To all whom it may concern:

Be it known that I, Elmer A. Hawley, a citizen of the United States, and resident of Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Pneumatic Scaling-Tool, of which the following is a specification.

The object of my invention is to provide a pneumatic scaling tool of simple, durable and inexpensive construction.

A further object is to provide a pneumatic scaling tool having a detachable tool or member, and means for so mounting and operating said detachable member as to secure flexibility of control of said members, so that the impact thereof can be varied as desired.

It is particularly my object to provide a pneumatic scaling tool of the type in which impact may be readily varied, and may be comparatively light for scaling boilers and the like.

My invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a central vertical sectional view of a scaling tool, embodying my invention.

Fig. 2 shows a horizontal sectional view taken on the line 2--2 of Fig. 1.

Fig. 3 shows an end elevation of the detachable tool member, and

Fig. 4 shows a plan view of the plate to which the springs are secured.

Fig. 5 shows a horizontal, sectional view through the lower part of the device and the spring therein.

In the exemplification of my invention illustrated in the accompanying drawings, I have used the reference numeral 10 to indicate generally a body having therein a central longitudinal bore 11. The upper portion of the bore, above the shoulder 12, is larger in diameter than the lower portion thereof. Screwed into the upper end of the bore 11 is a cap 13.

Mounted in the bore 11 is a reciprocating member, comprising the lower cylindrical portion 14 received and operated within the upper end of the smaller portion of the bore 11, and the upper portion 15 of greater diameter received and operated within the larger portion of the bore 11.

In the upper part of the portion 15 is a central longitudinal recess 16, extending downwardly into the portion 14. At the lower end of the openings 16 are radially extending openings 17, which lead from the recess 16 to the outer surface of the portion 15, as illustrated in Fig. 2.

In the wall of the member 10, around the upper end of the bore 11, are three spaced annular grooves, which have been numbered from the upper to the lower grooves respectively, 18, 19, 20. On one side of the member 10, the groove 19 communicates with an intake passage 21, which communicates with a fluid supply tube 22. The passage 21 also communicates with an upwardly extending passage 23, in the wall of the member 10. The upper end of the passage 23 communicates with the lower end of a passage 24, through the cap 13. The upper end of the passage 24 is closed by a plug 25.

In the outer surface of the portion 15 is an annular groove 26. In the lower part of the portion 15 are a plurality of vertical openings 27, leading from the groove 26 downwardly to the lower end of the portion 15, as illustrated in Figs. 1 and 2.

In the upper surface of the member 10 is an annular groove 28. The parts hereinbefore described, are so arranged that when the parts are in the position shown in Fig. 1, and a fluid is supplied through the tube 22, the fluid passes into the grooves 19 and 26, and also downwardly through the passages 27. The expansion of the fluid, if compressed air or such suitable fluid is used, will move the members 15 and 14 upwardly. When the groove 26 passes upwardly beyond the groove 19 the supply of fluid will be shut off, and the continued expansion of fluid in the device will force the member 15 upwardly until the groove 26 registers with the groove 18, whereupon the fluid will exhaust through the port opening or passage 29 extending from the groove 18 to the outer surface of the cylinder 10. At the same time, the groove 19 will register with the outer ends of the opening 17, and fluid will be forced through the passage 21, the groove 19, the passage 17 and recess 16, to the upper end of the member 15, and the expansion of the fluid at the upper end of the member 15 will force said member down-
wardly with a driving motion, until the passages 17 register with the groove 20, whereupon the fluid will exhaust through the passage 30 leading from the groove 20 to the outer surface of the cylinder 10. This operation may be repeated as often as desired.

It will be understood that the opening in which the supply tube 22 is secured may be plugged, and a supply tube may be connected with the upper end of the opening 24, and that the machine will then operate in the same way.

The object of having two places for attaching the supply tube is to make the tool better adapted for use in a variety of positions in doing close work in a boiler or the like.

On account of the fact that the area of the upper end of the member 15 is greater than the area affected by the expansion of the fluid during the upward movement of the member 15, the downward movement of said member is more rapid than the upward movement thereof. In this connection it may be mentioned that modifications may be made in the particular arrangement of the openings and passages for causing the reciprocating movement of the members 14 and 15.

The striking tool connected with the parts already described has the striking head 31, which may be of any suitable form, for instance, wedge shaped, as shown in Figs. 1 and 3. The striking head 31 is provided with a cylindrical shank 32 suitably received in the lower end of the bore 11, having an annular groove 32a at its lower end. In the lower end of the member 10, spaced from the bore 11, are two vertical openings 33. Screwed into the cylinder 10 at the upper ends of the opening 33 are plugs 34, to which are suitably secured coil springs 35, which springs are detachably connected with a flat plate 40, having the slot 41 with the contracted inner end 42. On the plate 40 are engaging devices 43 secured to the springs 35. The plate 40 is designed to rest on the head 31 with the shank 32 received in the contracted portion 42 of the slot 41. The portion 42 is of such size as will not admit the shank 32 except at the groove 32a. Some lateral play of the springs 35 is permitted so that the plate 40 may be moved till the shank 32 is in the wider part of the slot 41, whereupon the shank 32 may be moved longitudinally to remove the striking tool, since the slot 41 is wide enough to admit the shank 32. The parts just described are so constructed and arranged that when the member 14 is at its lower limit of movement, and the shank 32 is at its upper limit of movement, they are slightly spaced apart, as shown in Fig. 1.

Communicating with the bore 11, just above the lower level of the member 14 when the latter is in its lowermost position, is a laterally extending passage 35b, extending from the bore 11 to the upper surface of the cylinder 10. Screwed into the outer end of the passage 35b is a screw 36. Leading from the passage 35b to the outer surface of the body 10 is an inclined branch passage 37.

In the practical operation of my improved tool, as above described, when the member is reciprocated, it will be driven downwardly with a force which will compress the air between the member 14 and the member 32, thereby tending to drive the member 32 out of the bore 11. On the upward movement of the member 14, the springs 35 will draw the member 32 back to its upper limit of movement. It will be seen that the outward driving blow of the member 32 is caused by the compression of the air between the members 14 and 32. The amount of compression may be accurately regulated by adjustment of the screw 36. On account of the fact that the downward movement of the member 14 is more rapid than its upward movement, the members 32 and 31 are driven away from the member 14 on the downward stroke of said member 14, so that the head 31 can be placed adjacent to the scale of a boiler and used for knocking the scale off with a rapid succession of sharp taps. The force of the taps or blows can be regulated as desired by means of the screw 36. On account of the arrangement herebefore described of the intake passages, the tube 22 can be provided with a handle, which can be on the side of the tool, or at the end for convenience in using the tool in different positions.

The form of the tool 31 may be varied as desired and the tool 31 can be readily removed by shoving the plate 40 laterally till the shank 32 is received within the slot 41 and is clear of the contracted portion 42, when the shank 32 may be readily withdrawn. The springs 35 are allowed sufficient play in the openings 33 to permit sufficient movement of the plate 40 for inserting or removing the working tool.

It will be understood that some changes may be made in the construction and arrangement of my improved sealing device, without departing from its essential features and purposes, and it is my intent to cover by this application any such changes which may be included within the scope of my claims.

I claim as my invention:

1. In a pneumatic tool, a supporting body having a bore and recesses in one end thereof, springs received in said recesses, a plate secured adjacent to the end of said body having recesses to support said springs, said plate having a slot with a restricted inner end, a reciprocating member in said bore, and a striking tool having a shank provided
with a groove, said shank being received in the lower end of said bore, the portion of said plate around the restricted inner end of said slot being received in said groove, said recess being of such shape as to permit lateral movement of said plate and said springs.

2. In a device of the class described, a pneumatic scaling tool including a supporting member, a reciprocating member mounted therein, means for operating said reciprocating member more rapidly in one direction than in the other, an operating tool slidably mounted in said supporting member and slightly spaced from the reciprocating member when said reciprocating member and said operating tool are close together, yielding means for holding said operating tool at its upper limit of movement toward the reciprocating member, and means for regulating the air cushion between the reciprocating member and the operating tool.

Des Moines, Iowa, February 19, 1915.

ELMER A. HAWLEY.

Witnesses:

A. SHERMAN,
J. MAHER.