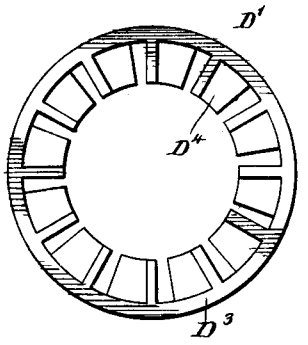
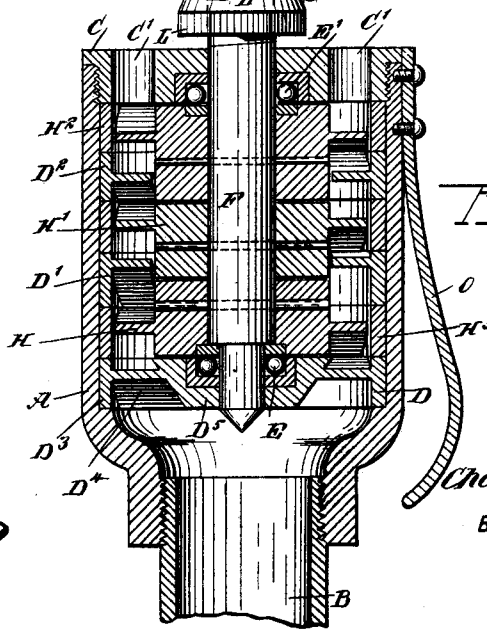


Fig. 2



WITNESSES:

J. A. Brophy

Wm. J. Hoeltz

INVENTOR

Charles W. Steele.

BY Munn & Co

ATTORNEYS

THE MORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES W. STEELE, OF DETROIT, MICHIGAN.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 675,800, dated June 4, 1901.

Application filed June 8, 1900. Serial No. 19,521. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. STEELE, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Motor for Tube-Cleaning Tools or the Like, of which the following is a full, clear, and exact description.

This invention relates to motors for boiler-tube cleaners or the like.

The object of the invention is to provide a new and improved motor which is simple and durable in construction, very effective in operation, and not liable to get out of order.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claim.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front end elevation of the improvement. Fig. 2 is a sectional plan view of the same with the scale cutter head and cutters in elevation. Fig. 3 is a face view of one of the propeller-wheels, and Fig. 4 is a like view of one of the deflectors.

The improved boiler-tube cleaner is provided with a head A, preferably made cylindrical and attached at one end to a pipe B, connected with a suitable source of motive-agent supply, such as steam, compressed air, or the like. The other end of the casing A is closed by an exhaust-cap C, having a plurality of exhaust-openings C′ for the escape of exhaust motive agent, as hereinafter more fully described.

In the casing A, near the inlet end thereof, is secured the deflector D, having in its center a ball-bearing E, in which is journaled one end of a shaft F, the other end of said shaft being journaled in a ball-bearing E′, carried by the cap C. The shaft F projects beyond the cap C and supports the scale-cutters G G′ G^2, adapted to engage the scale on the inner surface of the tube and cut or score off the scale in the manner hereinafter more fully explained.

Adjacent to the deflector D is arranged a propeller-wheel H, secured on the shaft F, and next to the propeller-wheel H is arranged a deflector D′, secured to the casing A, and next to this deflector is located a propeller-wheel H′, similar to the propeller-wheel H and likewise secured to the shaft F. A deflector D^2 is located next to the propeller-wheel H′, and another propeller-wheel H^2 is located between the deflector D^2 and the cap C, and the said propeller-wheel H^2 is also secured to the shaft F′. The several propeller-wheels H H′ H^2 have hubs H^3 and angularly-disposed blades H^4, the hubs H^3 being secured to the shaft F, the outer ends of the blades H^4 extending close to the inner surface of the rings H^5, arranged in the casing A between the rings D^3 of the adjacent deflectors, each of which is provided at its ring D^3 with inwardly-extending and angularly-disposed wings D^4, which stand in an opposite direction to the blades H^4 of the several propeller-wheels H H′ H^2. The first deflector D is, in addition, provided with a hub D^5, carrying the ball-bearing E, as previously explained. Otherwise, however, this deflector is also provided with an annular ring D^3 and angular wings D^4.

Now it is evident that when motive agent enters the casing A through the pipe B then it passes through the adjacent wings D^4 of the first deflector D against the blades H^4 of the first propeller-wheel H, so that the latter is rotated, and as it is secured on the shaft F a rotary motion is given to the latter. The motive agent as it passes through the space between adjacent blades H^4 in an angular direction passes to the next deflector D′, and as the wings thereof stand in an opposite direction to the blades of the preceding propeller-wheel H it is evident that the motive agent is directed by the second deflector D′ to the next propeller-wheel H′ to again actuate the same—that is, to turn this wheel in the same direction as the propeller-wheel H. A similar operation takes place in the deflector D^2 and the propeller-wheel H^2, the exhaust motive agent finally passing through the openings C′ out of the casing A. Thus the motive agent is utilized in such a manner that it acts successively on the several propeller-wheels to turn the same in one direction, thereby rotating the shaft with suitable force and great speed.

The cutters G G′ G^2, previously referred to,

are made conical in shape and threaded externally and grooved longitudinally, and said cutters are mounted on pins I I' I^2, projecting longitudinally from arms J, pivoted on a head K, secured to the outer end of the shaft F. The inner ends of the arms J are formed with extensions J', adapted to rest on an annular bevel L', formed on a nut L, screwing on the threaded portion of the shaft F, said bevel serving to limit the outward swinging movement of the arms J, but allowing an inward swinging thereof. The arms J are pressed on by springs J^2, so as to hold the same normally in an outermost position, the extensions J' abutting on the annular bevel L'. The head K is provided with radially-extending guideways K' for the arms J to swing in to prevent sidewise movement thereof.

The pins I I' for the cutters G G' are preferably round in cross-section, so that said cutters are free to turn on the pins; but the pin I^2 is preferably made polygonal in cross-section and the cutter G^2 is formed with a correspondingly-shaped bore for holding the cutter G^2 from rotation on the pin. The several cutters are held from accidental displacement on the pins by cotter-pins N, as is plainly indicated in Fig. 1. The casing A is preferably provided with springs O for keeping said casing centrally disposed in the tube when the device is in use.

The operation is as follows: The casing A is pushed into the tube to be cleaned by the operator manipulating the pipe B accordingly, and at the same time motive agent is passed through the pipe B into the casing A to cause the propeller-wheels H H' H^2 to rotate the shaft F, and with it the head K, so that the cutters G G' G^2 turn in the tube and with their cutting edges cut or score off the scale from the inner surface of the tube. The scoring-off process is materially assisted by the exhaust motive agent passing from the casing A into the tube to be cleaned, and this is of special importance when the motive agent is steam, which tends to loosen the scales for ready removal by the cutters G G' G^2. By having the cutters G G' G^2 constructed in the manner described it is evident that they have sharp cutting contact with the scale where it is thickest and a blunt contact where the cutters touch the tube, thus reducing the liability of injuring the tube to a minimum. By holding the cutter G^2 against rotation a scraping movement, as well as a pounding movement, is obtained, which assisted by the springs J^2, has proved very effective in removing refractory scales.

In case the scraping edge of the cutter G^2 is worn out or dulled the operator by withdrawing the corresponding cotter-pin can remove the cutter G^2 from the pin I^2 and then turn it slightly and replace it on the pin, so as to bring a new scraping-face into active position.

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

A motor, comprising a casing adapted for connection at one end with a motive-agent-supply pipe, a cap secured to the opposite end of the casing and provided with exhaust-ports, a series of deflectors in the casing, each consisting of a ring having inwardly-extending angularly-disposed deflecting-wings, a shaft having bearing at one end in the deflector at the inlet end of the casing and at the other end in the cap, propeller-wheels secured to the shaft and alternating with the deflectors, the said wheels having peripheral angularly-disposed blades, and rings in the casing surrounding the propeller-wheels and placed between the rings of the deflectors, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. STEELE.

Witnesses:
C. L. KELLER,
S. H. CORDESMAN.