No. 632,785. Patented Sept. 12, 1899.

F. W. HORNISH.

MECHANICAL BOILER CLEANER.

(Application filed Dec. 14, 1898.)

(No Model.) 4 Sheets—Sheet 1.

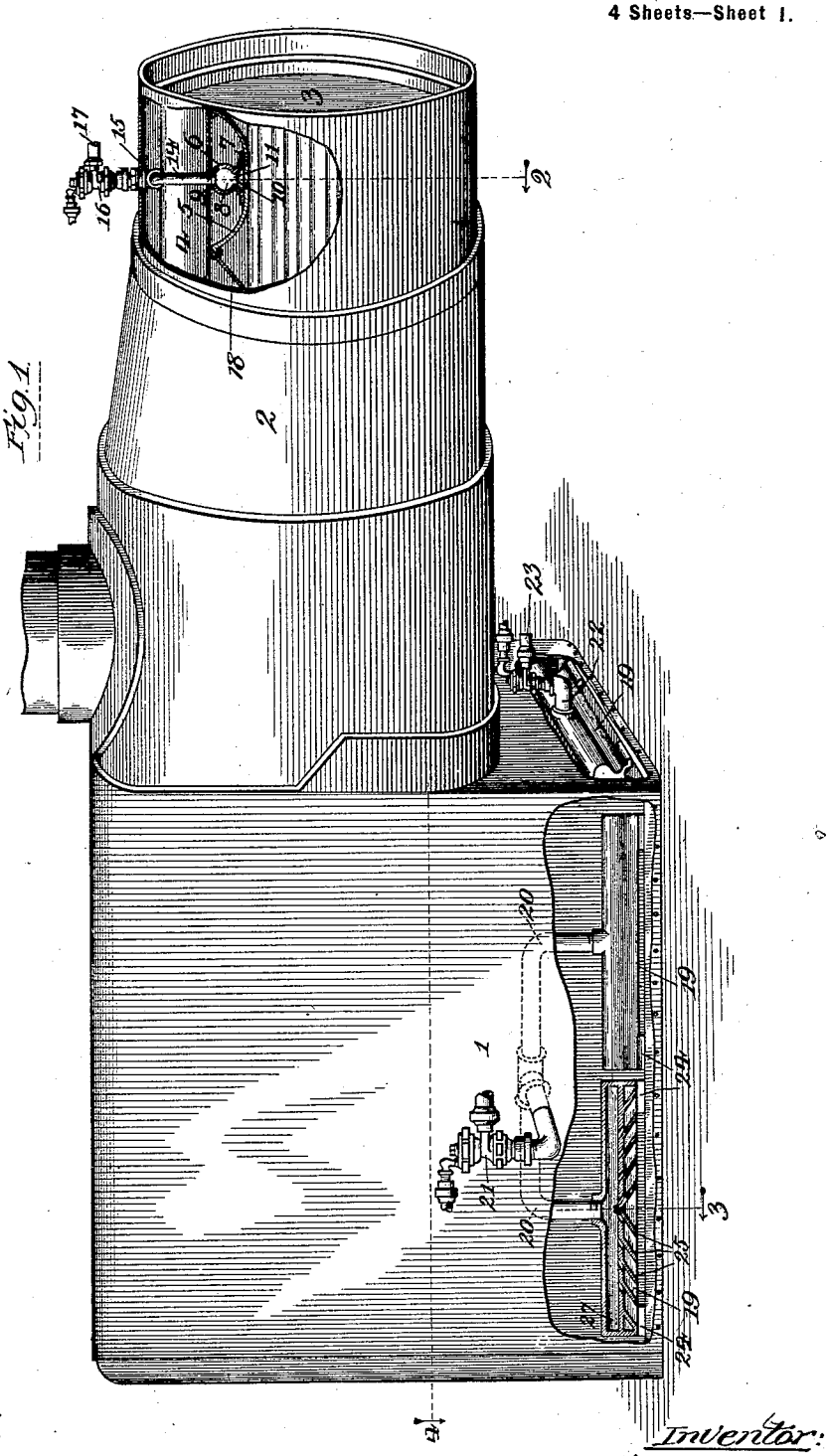


Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.

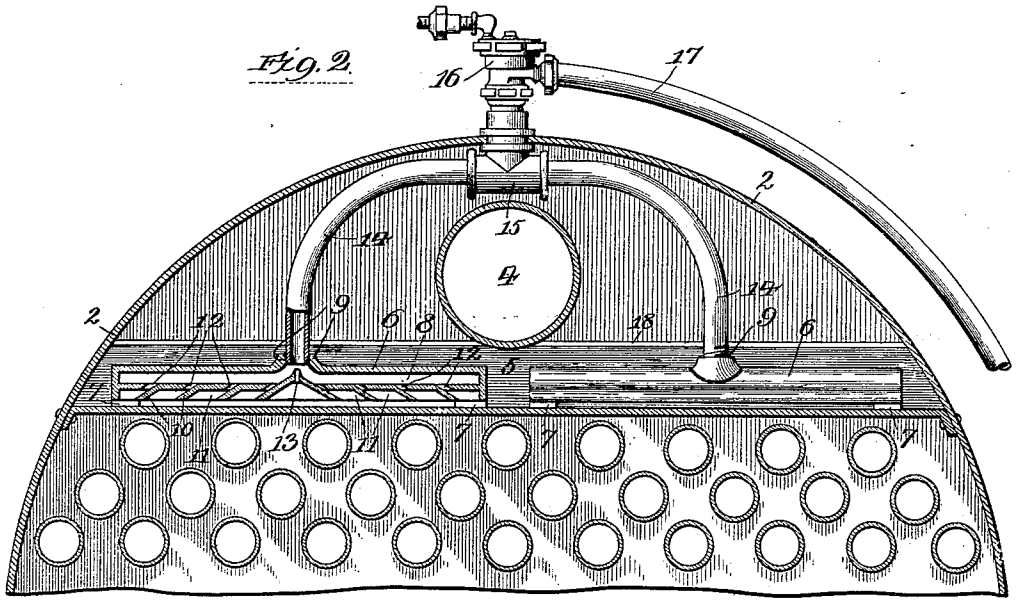
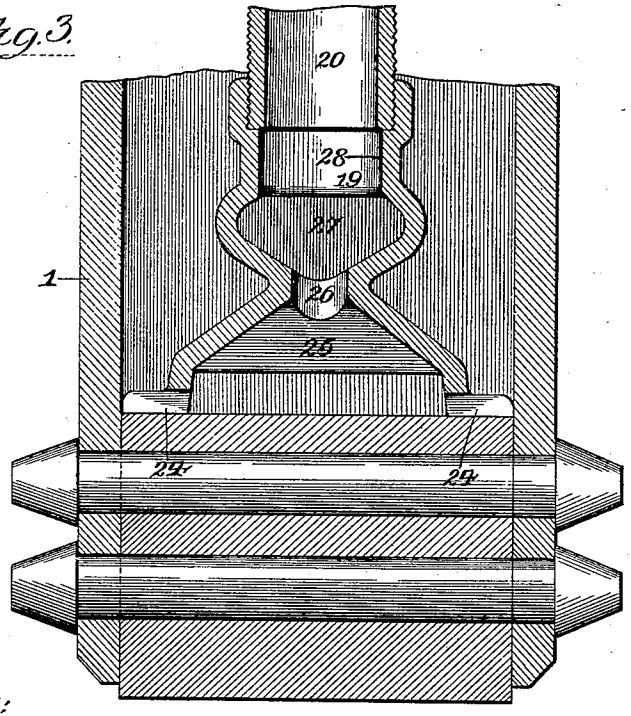


Fig. 3.



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Fig 4.

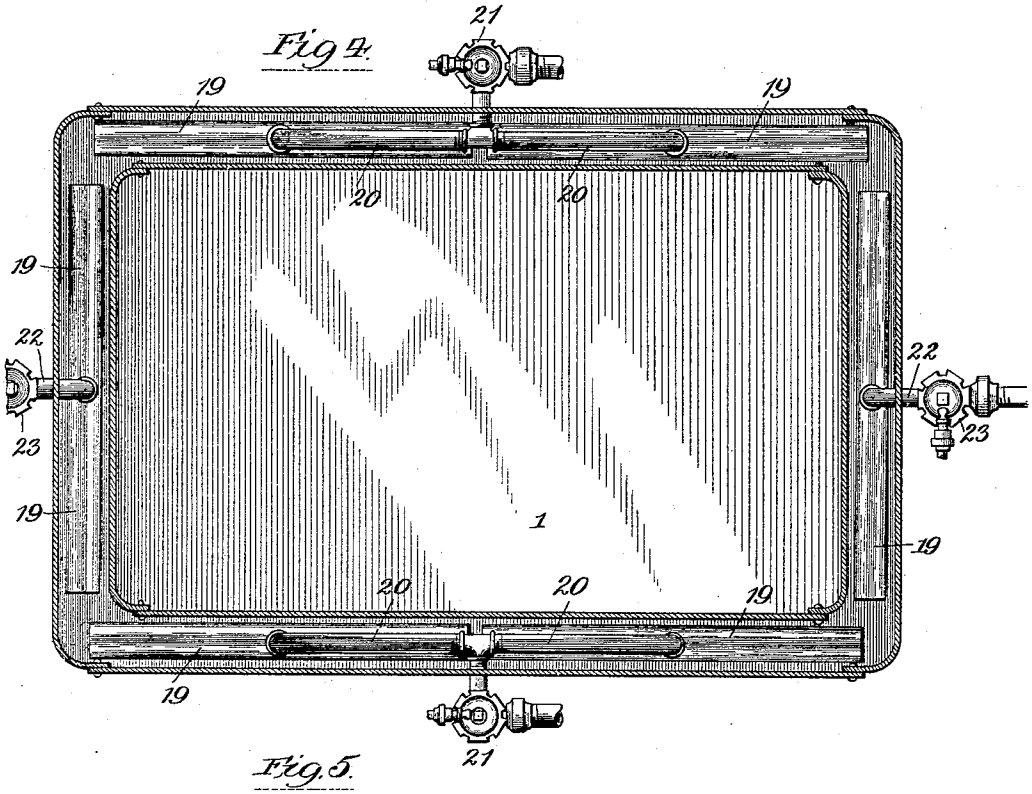
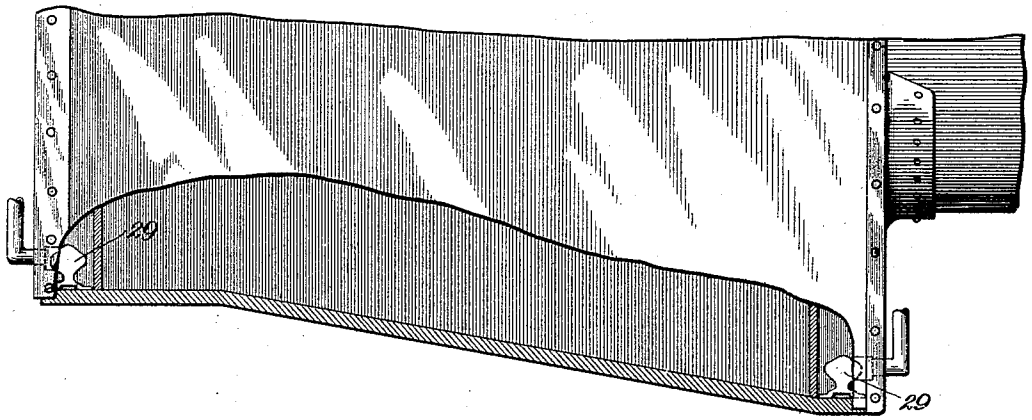


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

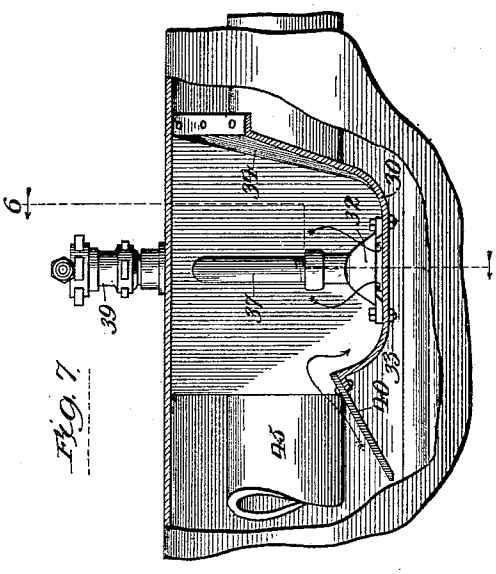


Fig. 7.

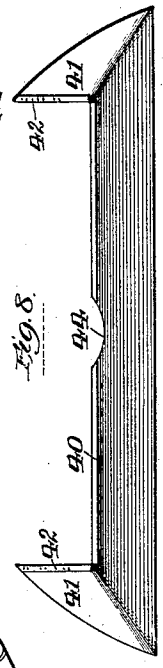


Fig. 8.

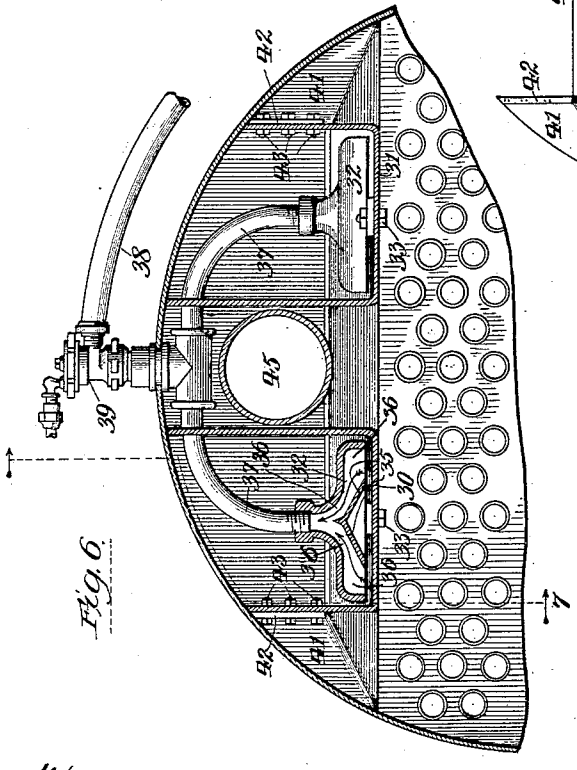


Fig. 6.

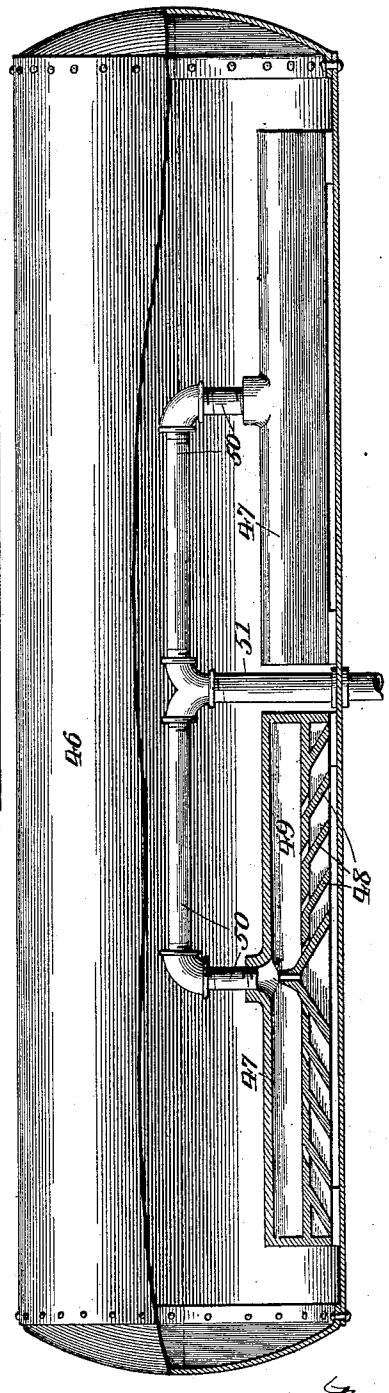


Fig. 9.

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UNITED STATES PATENT OFFICE.

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MECHANICAL BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 632,785, dated September 12, 1899.

Application filed December 14, 1898. Serial No. 699,252. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. HORNISH, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Mechanical Boiler-Cleaners, of which the following is a specification.

My invention relates to mechanical boiler-cleaners; and its object is to provide a suitable and efficient device of this character to prevent foaming and to remove sediment, and thereby avoid frequent washing out of the boiler.

My invention may be applied to any of the varied types of boilers, and while it is shown more particularly in connection with a locomotive-boiler it will be understood that I contemplate using my invention wherever applicable.

It is well known that in boilers and in the locomotive type, for instance, sediment, &c., is carried to the surface and toward the front of the boiler by the natural circulation of the water and is deposited in that locality and is also deposited to a considerable extent in the water-legs of the boiler. I design to locate my boiler-cleaners at such point of deposition and collection of sediment and provide for a separate or simultaneous blow-off of the different sets of cleaners used.

In the drawings, Figure 1 is a side elevation of a boiler of the locomotive type with portions thereof broken away to illustrate my invention applied thereto; Fig. 2, an enlarged sectional elevation on line 2 of Fig. 1; Fig. 3, a section on line 3 of Fig. 1; Fig. 4, a sectional plan on line 4 of Fig. 1; Fig. 5, a view of a portion of a boiler having a pitched fire-box, showing my invention applied to a boiler of such construction; Fig. 6, a side elevation on line 6 of Fig. 7, showing a modified form of construction and arrangement of my attachments or cleaners in the front of the boiler; Fig. 7, a sectional elevation on line 7 of Fig. 6; Fig. 8, a detail view of a deflector-plate used in the devices shown in Figs. 6 and 7, and Fig. 9 a sectional elevation of a mud-drum of a stationary boiler with my boiler-cleaner attached.

The boiler shown in Fig. 1 comprises the usual fire-box portion 1, the cylindrical portion or extension 2, with the usual front head 3 and dry pipe 4. Below the dry-pipe I arrange a surface-skimming device which comprises a skimmer-basin 5, together with means for removing the foreign matter collected and deposited therein. This basin is preferably, though not necessarily, curved, as shown, and is arranged in the forward end of the boiler and extends from side to side thereof and is preferably riveted or otherwise secured at its front edge and ends to the front head 3 of the boiler and to the sides of the boiler, respectively. The front head of the boiler may thus form a back for the basin; but such construction is not necessary, as a separate back may be provided for the basin, or the basin may be extended upward to form such a back. This basin holds the skimmings and settlings, which may be blown off at the will of the engineer, and such basin being for the collection and storage of sediment may be of any desired shape and dimensions.

As shown in Fig. 2, a draw-off device is placed in the bottom of the skimmer-basin. This device consists of what I will term for convenience a "draw-off" head 6, open at the sides and ends and resting on legs or flanges 7 and having a horizontal passage 8 with a central discharge-port 9. The lower portion of the draw-off head has a series of transverse inclined flanges or partitions 10, which are reversely inclined on either side of the center of such head. These flanges form transverse spaces or "suckers" 11, which communicate through holes 12 with the horizontal passage 8 and point in a direction from the ends toward the center. The holes at the ends of the draw-head are the largest, and their size decreases toward the center of the draw-head for a purpose hereinafter set forth. Owing to their reverse inclination the two sets of flanges or partitions form a central sucker or space which is triangular in cross-section and communicates with the outlet or discharge port through a hole 13. In each skimmer-basin I prefer to place two draw-off heads, as shown in Fig. 2, and connect their outlet-pipes 14 to a T 15 and then extend their common outlet outside the boiler, where the same is governed by a suitable valve device

16, preferably, though not necessarily, what is known on the market as the "McIntosh" blow-off cock, which is operated by fluid-pressure. The outlet-pipe 17 from the blow-off cock may be run in any desired direction to any desired point for the discharge.

As shown particularly in Fig. 1, I preferably provide one edge of the skimmer-basin with an inclined deflector-plate 18, which may be riveted, bolted, or otherwise secured to such edge. The function of such plate will be obvious from the description of the operation of the device, as hereinafter set forth.

I prefer to provide the front and back water-legs each with a draw-off head and each side water-leg with two draw-off heads. These heads 19 are all similar in construction and are similar to the heads in the skimmer-basin. The heads on the side legs may each be provided with discharge-pipes 20, whose common outlet, which extends through the boiler-shell at any desired point, is governed by separate blow-off cocks 21, which may be of the style already alluded to. The end heads have a discharge-pipe 22, which may extend directly through the boiler-shell, where each of such pipes is governed by a separate blow-off cock 23. It will be understood that the discharge may be run between the two sheets of the water-leg to any desired outlet. Fig. 3 is an enlarged sectional view on line 3 of Fig. 1, showing the construction of one of the draw-off heads and its arrangement in the water-leg. The head rests upon preferably integral legs or feet 24, so that a flow of water and sediment is obtainable along the sides as well as the ends. In this manner the sediment collecting on the sides, and particularly in the corners, of the water-legs can be readily sucked out and discharged by the heads.

Fig. 3 shows one of the flanges or partitions 25 and the central hole 26, communicating with the horizontal passage 27, having a central outlet-nozzle 28. It will be understood that the nozzle 28 may be directed at right angles to that shown, so as to extend directly extraneous of the boiler-shell, as illustrated with respect to the head at the front of the water-leg.

It is obvious that all the discharge-pipes or any two or more of them may be by suitable arrangement of the connecting-pipes joined to a common discharge-pipe, and while this arrangement may be desirable it is nevertheless preferable in such case that all the sets of heads be provided with separate blow-offs, so that the front leg of the boiler may be blown off separately from the side legs and each water-leg be blown off separately from the others. In case of a boiler with a pitched fire-box, as shown in Fig. 5, the said draw-off heads may be dispensed with and heads 29 arranged only at the front and back ends. It will be understood that suitable blow-off cocks may be attached to blow off the boiler through said heads 29. It is obvious that it would be undesirable and impracticable to arrange any heads upon the pitched bottoms of the side water-legs.

In the natural circulation of the water in the boiler the sediment floating on the surface is carried forward and deposited in the skimmer-basin 5, being assisted by the plate 18, which thus acts as a scoop or deflector and collects through a greater surface of water than would be the case otherwise. When the blow-off cock is opened at the will of the engineer, the boiler-pressure forces the sediment collected in the basin upward through the passages or suckers in the draw-off heads, as indicated by the arrows, and out through the discharge-pipes, whereby the basin is effectually cleaned of all sediment thus collected therein. The spaces which I term "suckers" in the draw-heads do not have the same-sized openings or holes into the horizontal passages, but the same vary from the center to the ends. This construction is of advantage in that if they were all of the same size the openings nearest the center would pass all the sediment, and those farther along might not draw their share. These partitions are inclined to form inclined passage-ways, so as to cause the sediment, &c., to travel in as direct a line as possible to the outlet. By these means I secure a surface blow-off the full width of the boiler from a skimmer-basin, which may have any desired storage capacity to collect and settle all the impurities which are carried to the skimmer by the natural circulation of the water in the boiler. It is obvious that the fluctuation of the water-line does not affect the proper working of the device, which is a circumstance of great advantage and importance, particularly in respect to locomotive-boilers. Whatever matter is not deposited in the skimmer-basin will be likely to collect in the water-legs of the boiler, and consequently I locate draw-off heads in these places. As above stated, the blow-off cocks can be operated simultaneously or separately, as desired. When the discharge-pipe of any of the heads in the water-legs is opened, the operation is precisely the same as with respect to the blowing off of the settlings in the skimmer-basin.

In Figs. 6 and 7 is shown a modified form of construction of basin and head particularly designed for use in those boilers in which the braces or stays would be an obstruction to the form shown in Figs. 1 and 2. In this modified form the basin device is made in two parts or basins 30 and 31, preferably suspended from the ends of the draw-off heads 32 by means of bolts 33 or otherwise. The forward part 34 of the basin is preferably continued upward, as seen in Fig. 7, in case the front head of the boiler cannot be used for such purpose on account of the interference with the braces. The heads are each provided with an angular partition 35, forming two sucker-spaces 36, communicating with discharge-pipes 37, whose common outlet 38 is governed

by a blow-off cock 39. A deflector-plate 40 is secured to an edge of each basin, and in order to fill the substantially triangular spaces on the outside of the basins, adjacent to the shell, I extend the plate to form flaps 41, preferably provided with flanges 42 for securing the same to the basins, respectively, by means of bolts 43 or otherwise. The flaps may be arranged at any desired angle with respect to the deflector-plate proper in order that the sediment, &c., may be properly directed into the basins. The plate is also preferably hollowed out, as at 44, to accommodate the dry pipe 45. These flaps or extensions on the deflector may, if desired, be made separate from the plate and secured thereto in any desired manner. It is obvious that such flaps serve to increase the skimming-surface of the boiler, so that the device skims practically the full width of the boiler, the dry pipe between the basins practically filling the space between such basins.

In Fig. 9 is shown the arrangement of my attachments in connection with the mud-drum 46 of an ordinary stationary boiler. The heads 47, preferably two in number, which are located at the bottom of the drum, have partitions 48, horizontal passages 49, and communicating passages, all forming the same construction of head as the heads 6 before described. The discharge-pipes 50 are connected to a common outlet-pipe 51, governed by a suitable blow-off cock. The operation of the device in a mud-drum is the same as in the case of those devices already described.

It will be understood that my device may be located in any place where sediment lodges or collects or where it may be collected by suitable means and that I locate such device at the places shown because it is demonstrable that such places are the ones where deposition occurs in the natural circulation of the boiler. Furthermore, it is obvious that the draw-off head may be of any desired shape and dimensions to correspond to the place where located. For instance, when my draw-off head is placed in an ordinary upright boiler such head may be curved to correspond with the curvature of the mud-ring.

Although I have described more or less precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents as circumstances may suggest or render expedient and without departing from the spirit of my invention.

I claim—

1. A mechanical boiler-cleaner comprising a stationary basin arranged within the boiler and having a depression in which the sediment collects, and a draw-off device for blowing out the sediment from the basin.

2. A mechanical boiler-cleaner comprising a stationary skimmer-basin supported within the boiler and having a depression to collect sediment and a draw-off head located substantially at the bottom of the basin and a valve-governed discharge-pipe through which the boiler is blown off and the collected sediment in the basin removed.

3. A mechanical boiler-cleaner comprising a basin arranged within the boiler and adapted to collect sediment, a draw-off head located within the basin and having upon its bottom a series of spaces forming suckers and a valve-governed discharge-pipe communicating with said spaces.

4. A mechanical boiler-cleaner comprising a plate extending from side to side of the boiler substantially at the surface of the water therein, and depressed to form a substantially U-shaped basin for the deposit and storage of sediment and a valve-governed draw-off head located substantially at the bottom of the basin to remove the sediment.

5. A mechanical boiler-cleaner comprising a stationary basin arranged within the boiler and extending from side to side thereof and having a depression to collect sediment, the back of the basin being above the water-line and the front thereof being below the water-line and a draw-off device for blowing out the sediment from the basin.

6. A mechanical boiler-cleaner comprising a basin arranged within the boiler and adapted to collect sediment, the back of the basin being above the water-line and the front thereof being below the water-line, a deflector connected to the said front below the water-line and a draw-off device for blowing out the sediment from the basin.

7. A mechanical boiler-cleaner comprising a basin arranged within the boiler and adapted to collect sediment, a draw-off head located within the basin and having a horizontal passage, a series of transverse partitions forming sucker-spaces communicating with said passage and a valve-governed discharge-pipe through which the boiler is blown off and the collected sediment in the basin removed.

8. A mechanical boiler-cleaner, comprising a draw-off head having a horizontal passage and a series of transverse partitions forming sucker-spaces communicating with said passage and a valve-governed discharge-pipe through which the boiler is blown off and sediment removed from the boiler through the draw-head.

9. A mechanical boiler-cleaner comprising a draw-off head having inclined partitions forming open spaces, a discharge-pipe and means of communication between said spaces and discharge-pipe.

10. A mechanical boiler-cleaner comprising a draw-off head having upon its bottom portion a series of inclined partitions forming inclined passages, and also having a common passage communicating with said inclined passages and a valve-governed outlet-pipe for said common passage.

11. A mechanical boiler-cleaner comprising a draw-off head having upon its bottom portion a series of inclined partitions forming in-

clined passages and also having a common passage, communicating through holes with said inclined passages, the holes increasing in size from the center to the ends, and a valve-governed outlet-pipe for said common passage.

12. A mechanical boiler-cleaner comprising a draw-off head open at its bottom and having an outlet thereabove, said head having at such bottom reversely-inclined partitions forming inclined passage-ways to said outlet and a valve-governed discharge-pipe communicating with said outlet.

13. A mechanical boiler-cleaner comprising a draw-off head having at its open bottom a series of transverse partitions forming inclined passages, the partitions on one side of the center of the head being reversely inclined to those on the other side, said head having an outlet or discharge port and means of communication between said inclined passages and said discharge-port.

14. A mechanical boiler-cleaner comprising a draw-off head having an outlet and having at its open bottom a series of transverse partitions forming inclined passages, the partitions on one side of the center of the head being reversely inclined to those on the other side and having holes communicating between the inclined passages and said outlet, said holes increasing in size from the center outward to the ends.

15. A mechanical boiler-cleaner comprising a draw-off head having a horizontal passage 8, a series of transverse parallel and inclined partitions 10 forming inclined passages 11 communicating through holes 12 with passage 8, and a valve-governed outlet-pipe from said passage 8.

16. A mechanical boiler-cleaner comprising a draw-off head having a horizontal passage 8, a series of transverse parallel and inclined partitions 10 forming inclined passages 11 communicating through holes 12 with passage 8, the partitions on either side of the center of the head being reversely inclined and forming at such center a space triangular in cross-section and having a central passage communicating with said passage 8.

17. A mechanical boiler-cleaner comprising a draw-off head open at its sides and ends and having an outlet communicating through its bottom with a boiler or drum, a series of inclined partitions arranged in the head at such bottom and forming inclined passage-ways from the boiler or drum upwardly to said outlet.

18. A mechanical boiler-cleaner comprising a draw-off head having a horizontal passage and having depending flanges or partitions inclined to form inclined passages, said partitions being substantially triangular in shape, said inclined passages each having a passage located at the apex of such triangular-shaped partition and communicating with said horizontal passage.

19. A mechanical boiler-cleaner comprising a skimmer-basin located within the boiler and extending from side to side thereof, such basin having a depression in which the sediment collects, a draw-off head located in the bottom of such basin and a valve-governed discharge-pipe communicating with the head.

20. A mechanical boiler-cleaner comprising a skimmer-basin located within the boiler and extending from side to side thereof, an inclined deflector-plate extending from one edge of such basin, a draw-off head located in such basin and a valve-governed discharge-pipe communicating with the head.

21. A mechanical boiler-cleaner comprising a skimmer-basin located within the boiler and extending from side to side thereof, a draw-off head therein consisting of a casing having a horizontal passage with an outlet, and a series of inclined transverse depending flanges forming inclined passage-ways communicating with such horizontal passage and a valve-governed discharge-pipe communicating with said outlet.

22. A mechanical boiler-cleaner comprising a curved plate forming a skimmer-basin extending from side to side of the interior of the boiler and secured respectively to the front head and sides thereof and a draw-off head located in said basin for removing the collected sediment in the basin.

23. The combination, with a boiler, of a skimmer-basin arranged therein, a pair of draw-off heads located in the basin and communicating therewith to remove the collected sediment, two discharge-pipes, a common outlet-pipe connected with said two pipes and a blow-off cock governing said outlet-pipe.

24. The combination, with a boiler, of a skimmer-basin arranged therein below its dry pipe and extending transverse with its front end secured to the front head of the boiler, a pair of draw-off heads located in the basin and communicating therewith to remove the collected sediment, two discharge-pipes extending from said heads on either side of the dry pipe, a common outlet-pipe connected to said discharge-pipes and a blow-off cock governing said outlet-pipe.

25. The combination, with a boiler having a water-leg or like place where sediment collects, of a valve-governed discharge-outlet and a draw-off head communicating therewith and located in a water-leg or similar place, said head being open at its bottom and having feet to raise it above the bottom of the water-leg and to provide for free passage on all sides of the head, such head having a horizontal passage communicating with such outlet and having depending transverse and inclined flanges forming inclined passage-ways communicating with the horizontal passage.

26. The combination, with a boiler, of a stationary skimmer-basin located substantially at the surface in the path of water circulation, a draw-off head located therein, and a draw-off head located in a water-leg of the boiler.

27. The combination, with a boiler of the

locomotive type, of a skimmer-basin located therein in the path of water circulation, a draw-off head located therein, a draw-off head in the front and back water-legs respectively and a pair of draw-off heads located in each side water-leg, each of said heads comprising a casing having an outlet and having a series of inclined depending flanges forming inclined passage-ways communicating with said outlet.

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