June 22, 1926. 1,589,691

S. J. HERMAN

BOILER CLEANER

Filed Dec. 9, 1918 3 Sheets-Sheet 1

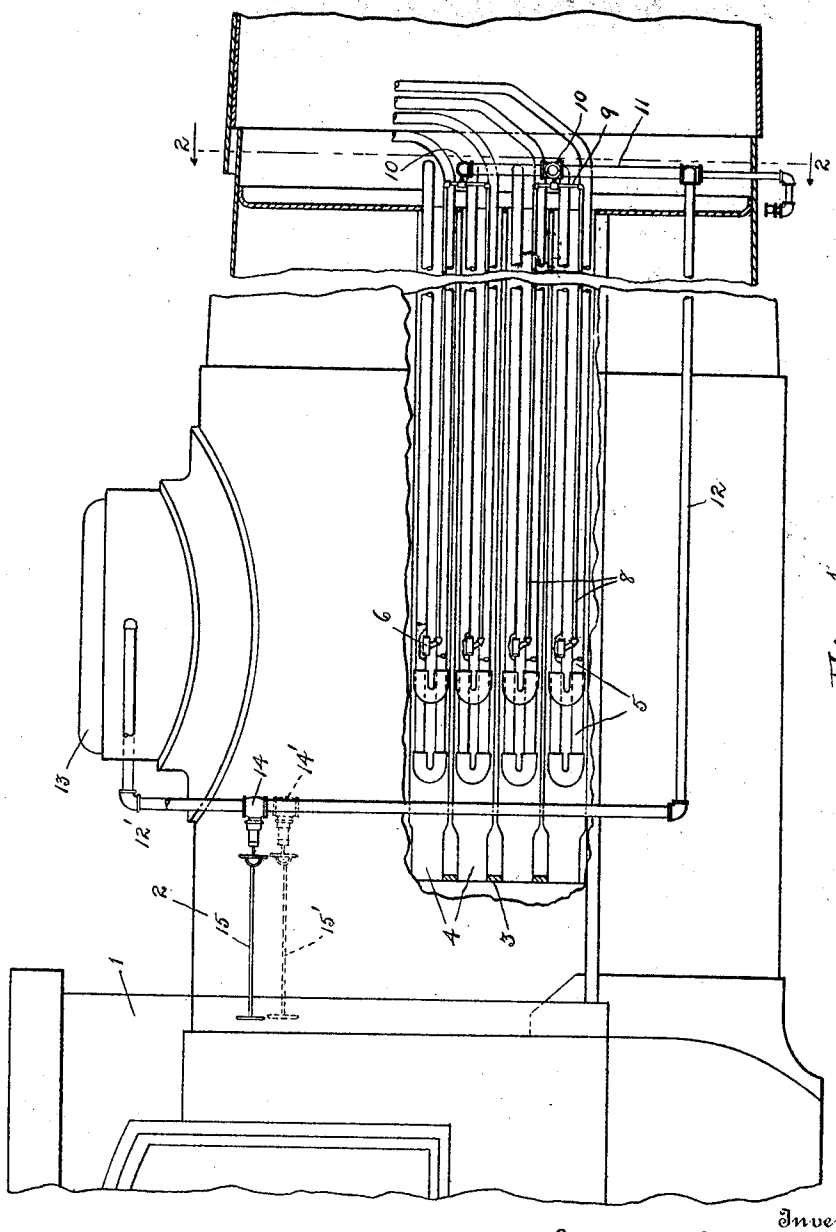



Fig. 1.

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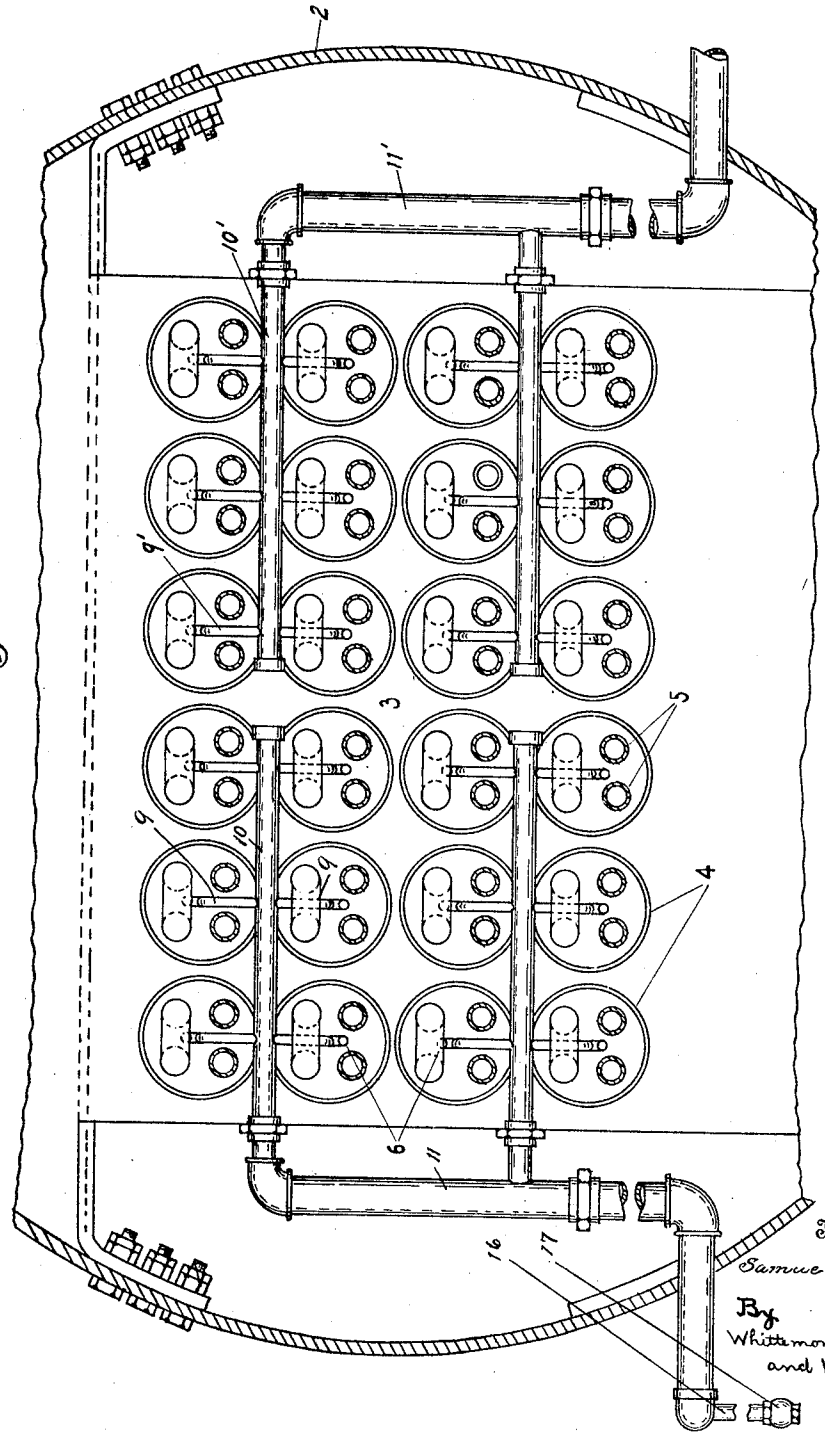
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Fig. 2.




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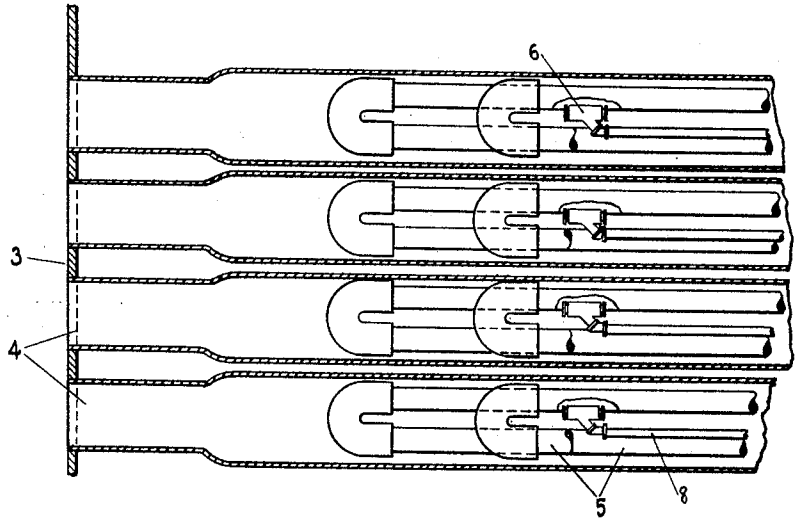



Fig. 3.

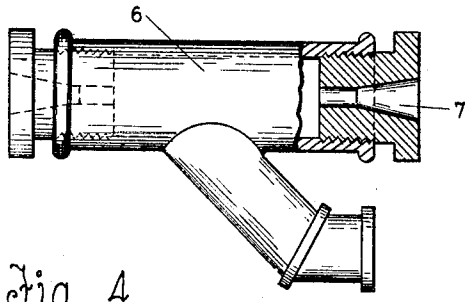



Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## BOILER CLEANER.

Application filed December 9, 1918. Serial No. 265,847.

This invention relates to boiler cleaners, and refers more particularly to a cleaner of the blower type and adapted for locomotive or other boilers of similar nature. Among the objects of the invention are to provide a cleaner employing the same blower units to act upon both the flues and the super-heater pipes within the flues; to provide a construction conveniently applicable to locomotive boilers of a standard type; to provide for location of the discharge nozzles within the boiler flues and adjacent to the forward portions of the flues and super-heater pipes so as to exert a maximum cleaning effect upon the relatively heavy soot, clinker, cinder, or other accumulations on said portions; to provide for discharge of the steam both forwardly and rearwardly from said nozzles; to arrange the control of the various valves from the cab of the locomotive; and in general, to provide a new and improved boiler cleaner of the character above referred to.

In the drawings:

Figure 1 is a view of a locomotive partly in side elevation and partly in section, showing the installation of blower units in the boiler flues;

Figure 2 is a cross sectional view taken on line 2—2 of Figure 1, showing a system of branch supply pipes for various cleaner units;

Figure 3 is a view showing a portion of Figure 1 upon enlarged scale;

Figure 4 is a detailed side elevational view of one of the blower nozzles.

In these views, the reference character 1 designates the cab of a locomotive, and 2 the shell thereof. The boiler 3 is provided with a series of parallel flues 4 in each of whch there is located a plurality of superheating pipes 5 return-bent at their rear ends as is best shown in Figure 3. Centrally within each flue 4, adjacent the rear ends of the superheater pipes, there is located a nozzle 6 having jet openings 7 for discharging steam both forwardly and rearwardly of the tubes. Said nozzles are offset slightly above the pipes 8 supplying steam thereto so as to minimize the obstruction offered to the jets by said supply pipes. The pipes 8 extend through the flues 4 to the front end of the boiler, where they are connected by short vertical extensions 9 to headers 10 extending across the end of the boiler between the rows of flues, each of the headers having said pipes 9 extending both upwardly and downwardly therefrom. The headers 10 are supplied with steam from a vertical portion 11 of a main steam supply pipe 12 which is extended rearwardly and then vertically, and connects with the dome 13 or some other suitable portion of the boiler to receive its steam supply. The flow through the pipe 12 is controlled by a valve 14 through an elongated handle 15 accessible from the engine cab.

It is preferred to duplicate the construction above described so as to permit the flues and super-heater tubes at one side of the center line of the boiler to be separately cleaned from those at the other side, whereby undue interference with the draft during a cleaning operation is avoided. The reference characters applied to one of the sets of duplicate parts are primed to distinguish said parts from the others.

Each of the supply pipes 12 is provided preferably at its forward end with a drainage pipe 16 terminating in a ball check valve 17 normally opened but automatically closed by steam pressure during cleaning operations.

The nozzles 6 and the steam supply pipes 8 leading thereto are subjected to high temperatures, due to their locations within the flues of the boiler and therefore are formed of a metal specially treated to withstand temperatures ranging up to between 1800° and 1500° Fahr. Owing to the location of the nozzles within the flues and intermediate the extremities of the super-heater tubes with the jets discharging both forwardly and rearwardly, a very efficient cleaning effect is exercised. Since the deposits accumulate most rapidly upon the return-bent ends of the super-heater pipes and upon the corresponding portions of the flues, the above-described location of the cleaner nozzles is such as to secure the most efficient results in removing the deposits.

It is to be noted that the described construction does not require the boiler to be shut down during the cleaning operation and that the steam jets are opposed to the draft only in a small portion of the entire length of the flues.

What I claim as my invention is:

1. In a boiler structure, the combination with a plurality of flues extending longi-

tudinally of a locomotive and steam superheating pipes respectively arranged in said flues, said superheating pipes having return bent portions located toward the draft inlets of the flues, of blower nozzles disposed within the respective flues and provided with jet openings discharging both forwardly and rearwardly for cleaning the flues and return-bent portions of said superheating pipes, a main steam supply pipe for said nozzles, and branch steam pipes extending through said flues to the nozzles.

2. In a boiler structure, the combination with a plurality of flues extending longitudinally of a locomotive and steam superheating pipes respectively arranged in said flues, of means respectively disposed within said flues in an intermediate relation to the ends of the super-heater pipes for discharging steam jets forwardly and rearwardly for cleaning said flues and the super-heating pipes.

3. In a boiler structure for locomotive boilers or the like, the combination with a plurality of flues extending longitudinally of a locomotive, and steam super-heating pipes respectively arranged in said flues, said super-heating pipes having return-bent portions located toward the draft inlet ends of the flues, of blower nozzles arranged adjacent the return bent portions to blow through the flues in a direction against the draft and toward the draft inlet ends of the flues and in a manner tending to remove accumulations at the return-bent portions of the super-heater pipes.

4. In a boiler, the combination with a fire tube system of a cleaner comprising an expanding jet nozzle inserted permanently within a tube and adapted under pressure to direct a jet of fluid at high velocity parallel with the axis of the tube and in the direction of the normal draft to induce an intensified gaseous flow through the tube, and means for admitting and conducting such fluid to the nozzle.

5. The combination with a multiple fire tube boiler of cleaning means comprising expanding jet nozzles inserted permanently within the fire tubes and each adapted under pressure to direct a jet of fluid at high velocity parallel with the axis of the tube and in the direction of the normal draft to induce an intensified gaseous flow through the tube, and means for admitting and conducting such fluid to the respective nozzles.

6. The combination with a fire tube boiler having two series or groups of fire tubes, of cleaning means for one such series or groups, comprising pipes permanently located within the tubes thereof having nozzles directing jets within the tubes parallel thereto, and in the direction of the normal draft, and a valved conduit conducting fluid under pressure to such pipes and nozzles whereby when fluid under pressure is admitted thereto the jets from the nozzles induce an intensified gaseous flow through the fire tubes of said group in the direction of the normal draft, accompanied by a reverse flow of gases through the tubes outside such group.

7. The combination with a fire tube boiler having two series or groups of fire tubes, of two series or groups, of cleaning means comprising pipes permanently located within said tubes having nozzles directing jets within the tubes parallel thereto, and in the direction of the normal draft, whereby to induce an intensified flow of gases through the tubes, and conduits conducting fluid under pressure to the respective groups of cleaning means, with valves for controlling the flow thereof to either group separately, whereby when fluid is admitted to one group of cleaning means, the jets from the nozzles thereof induce a gaseous blast in corresponding direction through the fire tubes of such group, accompanied by a reverse flow of gases through the tubes of the other group, and when fluid is shut off therefrom and admitted to the other group of cleaning means, the gaseous flow through the respective groups of fire tubes is reversed.

In testimony whereof I affix my signature.

SAMUEL J. HERMAN.