

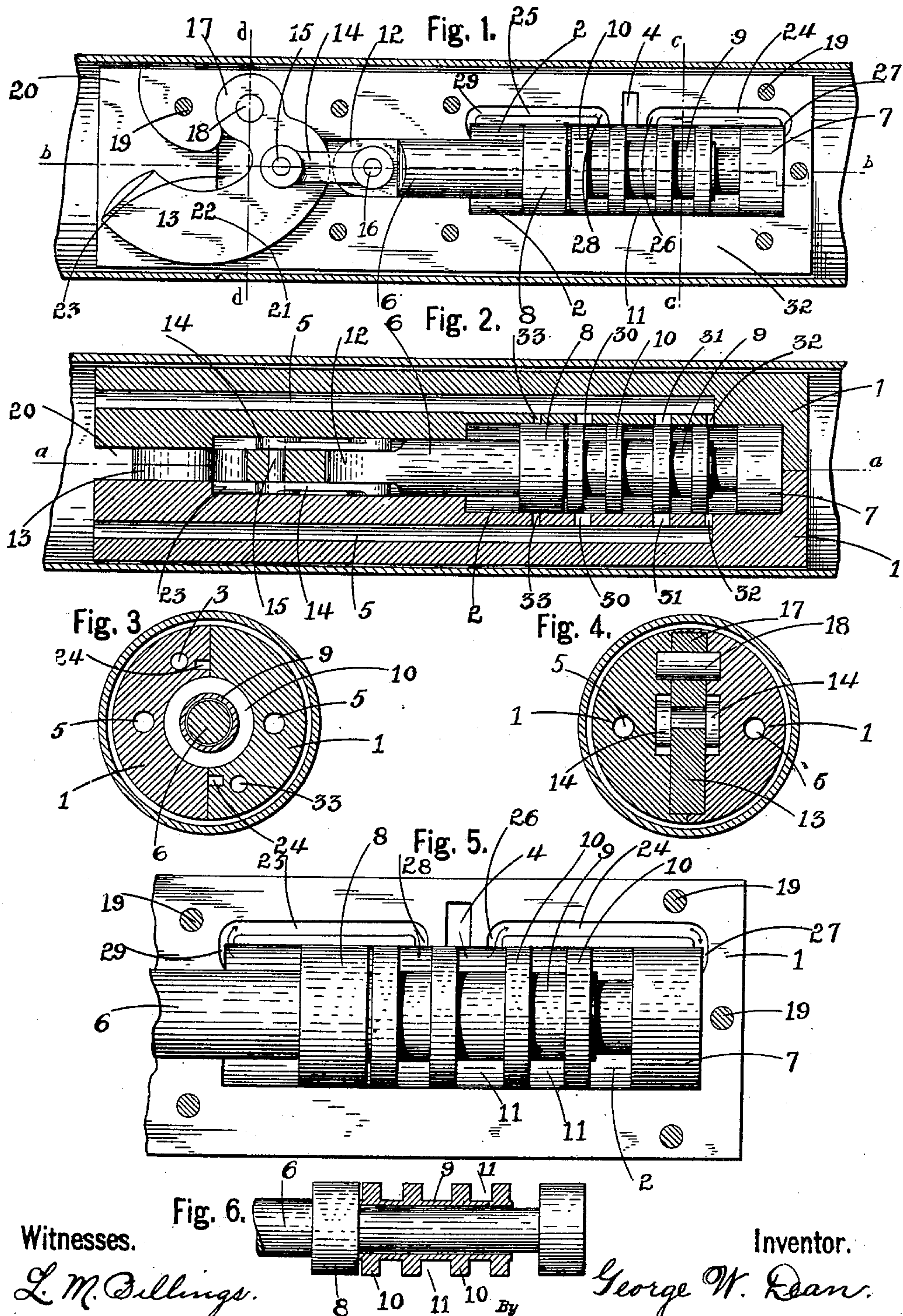
No. 682,044.

Patented Sept. 3, 1901.

G. W. DEAN.  
SCALE REMOVING DEVICE.

(Application filed Feb. 9, 1901.)

(No Model.)



Witnesses.

L. M. Billings.

Geo. A. Neubauer.

Inventor.

George W. Dean.

A. J. Sangster Attorney.



# UNITED STATES PATENT OFFICE.

GEORGE W. DEAN, OF FORT ERIE, CANADA, ASSIGNOR OF ONE-HALF TO  
GEORGE B. NYE, OF BUFFALO, NEW YORK.

## SCALE-REMOVING DEVICE.

SPECIFICATION forming part of Letters Patent No. 682,044, dated September 3, 1901.

Application filed February 9, 1901. Serial No. 46,664. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. DEAN, a subject of the King of Great Britain, residing at Fort Erie, in the county of Welland, Province of Ontario, and Dominion of Canada, have invented certain new and useful Improvements in Scale-Removing Devices, of which the following is a specification.

My invention relates to an improved device for removing scale from boiler-flues and the like; and one of the objects of the invention is to form the shell of the device in parts which can be separated to permit dismantling the mechanism for cleaning or repairing.

The invention further relates to the peculiar form of valve mechanism employed and to certain details of construction of the hammer mechanism.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The invention is susceptible to various changes in the form, proportion, and minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal section on line *a a*, Fig. 2, through a fragment of a pipe or flue, also showing one of the halves of my improved scale-removing device. Fig. 2 is a longitudinal section on line *b b*, Fig. 1. Fig. 3 is a transverse section on line *c c*, Fig. 1. Fig. 4 is a transverse section on line *d d*, Fig. 1. Fig. 5 is an enlarged fragment of one of the halves, showing the valve movement. Fig. 6 is a fragment of the piston with a longitudinal section through the movable valve device.

The shell of the device is formed in two halves, each of which is a duplicate of the other and is denoted by the numeral 1. Each shell portion 1 has a steam-chamber 2, a longitudinally-extending steam-port 3, which communicates with the steam-chamber through a short transverse opening 4, and a longitudinally-extending exhaust-port 5, which communicates with the steam-chamber at several points, as will be more specifically

described further on. Each half portion has recesses or depressions to receive the piston, the hammer, and the connection between the piston and hammer. The piston 6 is formed with two enlarged portions or shoulders, one numbered 7 at its rear end and another numbered 8, located at or near the middle, and a tubular valve device 9 is arranged upon the piston between these shoulders and has a limited longitudinal movement thereon between said shoulders. This valve device has a series of enlargements or valve-closing rings 10, which are separated from each other by steam-receiving spaces 11. The forward end of the piston is shaped to form an eye 12, and the hammer or striker 13 is connected to the piston by the connecting-rods 14, which are pivotally fastened to the hammer and piston end by the pintles 15 and 16. The hammer or striker 13 is of a curved form and has an eye portion 17 at one end, through which the pivoting-pintle 18 passes. Two halves of the shell are detachably secured together by a series of bolts 19, which pass through said halves at suitable intervals, and the pivoting-pintle 18 serves as an additional fastening for the two halves. Two connecting-rods 14 are preferably employed, one being arranged on each side of the hammer. Each half is provided with a shallow depression or recess 20 at its forward end, of similar form, which register with each other when the two halves are together and form a space in which the hammer operates. The inner edge or wall 21 of the recess 20 conforms in shape to the curved inner edge 22 of the hammer, so that when the hammer is in its rearward position its inner edge for nearly its entire length is in contact with the wall of the recess, and the outer edge or wall 21<sup>a</sup> likewise conforms to the curve of the outer edge 22<sup>a</sup> of the hammer. The hammer in operating plays between the inner and outer irregular walls of the recess, and the eye or pivotal end 17 is substantially circular, except where it joins the hammer-body, and fits in the substantially circular slot in the shell-body. (See Fig. 1.) This prevents the wear and tear which would necessarily ensue should the hammer strike at a point or points only. A secondary recess 23, which is smaller than the recess 20



and substantially rectangular in shape, is formed in each of the halves in the bottom of the recess 20, in which one of the connecting-rods 14 is supported and travels. The pintles 15 and 16 are about equal in length to the distance between the bottom surface of the opposed recesses 23, and are held against pivotal displacement between said bottom surfaces. (See Fig. 2.) Two longitudinally-extending openings or chambers 24 and 25 for conducting the steam are formed in each half on one side of the steam-chamber, the ends of each of which curve into communication with the steam-chamber at one end of the chamber and at an intermediate point. (See Fig. 1.) These openings serve to conduct the steam against the forward and rear shoulders 7 and 8 of the piston, and thus reciprocate the same, and the valve-closing rings on the movable valve device serve to shut off or close the intermediate ends of the openings alternately, and thus close one or the other of the openings against steam according to the relative position of the piston. Referring to Fig. 5 for an explanation of this portion of the mechanism, in which the piston is in its rearward position, steam is admitted through the steam-ports 3 into the steam-chamber 2 and passes into the intermediate connecting end 26 of the opening or channel 24 and then rearwardly and through the rear end 27 against the rear end of the piston or shoulder 7, forcing it forward. When the piston nears the limit of its forward movement, the movable valve device moves so as to bring one of the rings 10 into closing position relative to the end 26 of the opening 24 and opening the intermediate end 28 of the opening or chamber 25 and permitting the steam to pass through said opening or channel 25 and the curved forward end 29 of said opening against the forward shoulder 8 and reversing the movement of the piston.

30 and 31 represent the main openings, which communicate with the exhaust-ports, and 32 and 33 small vents, which also communicate with the exhaust-ports and serve as outlets for the steam between the shoulders 7 and 8 and the adjacent portions of the valve device. The main or large openings 30 or 31 are opened and closed by the rings 10, and the small vents 32 and 33 are opened and closed by the shoulders 7 and 8.

I claim as my invention—

1. A scale-removing device comprising a shell formed in two separable half portions; each half having a depression forming half of the valve-chamber, a recess forming half of a hammer-receiving space and a secondary recess forming a pocket, a piston in the valve-chamber, a hammer in the hammer-receiving space and connections in the pockets pivoted to the hammer and piston.

2. A scale-removing device comprising a shell having a steam-chamber, a hammer sup-

ported in said shell, an actuating-piston in the steam-chamber, rods connecting the piston to the hammer and a tubular valve device slidably encircling the piston and having a series of steam-receiving spaces.

3. A scale-removing device comprising a shell having a steam-chamber, a hammer supported in said shell, an actuating-piston in the steam-chamber having a reduced portion, rods connecting the hammer to the reduced portion of the piston, and a tubular valve device slidably encircling the reduced portion of the piston and having a series of transverse grooves forming a plurality of steam-receiving spaces.

4. A scale-removing device comprising a shell formed in halves; each half having exhaust and inlet ports, a depression forming part of a valve-chamber and a recess forming part of a hammer-receiving chamber, a reciprocating piston in the valve-chamber, a hammer in the hammer-receiving chamber, and a valve device slidably mounted on the piston and having a plurality of transverse steam-spaces and rings or enlargements between the spaces.

5. In a scale-removing device, a shell having a chamber provided with two oppositely-disposed walls of curving conformation, of an angular hammer having two curved side edges corresponding to the curves of the walls and adapted to play between said walls.

6. In a scale-removing device, a shell having a chamber provided with irregular oppositely-disposed walls and a pivotal space having a nearly-circular wall, of an angular hammer having opposite side edges conforming to the irregular walls and a pivoted end portion fitting in the pivotal space and having a curved edge conforming to the wall of said space.

7. A scale-removing device comprising a shell, a curved hammer pivoted at one end in said shell, a centrally-arranged actuating piston and rods pivotally connected at one end to an intermediate portion of the hammer and at the opposite end to the piston.

8. A scale-removing device comprising a shell, a comparatively large curved hammer in said shell, an actuating-piston having a reduced end provided with opposite flat surfaces and flat connections pivoted to the piston end and the hammer.

9. A scale-removing device comprising a shell having a central longitudinal opening which enlarges at one end to form a valve-chamber, reduces at one intermediate point to form a pocket and enlarges at the opposite end to form an irregular walled hammer-space, a piston in the valve-chamber having a reduced end extending into the pocket, an angular hammer pivoted at one end and having curved surfaces conforming to the irregular walls of the hammer-space, and two flat connections arranged on opposite sides of and pivoted to the hammers and piston.



10. A scale-removing device comprising a  
shell formed in longitudinal halves and each  
half having a longitudinal depression which  
forms part of a valve-chamber, a hammer-re-  
ceiving space and an intermediate pocket, a  
5 piston in the valve-chamber having a reduced  
end extending into the pocket, a curved ham-  
mer pivoted at one end in the hammer-space  
and curving across the pocket and rods in the  
pocket pivoted to the hammer and piston end. 10  
GEORGE W. DEAN.

Witnesses:

L. M. BILLINGS,  
GEO. A. NEUBAUER.