

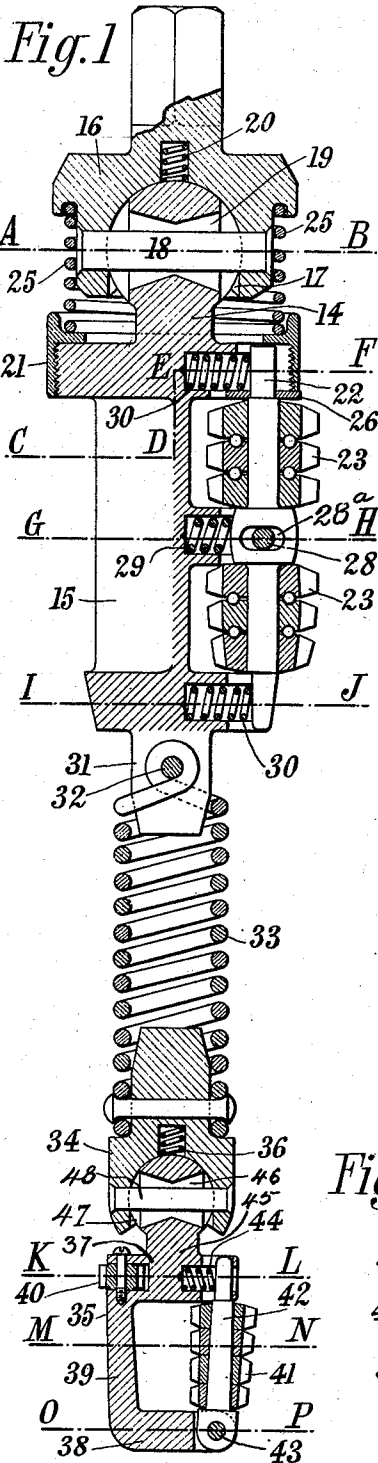
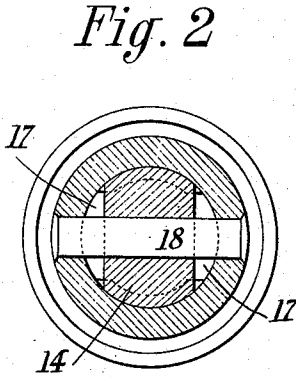
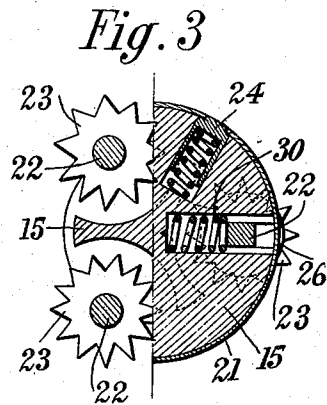
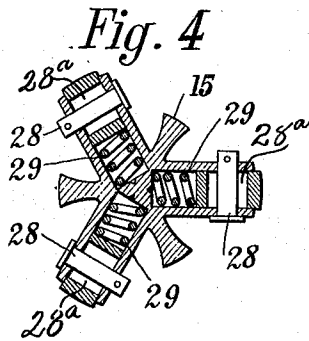
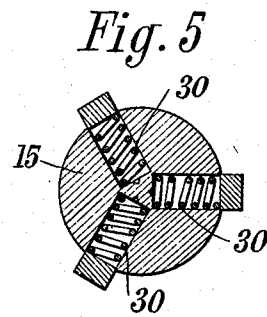
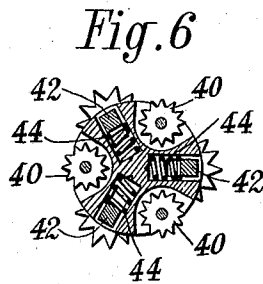
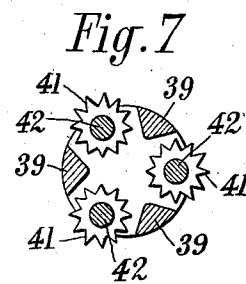
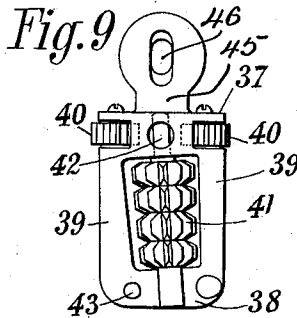
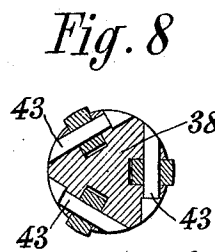
No. 854,819.

PATENTED MAY 28, 1907.

J. GEORGES & E. A. DORMOY.

DEVICE FOR REMOVING SCALE FROM BOILER TUBES.

APPLICATION FILED FEB. 27, 1906.



Witnesses:
L. H. Kite,
Geo. Marshall

Inventors -
Jacques Georges and
Emile Auguste Dormoy,
By Worth Ayer & Co.
Attys.

UNITED STATES PATENT OFFICE.

JACQUES GEORGES AND EMILE AUGUSTE DORMOY, OF ALGIERS, ALGERIA.

DEVICE FOR REMOVING SCALE FROM BOILER-TUBES.

No. 854,819.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed February 27, 1906. Serial No. 303,547.

To all whom it may concern:

Be it known that we, JACQUES GEORGES and EMILE AUGUSTE DORMOY, two citizens of the Republic of France, residing at Algiers, Algeria, have invented new and useful Improvements in Devices for Removing Scale from Boiler-Tubes, of which the following is a specification.

This invention relates to an improved device for removing scale from straight or curved boiler tubes of all kinds the said device having the advantage that the teeth of the scrapers which it comprises are unsymmetrically arranged and consequently insure the complete removal of the scale. However the manner in which the said scrapers are grouped or arranged is such that the device can be introduced into tubes of any diameter met with in practice, but that sufficient mechanical resistance is retained to secure efficient action.

In order to render the device flexible it is connected with the operating mechanism by means of a universal joint and the scrapers are separated from each other and from the rear of the device by ball bearings or their equivalents. Moreover the front part of the device is provided with a projection to which another smaller device can be connected for the purpose of preparing a passage for the larger device.

The invention is illustrated in the annexed drawing in which:

Figure 1 is a longitudinal section of the device, Fig. 2, 3, 4, 5, 6, 7 and 8 being respectively cross-sections on the lines, A—B, C—D, E—F, G—H, I—J, K—L, M—N and O—P of Fig. 1. Fig. 9 represents the lower part of the device shown in Fig. 1.

The neck 14 of the frame 15 is integral with a spherical knob 50 which has flat sides and is lodged in a cap or socket 16 provided with two recesses 17 which allow of introducing or removing the said knob after rotating the latter through an angle of 90 degrees from the position shown in Figs. 1 and 2. The said spherical knob is normally retained in the socket 16 by means of a pin 18 extending through apertures in the two parts. The aperture provided for this purpose in the knob is elliptical in the diametrical direction, and flared from its axial center toward its ends, so that the connection between the parts 14 and 16 partakes of the nature of a universal joint. The pin 18 therefore only serves to impart rotary movement to the

frame 15, the thrust and pull exerted during the cleaning operation being transmitted by means of the spherical knob and the socket.

A helical spring 20 is located in a suitable cavity in the part 16, and bears against the spherical knob and the end-wall of the said cavity. A sleeve 21 screwed or otherwise fixed to the frame 15 serves to support the axles 22 of the scrapers 23, and a catch 24 which is lodged in the frame 15 and subjected to spring pressure (Fig. 3) holds the said sleeve in position. This sleeve 21 is provided at its upper part with a flange which forms a seat for one end of a helical spring 25 inserted between said sleeve and the part 16.

The purpose of the springs 20 and 25 is to prevent too easy relative movement of the parts about the universal joint, during the removal of the device from one tube to another without stopping the driving mechanism or motor. A rotatable washer 26 of hardened steel is interposed between the scrapers 23 and the frame 15. Ball-bearings are provided between the scrapers 23, the latter being somewhat beveled or chamfered and having teeth irregularly spaced; the said scrapers are arranged in groups and are not of uniform diameter. The frame 15 is recessed in such a manner that the scrapers 23 can be placed as closely as possible to the central axis of the device.

The axles 22 supporting the groups of scrapers 23 are provided at their centers with slots through which extend pins 28 and helical springs 29 and 30 constantly tend to push the said axles 22 outward to the limit allowed by the said slots and pins 28. The office of the pins 28 which cross the opening 28^a pierced in the axles 22 and elongated in the direction of the radius of the apparatus, is to permit said axles 22 to move more or less with respect to the longitudinal axis of the frame without the possibility of being displaced longitudinally. The projection 31 formed on the frame 15 allows of connecting to the latter, by means of a pin 32 and a double spring 33, a socket 34, substantially similar to the socket 16 but of smaller size, to which a frame 35 is connected in the same manner as described with reference to the frame 15 and socket 16, a spring 36 being provided to prevent too great mobility of the frame 35 relatively to the socket 34, to provide for which the body 45, solid with the plate 37, at its free extremity is formed into a sphere flattened upon two opposite sides

and is pierced, perpendicularly to the flattened portions, with an opening, 46, oval and double conical in the direction of the axis of the frame; the piece 34 is provided axially with a spheroidal opening in which the spherical extremity of the head 45 is located, and further, two channels, 47, diametrically opposed, are cut longitudinally in the piece 34 from its lower extremity up to the axis of the pin 48 which traverses the head and which traverses also the opening 46 of the spherical extremity of the head 45.

The two end portions or plates 37 and 38 of the frame 35 are not connected to each other by means of a central column as in the case of the frame 15, but by means of pillars 39. Moreover the plate 37 is provided with recesses in which are located small rotatable scrapers 40 projecting slightly beyond the periphery of the said plate.

The scrapers 41 supported by the frame 35 have irregular teeth and are of different diameters and are mounted on axles 42 pivotally connected at 43 to the plate 38. Springs 44 located in recesses in the plate 37 tend constantly to push the axles 42 away from the axis of the frame 35. Moreover, the axles 42 are arranged each in a plane tangent to the frame 35 and are inclined with respect to the generatrix following which contact is made with the plane of tangence corresponding with the frame 35; owing to this arrangement the tool bites into the scale in the manner of a tap.

It will be understood that with the arrangement described, the rotary scrapers can be of comparatively large diameter in a tool the total diameter of which is relatively small, and that the said scrapers can be mounted on axles of diameters sufficient to resist large transverse strains. The resilient bearings of the axles 22 and 41 allow the latter to move relatively to the longitudinal axis of the device in accordance with the irregularities of the tubes due to construction or incrustation. The said bearings also facilitate the introduction of the tool into the tubes, and the forward movement of said tool as the work proceeds. Owing to the irregularity of the teeth of the scrapers and to the fact that the latter revolve at different speeds by reason of their different diameters, the said teeth do not merely cut grooves in the incrustation, but attack and remove the latter in a regular progressive manner at all parts, whatever the thickness and nature thereof may be, the attack being facilitated by the chamfering of the scrapers. The small scrapers 40 allow the frame 35 to roll without friction on the inner wall of the tube, so that the passage through curves of the latter is made easier; the scrapers 40 also co-operate, of course, in the removing of the scale. The frame 35 being of smaller diameter than the frame 15, prepares a passage for the latter in the tube.

The universal joints and the double spring 33 allow the tool to pass through any bend or curve likely to be met with in practice.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:

1. A device for removing scale consisting of a frame provided with radial projections having openings therein, axles mounted in said projections and having elongated openings therein, springs in said openings in said projections bearing against said axles, chamfered rollers having irregularly arranged teeth and mounted on said axles, and a pin carried by one of said projections and passing through said elongated opening in each of said axles.

2. A device for removing scale consisting of a frame provided with radial projections having openings therein, axles crossing said openings, chamfered rollers having irregularly arranged teeth mounted on the axles, springs in the radial openings, a head solid with the frame elongated axially at its upper extremity having the form of a sphere flattened upon two opposite sides and being pierced perpendicularly to the flattened portions with a double conical opening in the direction of the axis of the frame, the said upper spheroidal extremity of the head being located in a spheroidal axial opening of a socket piece and also provided with two longitudinal diametrically opposite channels, a pin traversing the double conical opening of the spheroidal extremity of the axial head of the frame, the socket piece having the spheroidal opening being also provided with an axial opening, a spring located in the last named opening, a sleeve screwed upon the upper extremity of the frame, a spring located in said cap, a catch located in an opening formed in the frame, and a spring inserted between it and the base of said opening.

3. A device for removing scale consisting of a frame provided with radial projections having openings therein, axles crossing said openings, chamfered and irregularly toothed rollers mounted on said axles, springs in the radial openings, an axial projection solid with the lower part of the frame, a pin crossing said opening, a double spring connected with said pin, a second pin crossing a socket piece provided with a spheroidal opening and connected with the double spring, a frame composed of two plates connected by arms and having a flattened spheroidal head and a pin crossing the longitudinal axis of this frame, said pin traversing also a double conical opening provided in the upper spheroidal extremity of the head and perpendicularly to the flattened portions of said head.

4. A device for removing scale consisting of a frame provided with radial projections having openings therein, axles crossing said

openings, chamfered rollers having irregular
teeth mounted on said axles, springs located
in the radial openings, an extremity of the
said frame having an axial projection, a pin
5 crossing the same, a double spring connected
with said pin, a socket piece having an open-
ing, a second frame having a flattened spheroidal head entering said last mentioned opening, a pin in said second frame connected with
10 said double spring, axles pivoted to the outer
end of said second frame, chamfered and
toothed rollers on said axles, springs located

in openings in said second frame and bearing
against the free ends of said axles, said axles
being normally inclined to the axis of the 15
frame.

In testimony whereof we have affixed our
names to this specification in the presence of
two subscribing witnesses.

JACQUES GEORGES.

EMILE AUGUSTE DORMOY.

Witnesses:

HENRI VIGNAUD,
JULIEN CAUERN.