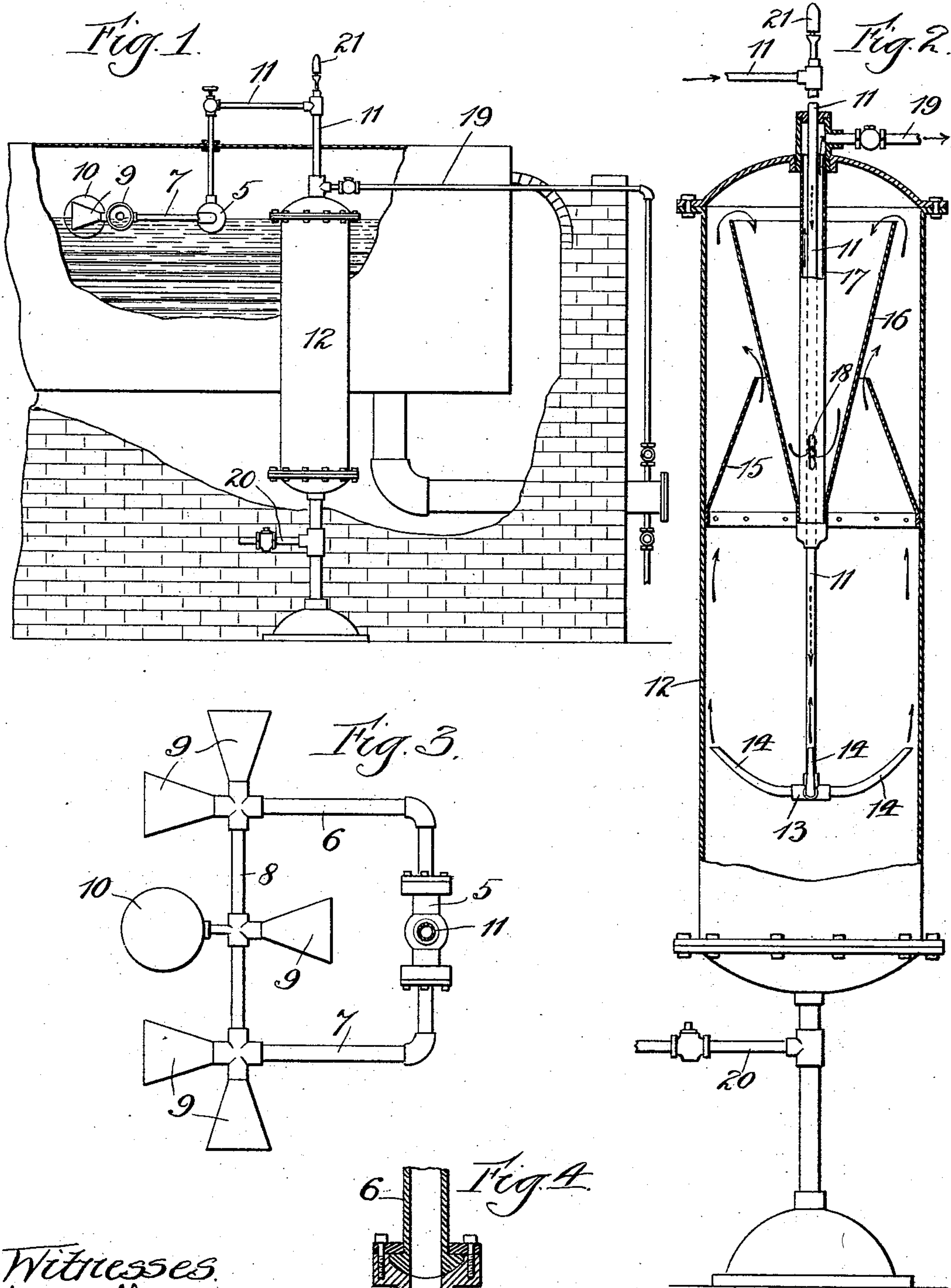


(No Model.)

F. L. SMITH.
BOILER CLEANER.

No. 543,541.

Patented July 30, 1895.



Witnesses.
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UNITED STATES PATENT OFFICE.

FRANK L. SMITH, OF BLUE ISLAND, ASSIGNOR OF ONE-HALF TO WILLIAM J. WILEY, OF CHICAGO, ILLINOIS.

BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 543,541, dated July 30, 1895.

Application filed March 18, 1895. Serial No. 542,256. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. SMITH, a citizen of the United States, residing at Blue Island, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Boiler-Cleaners, of which the following is a specification.

This invention relates to boiler-cleaners; and its object is to simplify and improve the construction of the same and to render the same more efficient and certain in operation.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally more specifically pointed out in the appended claims.

Referring to the accompanying sheet of drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in side elevation of a portion of a steam-boiler with my invention applied thereto, part of the boiler-setting being broken away to show the relative arrangement of the parts comprising my invention. Fig. 2 is a central longitudinal sectional view of the precipitating or settling chamber. Fig. 3 is a detail view in plan of the skimmer. Fig. 4 is a detail view in central section of a swivel-union joint for the skimmer-frame.

The same reference-sign is employed throughout the several views to designate the same part wherever it occurs.

Reference-sign A designates a steam-boiler of any desired or well-known construction mounted in any suitable setting B. As is well known by persons skilled in the art, the act of ebullition in a new boiler creates a seething or surging of the water contained therein. This action of the water causes all the impurities contained in the water, such as mud, sludge, lime, or other impurities, to rise to the surface. If this foreign matter is not removed it settles to the bottom when the boiler cools down, and becoming deposited upon the tubes or shell of the boiler forms a scale. Repeated depositions of impurities from water increases the amount of the scale, and without relief the boiler is soon rendered inefficient in its heating capacity and actually dangerous on account of its liability to explosion, due to over-

heating the scaled tubes or shell. It is a known fact that nearly all the impurities in the water are contained in the upper five or six inches of the water during the process of steam-generation, and to the removal of these impurities and foreign matter while carried at or near the surface of the water in the boiler is my invention directed. In order to accomplish this result I arrange in the boiler what I shall call generically a "skimmer." In Fig. 3 I have shown a desirable form of skimmer, which comprises a T-connection 5, having suitable pipes 6 7 communicating with the respective ends thereof, which pipes project parallel with each other and are joined at their outer ends by means of cross-pipe 8. In communication with the series of pipes 6 7 8 and projecting therefrom are a series of wide-mouthed funnels 9. These funnels may be arranged to point in any suitable or desirable direction and may be of any desirable number to perform the work required of them. The connection of pipe-sections 6 7 with the T-connection 5 is preferably a swivel or pivoted connection, in order to permit the frame of the skimmer to rock or swing up and down thereon, for a purpose that will more fully presently appear. I have shown in Fig. 4 a construction embodying this idea, wherein is shown a substantial ball-and-socket union or joint.

It will be seen that it is important to provide for varying levels of the water in the boiler, in order to secure the greatest degree of efficiency and the widest range of use of the attachment, and hence the importance of pivotally mounting the skimmer-frame. In order that the funnels may always occupy an effective position with reference to the surface of the water, whatever the variations in height of the water-level may be, within reasonable limits, I mount upon the skimmer-frame a float 10, which serves to maintain the pivoted skimmer-frame, and hence, also, the funnels always in proper position on the surface of the water.

From the T-connection 5 a suitably arranged pipe 11 leads out through the boiler and into a precipitating or settling chamber 12, arranged in any suitable or convenient location with reference to the boiler. Pipe 11

is arranged to extend a suitable distance into the chamber 12, and terminates in a head 13, having communication with a series of short radiating and upwardly-turned sections of pipes 14, delivering upwardly into the chamber 12. In the drawings I have shown a construction wherein four of such radiating pipe-sections 14 are employed, but it will be understood that any suitable number of such sections may be employed, and I do not desire to be limited to any specific number or arrangement. Within chamber 12 is arranged a series of shields in the form of funnels, through which pipe 11 is arranged to pass. In the drawings I have shown two such shields or funnels reversely arranged with respect to each other—that is to say, the flared mouths of the funnels are arranged to open in opposite directions. In this arrangement the funnel 15 is suitably bolted and otherwise suitably secured to the inner wall of the chamber 12, with the mouth thereof presented toward the bottom of said chamber. The funnel 16 is arranged with the mouth thereof presented toward and arranged adjacent to the top of the chamber 12, and having the smaller end thereof projected inside the smaller end of funnel 15, a space of suitable dimension being left between the two funnels to permit the passage of steam and water, as will hereinafter more fully appear. The funnel 16 may be supported in any desirable or suitable way. A pipe 17, of larger internal diameter than the external diameter of pipe 11, is suitably supported in the chamber 12, and is arranged to inclose the said pipe 11, as shown, said pipe 17 being closed at the lower end thereof except through a series of suitable openings 18 within the funnel 16, it being preferable to form a tight joint between the lower end of said funnel 16 and the pipe 17, as shown. The pipe 17 leads out through the top of the chamber 12 and connects through a pipe-connection 19 with any suitable return-conduit by which the water passing off therethrough may be returned to the boiler.

The operation of the apparatus so far described is as follows: The steam-pressure in the boiler forces the mud, sludge, or other foreign matter carried upon or near the surface of the water in the boiler into the funnels 9, thence through the pipes 6 or 7 and 11 into the chamber 12, and delivers the same, together with what water and steam as also may pass over into the settling-chamber 12 through the upturned ends of pipe-sections 14. The temperature of the chamber 12 being less than that of the boiler, not only is the circulation assisted, but the cooling off of the matter carried into the chamber from the boiler causes the mud and other impurities, having a greater specific gravity to be precipitated to the bottom of the chamber 12, whence it may be removed or drawn off through the blow-off pipe 20. By reason of the upturning of the delivery-pipe sections 14 it

will be seen that the draft created in the settling-chamber is deflected upward, and hence does not agitate the sediment that has already been deposited in the bottom of chamber 12, thereby effecting a thorough precipitation. Moreover, by reason of the fact that the delivery ends of pipe-sections 14 are arranged adjacent to the sides or walls of the chamber, the current therefrom takes the direction indicated by the arrows—that is, rises in the chamber in a stream flowing adjacent to the walls of the chamber, thereby leaving a large space, and hence a large body of water centrally of the chamber practically without material agitation, thereby permitting the process of settling or precipitation to go on rapidly and without interruption, and hence materially adding to the efficiency of the apparatus. The steam and water passes upward between the funnels 15 16, and into the upper funnel 16, and thence through the apertures 18 into pipe 17, and off through pipe-connection 19, and returned to the boiler in its purified condition for reuse.

In connection with my improved apparatus I provide an alarm to indicate the falling of the water-level in the boiler below the safety or any desired point. In carrying out this idea I arrange an alarm device in connection 11, adapted to be actuated by excess of heat in said pipe. Therefore, when the level of the water falls below any desired point—for instance, when the float 10 is brought to rest upon the top of the upper tubes and no more water can pass into the funnels 9—the steam enters the connection, and being heated to a greater degree than the water which before passed through the pipe effects an actuation of the alarm device. Many different forms of apparatus embodying this idea may be used, and I do not desire to be limited or restricted to the specific form shown, which comprises a steam-whistle 21, which may be normally closed by means of a fusible plug in any well-known manner, the fusing of the plug by excess of heat in pipe 11 causing the whistle to sound by the passage of the steam therethrough.

In practical operation the boiler-cleaning attachment hereinabove described may be conveniently applied to any existing boiler, and it performs the function not only of removing the impurities contained in the water, but, by preventing further deposit of scale upon the tubes and shell of a boiler, it causes the scale which has previously been deposited thereon to break and to become loose by repeated expansions and contractions, thereby permitting the easy removal thereof from the boiler.

It is evident that many variations and changes in the construction and relative location and arrangement of parts would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I desire it to be distinctly understood, therefore, that I do not limit or

restrict myself to the exact details shown and described; but having stated the object and nature of my invention, and having described a form of apparatus embodying the same, and having explained the function and mode of operation thereof,

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a boiler cleaner a settling chamber, a cone-shaped shield arranged therein, having the mouth thereof presented toward the top of said chamber, an exit pipe having its receiving end arranged within said shield, a second shield mounted in said chamber and reversely arranged with respect to said first mentioned shield, a skimmer arranged in the boiler, a pipe connection leading therefrom and delivering into said chamber, at a point adjacent to the inner wall of said chamber, beneath the lowermost shield; as and for the purpose set forth.

2. In a boiler cleaner, a settling chamber, a cone-shaped shield arranged therein, having the mouth thereof presented toward the top of said chamber, an exit pipe arranged in said chamber having its receiving end opening into said shield, a second shield mounted in said chamber, and reversely arranged with respect to said first mentioned shield, a skimmer arranged in the boiler, a pipe connection from said skimmer to said chamber, arranged to pass through said exit pipe and adapted to deliver into said chamber at a point beneath the lowermost shield; as and for the purpose set forth.

3. The combination of a boiler, a settling chamber, arranged adjacent thereto, a skimmer arranged in said boiler, a pipe communicating with said skimmer and arranged to deliver into said settling chamber, the delivery end thereof being upwardly turned; as and for the purpose set forth.

4. The combination of a boiler, a settling chamber, arranged adjacent thereto, a skim-

mer arranged in said boiler, a pipe communicating with said skimmer and arranged to deliver into said settling chamber, the delivery end thereof comprising a series of upwardly turned pipe sections; as and for the purpose set forth.

5. The combination of a boiler, a settling chamber, arranged adjacent thereto, a skimmer arranged in said boiler, a pipe communicating with said skimmer and arranged to deliver into said settling chamber, the delivery end thereof being arranged below the level of the skimmer, and comprising a series of radiating upwardly turned pipe sections; as and for the purpose set forth.

6. The combination of a boiler, a settling chamber, a skimmer, a pipe communicating with said skimmer and arranged to pass through the top and into said settling chamber, and having its larger end presented toward the top of said chamber, said pipe arranged to pass through said shield, the delivery end of said pipe comprising upturned pipe sections, and arranged below the lower and smaller end of said shield; as and for the purpose set forth.

7. The combination of a boiler, a settling chamber, two-coned shaped shields arranged thereon, one of said shields arranged to pass through the other, said shields being reversely arranged with respect to the other, the upper shield having the large end thereof presented toward the top of the chamber, a skimmer arranged in said boiler, and a pipe communicating therewith and delivering into said chamber at a point below the lowermost shield; as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 15th day of March, 1895, in the presence of the subscribing witnesses.

FRANK L. SMITH.

Witnesses:

H. S. STAFFORD,
MARTIN SCHIPPEL.