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1,577,309

S. SORENSEN

BOILER TUBE SCALING DEVICE

Filed Nov. 19, 1924

Fig. 1.

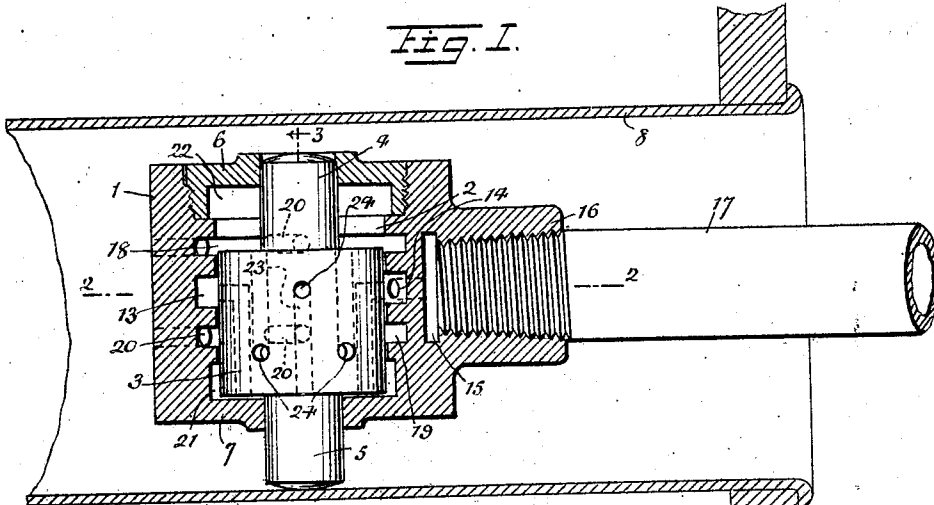


Fig. 2.

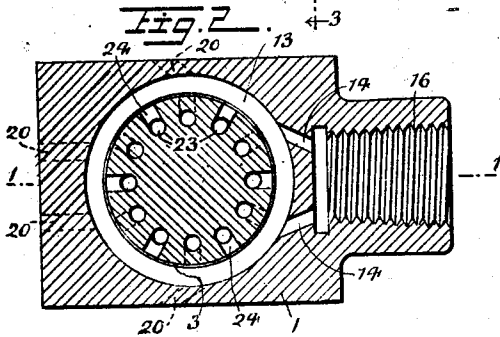


Fig. 3.

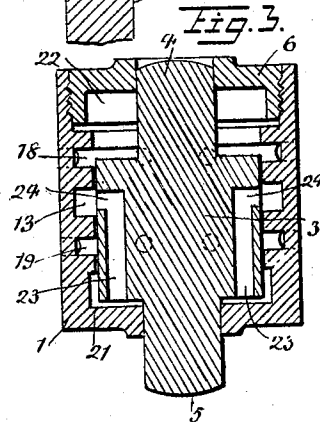
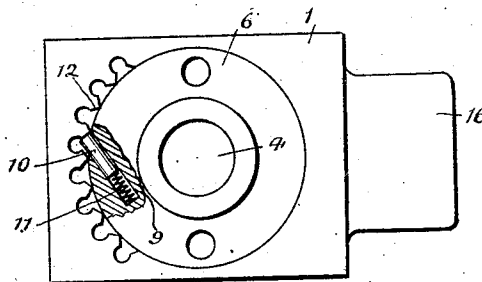


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

STEPHEN SORENSEN, OF NEW YORK, N. Y.

BOILER-TUBE-SCALING DEVICE.

Application filed November 19, 1924. Serial No. 750,593.

To all whom it may concern:

Be it known that I, STEPHEN SORENSEN, a citizen of the United States, and a resident of the city of New York, Port Richmond, borough of Richmond, in the county of Richmond and State of New York, have invented a new and Improved Boiler-Tube-Scaling Device, of which the following is a full, clear, and exact description.

10 This invention relates to a boiler tube scaling device. An object of the invention is to provide a device which can be extremely economically manufactured and which is simple, efficient, durable and compact in its construction and operation.

Another object concerns the provision of means whereby the mechanical work required to make the device is reduced to a minimum.

20 A further object concerns the provision of means whereby the reciprocating piston which forms the hammer carries substantially all the ports for conducting steam or impelling fluid to and from the steam chambers and thereby acts as its own slide valve.

The invention is illustrated in the drawings, of which—

30 Figure 1 is a section taken on the line 1—1 of Fig. 2;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 1; and

35 Fig. 4 is a plan view of the device with a portion of the top plate cut away to show the locking device therefor.

The form of the invention shown in the drawings is a preferred form, although it is understood that modifications in the construction and arrangement of the parts and in the character of the materials used may be adopted without departing from the spirit of the invention as set forth in the appended claim.

45 In its general aspect the invention comprises a scaler including a head portion adapted to be inserted within a boiler tube or similar location. This head portion contains a cylinder within which a piston is adapted to reciprocate. This piston is provided with hammerlike stems projecting from opposite sides thereof, which encounter the walls of the tube as the piston is reciprocated by the impelling fluid.

The walls of the cylinder are provided

with a plurality of grooves acting as steam admission and exhaust grooves. The admission groove is connected to an admission pipe, and the exhaust grooves are connected by passages leading to the exterior of the body portion for the discharge of the fluid. These grooves are preferably circular and can be easily and economically formed within the walls of the cylinder. The piston itself is provided with a plurality of ports and passages which are so related to the grooves in the cylinder walls and the steam chambers formed at the ends of the cylinder that the flow of the steam is controlled by these ports in the piston due to the movement thereof. In view of the fact that the piston is removable the ports therein can be very readily formed, whereas if it were required to machine the cylinder wall with anything but radial ports the manufacture of the device would be much more expensive. It is for this purpose, therefore, that I provide the piston itself with the steam ports, which ports, by reason of the movement of the piston, are opened and closed to control the flow of the fluid.

The preferred form of the invention as shown in the drawings comprises a body portion 1 within which is formed a chamber 2 acting as a cylinder. Within this cylinder a piston 3 is adapted to reciprocate. This piston at its opposite ends is provided with hammer stems 4 and 5 which project through suitable openings in the end walls 6 and 7 of the cylinder to strike the walls of the boiler tube 8 as the piston reciprocates.

60 Preferably the end wall 6 of the cylinder is in the form of a cap which is screwed into the body portion and can be removed. This cap along its edge is provided with a bore 9 into which a pin 10 extends. Back of this pin, within the bore 9, is a spring 11 tending to force the pin out of the bore. This pin is adapted to engage with shoulders such as 12 formed in the upper surface of the body portion adjacent the cap 6 to prevent its being unscrewed from the body portion excepting when the pin is drawn back into the bore 9. This acts as a simple and efficient lock, so that when the cap is once screwed into place it cannot be jarred loose. When unscrewing the cap, a suitable tool is inserted between the pin 10 and the shoulder 12 which it engages to force the pin into its recess.

The cylinder is provided with a central

circular groove 13 to which an inlet port 14 connects, this port leading to a passage 15 formed in a lateral boss 16 formed on the side of the body portion 1 and into which an inlet pipe 17 is suitably threaded. The circular groove 13 in the cylinder is centrally disposed with respect to the path of movement of the piston and with respect to the length of the cylinder, and is the admission groove for the impelling fluid. On opposite sides of this admission groove are two grooves 18 and 19. These grooves are exhaust grooves and are connected to the exterior of the body portion by a plurality of exhaust passages such as 20 leading to the opposite ends of the cylinder steam chambers 21 and 22 are formed. The body portion of the piston 3 is provided with a plurality of steam passages, such as 23, extending longitudinally of the piston. Each of these passages connects at its inner end with a radial passage such as 24 leading to the periphery of the piston. It is to be understood, however, that certain of these passages 23 extend toward one end of the piston and certain others, preferably an equal number, extend toward the opposite end of the piston and open thereinto. Any of the steam passages 23 which open into one end of the piston have their connection with the radial ports 24 on the opposite side of the center line of the piston, consequently, the steam passages 23 which open into the other end of the piston have their connections to the radial passages 24 on the opposite side of the center line of the piston. By reason of this construction, it will be observed from a consideration of the drawing that whenever the piston is at either end of the cylinder certain of the radial ports 24 formed therein are in alignment with the fluid admission groove 13.

In the operation of the device, therefore, assuming that the piston is in the position shown in Figs. 1 and 3, the steam will enter the pipe 17, pass through the inlet port 14, into the admission groove 13. It will pass from this groove into the plurality of radial passages 24 which happen to be aligned therewith in this position of the piston, and will pass down the steam passages 23 to the lower end of the piston and enter the lower steam chamber 21. This fluid, which may be steam, will then force the piston outwardly. As the piston travels up, the radial passages 24 will be closed off from the

groove 13 and will be connected to the exhaust groove 18 and, at the same time, the lower end of the steam passages 23 will be open to the exhaust groove 19, so that simultaneously the steam or impelling fluid trapped in the chamber 21 and in the passages 23 and the ports 24 will be exhausted rapidly. This exhaust action will tend to act in such a manner as to clean the surface of the boiler tube adjacent the device because of the pressure under which the fluid is released from the cylinder. As the piston reaches the opposite end of its stroke from that shown in Fig. 1, the other side of the admission ports 24 are brought into alignment with the admission groove 13, thus causing the steam or fluid to be admitted to the opposite end of the cylinder, acting on the other end of the piston to move it in the reverse direction, whereupon a similar cycle of operations takes place.

It will thus be observed that in so far as the flow and control of the steam is concerned, all of the ports and passages which lead steam from the inlet groove to the steam chambers and from the steam chambers to the exhaust groove are carried by the piston, and since this piston can be removed from the cylinder, it is a relatively economical matter to machine and bore the piston, the only machining required to be applied to the cylinder walls being to form the grooves above mentioned therein and drill the radial ports 14, 20, a matter which is relatively economical. In other words, the piston itself acts as its own slide valve.

What I claim is:—

A body having a cylinder therein, said cylinder having a central fluid admission groove and fluid exhaust grooves, passages on opposite sides of the admission groove, said cylinder having steam chambers at opposite ends thereof, a reciprocal piston disposed in said cylinder, said piston having axially spaced radially disposed rows of admission ports adapted to be respectively aligned with the admission groove in either extreme position of the piston within the cylinder, and with the exhaust grooves at intermediate positions of the piston and passages leading from said ports to opposite ends of the piston, whereby motive fluid is delivered to and exhausted from the steam chambers through the piston, said piston in its movement acting as a slide valve to control the flow of fluid.

STEPHEN SORENSSEN.