

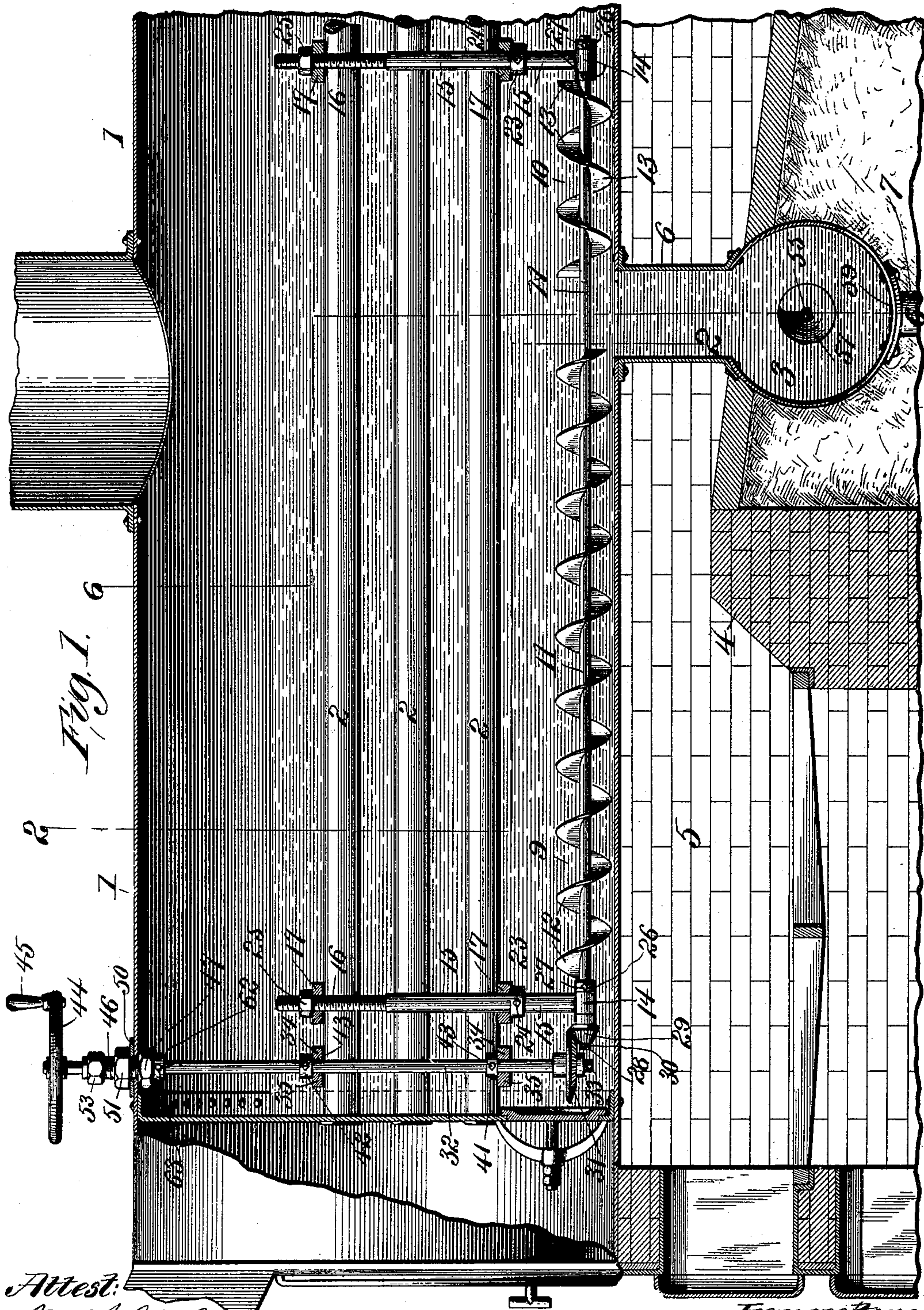
(No Model.)

2 Sheets—Sheet 1.

J. C. BURNESON & O. G. RICHEY.
BOILER CLEANING APPARATUS.

No. 581,247.

Patented Apr. 20, 1897.



Attest:
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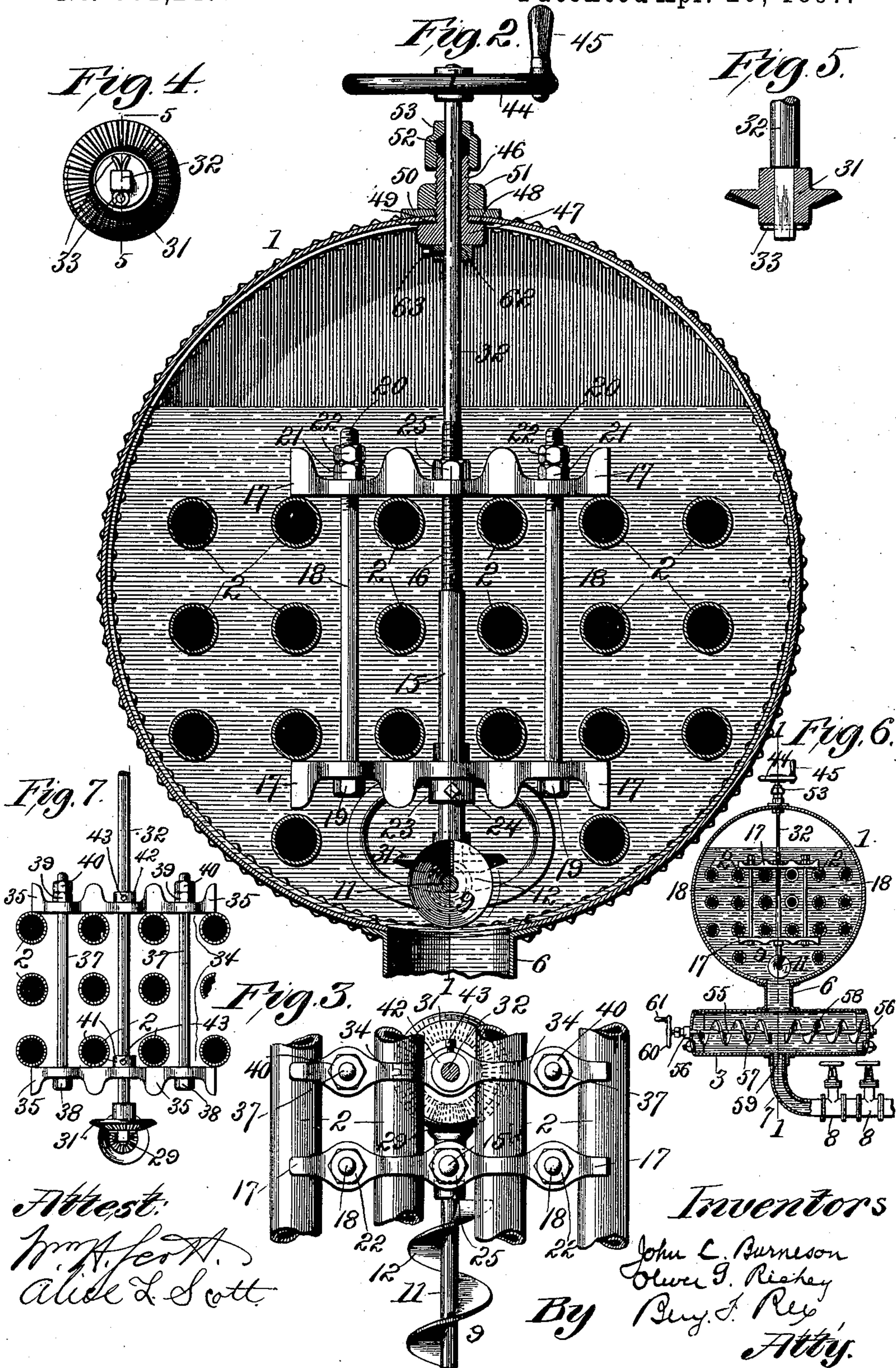
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UNITED STATES PATENT OFFICE.

JOHN C. BURNESON AND OLIVER G. RICHEY, OF ST. LOUIS, MISSOURI.

BOILER-CLEANING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 581,247, dated April 20, 1897.

Application filed June 24, 1896. Serial No. 596,762. (No model.)

To all whom it may concern:

Be it known that we, JOHN C. BURNESON and OLIVER G. RICHEY, citizens of the United States, residing at St. Louis, in the State of Missouri, have made certain new and useful Improvements in Boiler-Cleaning Apparatus, of which the following is a full, clear, and exact description.

Our improvements relate to means for removing scale and mud from steam-boilers, and are especially adapted for use in connection with boilers having mud-drums connected therewith; and our invention has for its chief objects, first, the removal of scale and mud from boilers; second, convenience in removing the mechanism used from the boilers and in replacing it when desired; third, the avoidance of injury to the shells of boilers by the operation of said mechanism, and, fourth, the removal of the scale and mud deposited in the mud-drums therefrom. We attain these objects by mechanism whose preferred form is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section on line 1 1, Figs. 2 and 6, of a boiler and mud-drum with our improvements applied thereto, the rear end of the boiler being broken away. Fig. 2 is a vertical cross-section on line 2 2, Fig. 1. Fig. 3 is a detailed plan view of means supporting portions of our apparatus. Fig. 4 is a detailed view, in end elevation, of a bevel-wheel and its shaft, preferably used in transmitting motion to conveyer-screws in the boiler. Fig. 5 is in part a vertical cross-section on line 5 5, Fig. 4, and in part a side elevation of the shaft to which the gear-wheel shown is secured. Fig. 6 is a cross-section of the apparatus on line 6 6, Fig. 1; and Fig. 7 is a detailed view, in front elevation, of the means supporting the driving-shaft.

Similar numerals refer to similar parts throughout the several views.

The horizontal boiler 1 (shown in the drawings) is of a common type, and is provided with the usual return-flues 2 and a mud-drum 3, connected with the boiler, back of the bridge 4 of the furnace 5, by means of a water-leg 6, as usual in such constructions, and the mud-drum 3 is shown provided with a blow-off pipe 7, preferably connected with the under side of the mud-drum at about its

center, and preferably furnished with gate-valves 8 8.

Within the boiler 1 and preferably longitudinally above and near the center of its bottom we arrange two conveyer-screws 9 and 10, one, 9, between the water-leg 6 and the front of the boiler, and one, 10, between said water-leg and the back of the boiler. One of these screws is preferably a right-hand screw and the other a left-hand screw. The essential point is that the rear screw 10 shall oppose the action of the front screw 9 when both are caused to revolve, so that when the screw 9 is so revolved as to cause scale on and near the bottom of the boiler to move toward the water-leg 6 the screw 10 will oppose its passage beyond the water-leg and tend to carry any scale forward to the water-leg that may be driven too far back. This is very important in ordinary flue-boilers, as the mud-drum used in connection with such boilers is usually located about midway between their ends, that being considered by those skilled in the art the best position.

We prefer in constructing the screws 9 and 10 to use a single shaft 11 and attach the blades 12 and 13 of both screws to it. The ends of the shaft 11 we preferably support in bearings 14 14, respectively attached to the lower ends of vertical rods 15 15, which are preferably screw-threaded at their respective upper ends 16 and are each preferably suspended from the flues 2 of the boiler and held in place by means of a frame consisting of two cross-bars 17 17, through holes in which the rod 15 passes and which are preferably secured together and fastened in place by means of a pair of tie-rods 18 18 passing through them and each preferably having a head 19 at one end and screw-threaded at the other end 20, and preferably provided at the screw-threaded end with an ordinary nut 21 and a jam-nut 22. By screwing up these nuts the frame can be secured rigidly in position. The bars 17 17 are preferably duplicates. It is desirable that they should not occupy any more space on the flues than is necessary, and for that reason we preferably make them narrow from side to side and thick from top to bottom at points where they rest against the flues 2 and wider transversely and thinner vertically at intermediate points.

The rod 15 in each case is prevented from moving vertically preferably by an adjustable collar 23, secured in place by a set-screw 24, which rests against the under side of the lower cross-bar 17, and a nut 25, screwed upon the upper end of the rod 15 and resting against the top of the upper bar 17 of the frame, all preferably as shown most clearly in Fig. 2.

The shaft 11 may be prevented from moving longitudinally by means of movable collars 26, secured thereto by set-screws 27 or other suitable means.

The front end 28 of the shaft 11 is preferably squared, and a pinion 29, having a hole through it corresponding in size and shape to the end of the shaft 11, is slipped over the end 28 of the shaft and secured in place by a split key 30. The preferred construction is in all respects, so far as the method of attaching the pinion in place is concerned, exactly the same as the one adopted in securing the bevel-wheel 31 to the vertical driving-shaft 32, (illustrated in Figs. 4 and 5,) in which the key used is numbered 33. The bevel-wheel 31 engages the pinion 29.

The driving-shaft 32 is preferably supported by means of a frame 34, which is shown in all respects exactly like the frames used in supporting the shaft 11 in place and hereinbefore fully described. In this frame the cross-bars 35 are held together by means of tie-rods 37, having heads 38 and nuts 39 and 40, by means of which it is clamped to the flues 2 of the boiler. The driving-shaft 32 passes through vertical holes in the cross-bars 35 and carries a collar 41, which rests upon the lower cross-bar 35, and another collar 42, which rests upon the upper cross-bar of the frame. Both collars are preferably movable, and each is preferably secured to the shaft by means of a set-screw 43. The upper end of the shaft 32 preferably extends out through a gland secured in an opening in the top of the boiler and has a wheel 44, with a crank-handle 45, shown attached to its upper end, for imparting motion to it. The gland through which the shaft 32 passes is preferably composed of a sleeve 46, having a head 47 at its lower end resting against a gasket 48, placed between it and the inside of the boiler-shell 49, opposite the gasket.

We preferably reinforce the boiler-shell on the outside by means of a washer 50, made concave on the bottom, so as to fit the shell, and flat on top.

The sleeve 46 is screw-threaded on the outside and is fastened in position by means of a nut 51, screwed onto it and down against the washer 50. At its upper end it is preferably concave, and a packing 52 is held between it and a screw-cap 53. This gland not only prevents the escape of steam, but supports the upper end of the driving-shaft 32 and prevents the boiler-shell 49 from being injured by the operation of the device. Immediately beneath the gland we preferably

arrange a collar 62 on the driving-shaft and secure it in position by means of a set-screw 63. This collar prevents the driving-shaft from rising and lifting its gear-wheel out of engagement with the pinion of the conveyer-shaft. Within the mud-drum 3 we preferably arrange centrally a shaft 55, journaled in glands 56 56 in the ends of the drum, and having attached thereto a right-hand conveyer-blade 57 and a left-hand blade 58, preferably, but not necessarily, having a space between them opposite the mouth 59 of the blow-off pipe 7. To the end of the shaft 55 we preferably secure a wheel 60, having a crank-handle 61.

Our apparatus in the form described operates as follows: Scale having accumulated along the bottom of the boiler over the furnace, in the usual manner, the conveyer-screws 9 and 10 are set in motion by turning the wheel 44, which sets the driving-shaft 32 in motion, and from it motion is transmitted through the bevel-wheel 31 and pinion 29 to the conveyer-shaft 11. The conveyer-blade 12 propels the loose scale in the boiler toward the mouth of the water-leg 6, leading to the mud-drum 3, and the motion of the blade 13 tends to prevent any scale from being driven past the mouth of the water-leg 6, and draws toward it and propels back toward the water-leg any scale and mud passing around it at the sides. The result of the joint action of the two blades is to cause the scale to sink down through the water-leg 6 into the mud-drum 3. After the boiler has in this manner been cleaned the gate-valves 8 8 are opened, so as to give the mud and scale a free passage out through the blow-off pipe 7. The right and left hand screw-blades 57 and 58 are then set in motion by turning the wheel 60, and the scale and mud forced toward the mouth of the blow-off pipe, through which it escapes. By keeping the boiler and mud-drum clean in this way the life of the boiler and the water-leg 6 are greatly prolonged.

It will be obvious that other well-known means for communicating motion to the shafts 32, 55, and 11 may be adopted in place of those described, and we do not wish to be understood as confining our claims to the special means shown. We desire to cover equivalents broadly.

Our apparatus is particularly useful in preventing the accumulation of scale in boilers, but it is also useful in removing mud, and at sea it is useful in removing the salt and sediment deposited.

We claim—

1. The combination of a horizontal, flue-boiler having an outlet for deposits through its bottom; a conveyer-shaft 11, arranged longitudinally in the boiler and having attached thereto, a right and a left hand screw conveyer-blade, with their inner ends opposite each other, and in the neighborhood of said outlet; journal-bearings 14, 14, for the ends of the shaft; a pair of vertical rods 15, each

attached to one of said bearings and screw-threaded at its upper end; a supporting-frame for each rod 15, each frame having a pair of horizontal cross-bars, 17, one resting on top of a set of flues, and the other beneath it against the under side of a lower set of flues; and a pair of tie-rods, each having a head at one end, and screw-threaded at the other, and each passing through holes in the cross-bars and being fastened in place by one or more nuts; and, the rod 15, supported by the frame passing up through vertical holes therein, and having beneath the lower cross-bar, a collar secured by a set-screw, and above the upper cross-bar a nut, together, preventing vertical movement, substantially as described.

2. The combination of a horizontal flue-boiler; having an outlet through its bottom for deposits; a conveyer-shaft 11, having a right and a left hand conveyer screw-blade attached thereto, arranged with their inner ends opposite each other, and in the neighborhood of said outlet; journal-bearings, in which said shaft turns; a vertical driving-shaft passing through the top of the boiler; means supporting the driving-shaft; and means transmitting motion from the driving-shaft to the shaft 11.

3. The combination of a horizontal flue-

boiler; having an outlet through its bottom for deposits; a vertical driving-shaft; a bevel-wheel on its lower end; a gland through which it passes out of the boiler, and which is composed of a screw-threaded sleeve 46, having a head 47 at its inner end; a gasket 48, between the head 47 and the boiler-shell; a washer concave on the inside and flat on top, resting on top of the shell; a nut 51, fastening the sleeve in place and resting on the washer; a screw-cap 53, and a packing 52, between the cap and the sleeve; means supporting the driving-shaft and preventing longitudinal movement thereof; a horizontal shaft; bearings therefor, in which it turns, means supporting it in position; a bevel-wheel on its forward end which is engaged by the bevel-wheel on the driving-shaft; a right and a left hand screw conveyer-blade attached to the horizontal shaft end to end, and with their inner ends in the neighborhood of the outlet from the boiler, and said blades conveying deposits toward the outlet, substantially as described.

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Witnesses:

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