

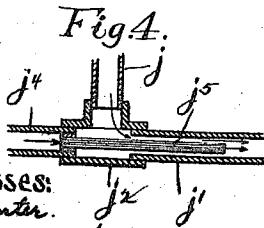
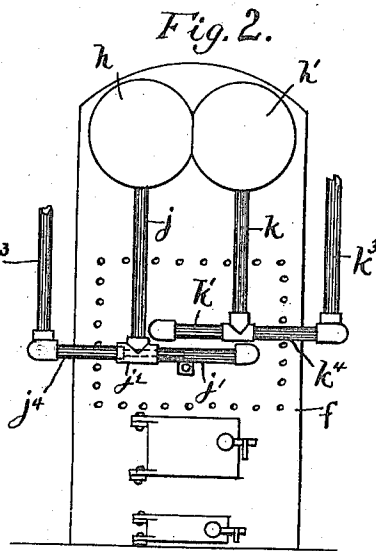
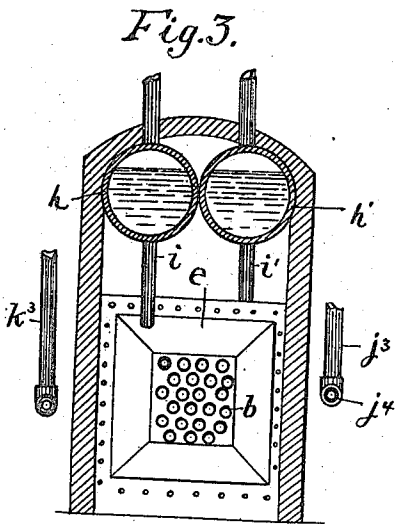
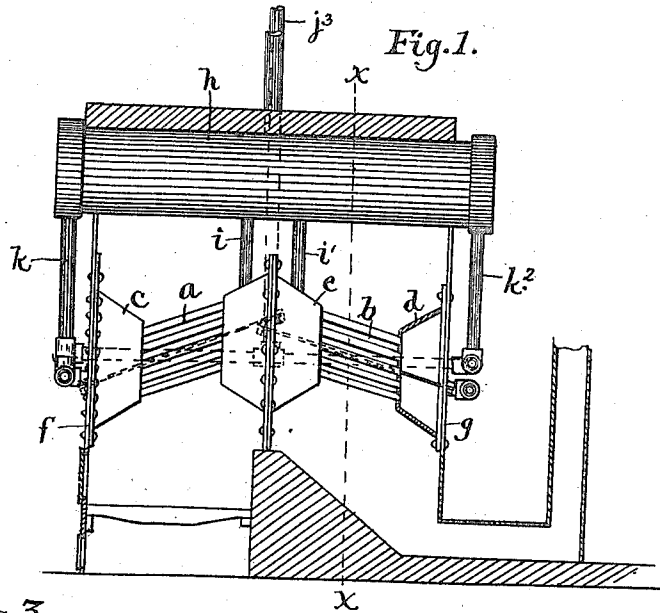
W. S. JACKSON.
STEAM HEATING BOILER.

APPLICATION FILED OCT. 23, 1913. RENEWED JUNE 5, 1917.

1,236,306.

Patented Aug. 7, 1917.

2 SHEETS—SHEET 1.



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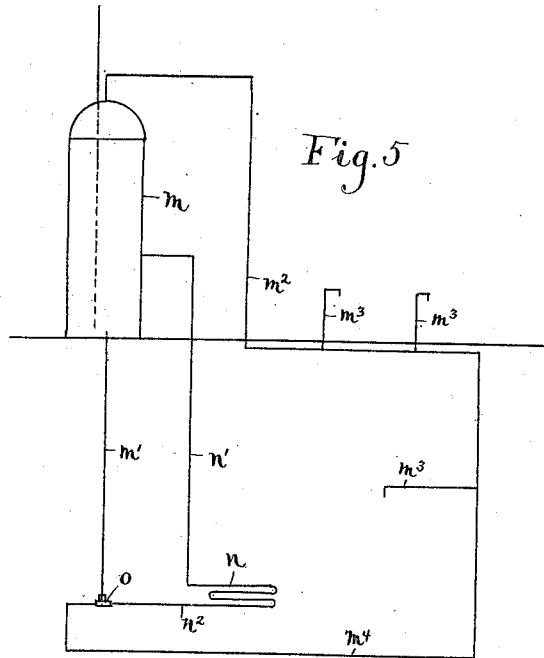
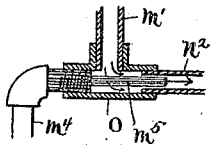


Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

WALTER S. JACKSON, OF WATERVILLE, MAINE.

STEAM-HEATING BOILER.

1,236,306.

Specification of Letters Patent.

Patented Aug. 7, 1917.

Application filed October 23, 1913, Serial No. 796,756. Renewed June 5, 1917. Serial No. 173,057.

To all whom it may concern:

Be it known that I, WALTER S. JACKSON, of Waterville, in the county of Kennebec and State of Maine, have invented certain new and useful Improvements in Steam-Heating Boilers, of which the following is a specification.

My invention relates to heating systems in which steam or hot water boilers are used. In such heating systems it is very important that the circulation of water in the boiler and the circulation of hot water or steam in the distributing pipes should be vigorous in order that the heat may be promptly and uniformly distributed throughout the system.

The object of my invention is to increase the circulation in the distribution pipes of steam and hot water heating systems, hot water supply systems and the like where a boiler is used having a local circulation in connection with a general distribution system.

The invention consists essentially of connecting the return pipe of the distribution system with the local circulation pipes of the boiler in such a manner that the flow of water in the circulation pipes will induce a flow of water from the return pipe on the well known principle of the injector. The invention is particularly applicable to boilers having a considerable vertical distance between the lower and upper portions, hot water systems making use of coils and pressure boilers and other cases wherein the local circulation in the boiler is vigorous and provides a rapid flow of water through the circulation pipes. The location of what is in effect an injector nozzle in such a rapidly moving body of water results in inducing a flow through the distribution pipes and thereby greatly increasing the efficiency of the system.

The invention is capable of being used in a great variety of ways, two of which are hereinafter shown.

My invention may best be understood by reference to the accompanying drawings in which are represented one embodiment of it as applied to a steam boiler and another as applied to an ordinary hot water supply system such as are commonly used in dwellings.

In the drawing,
Figure 1 is a side elevation of a boiler of

a type adapted for use with my invention with the side wall removed,

Fig. 2 is a front elevation of the same,

Fig. 3 is a section on the line $x x$ of Fig. 1,

Fig. 4 is a section showing the connection of the return pipe with the circulation pipes of the boiler.

Fig. 5 is a diagram of a hot water supply system, and

Fig. 6 is a sectional detail of the injector.

Referring to Figs. 1-4, the boiler which I prefer to make use of for house heating is constructed with an upper and a lower section, the lower section being directly in the path of the flames from the furnace and the upper section above them. Circulation pipes connect the upper and the lower sections whereby a constant circulation is maintained between the upper and lower sections of the boiler.

As here shown, the lower section of the boiler is made up of two stacks of tubes a and b each terminating in an auxiliary water chamber at one end of the boiler and in a central auxiliary water chamber in the center of the boiler. The stack of tubes a terminates in the head of the chamber c at the front end of the boiler and the stack b terminates in the head of the chamber d . The central chamber e is higher than the end chambers so that the tubes incline upwardly from the end to the center. Each of the heads to which the tubes connect has inclined side walls and flanges forming a water chamber. The flanges of the two central heads are riveted or bolted together to form the central chamber and the end heads are bolted to front plate f and the rear plate g of the boiler.

The upper section of the boiler is made up as here shown of a pair of pipes or cylinders h and h' of large diameter located side by side above the stacks a and b .

The lower section is connected to the upper section by suitable circulation pipes to insure a free circulation of water between the two sections.

As here shown, the central chamber e is connected with the two upper cylinders h and h' by pipes i and i' .

The end chambers c and d are connected with cylinders h and h' by means of pipes at each end of the boiler and outside of the casing.

The vertical pipe k extends downwardly from the cylinder h' connecting with a horizontal pipe k' which turns and enters the chamber c . Connecting with the end of the cylinder h is a vertical pipe j which connects with a horizontal pipe j' , the latter turning and entering the same chamber as the pipe k' .

The horizontal pipe k' connects with a pipe k^4 which extends around the outside of the boiler to the rear end and there enters the chamber d and connects with a vertical pipe k^2 which enters the other end of the cylinder.

In the same manner the pipe j' connects with a pipe j^4 which extends around the opposite side of the boiler on the outside and enters the chamber c connecting there with a vertical pipe which enters the cylinder h .

The return pipes j^3 and k^3 connect with the horizontal circulation pipes j^4 and k^4 at any suitable point.

Thus each of the cylinders is connected by vertical pipes with the central chamber and the two end chambers so that a rapid circulation of water takes place which is materially hastened by the upward slope of the tubes a and b from the ends to the center.

The real connection between the return pipes and the circulation pipes is made in such a way that the flow of circulation water past the end of the return pipe will induce a flow into the boiler of the return water, in other words by means of an injector.

The return water flows through the pipes k^3 and k^4 connecting with the circulation water at the junction of the pipes k and k^4 and in the same manner the water that comes in through the return pipe j^3 flows through the pipe j^4 and connects with the circulation water at the junction of the pipes j and j^4 . To aid the return water in entering the boiler, I connect the inner end of the pipe j^4 where it enters the T j^2 with a small pipe j^5 somewhat smaller in diameter than the pipe j' , extending it a considerable distance into the pipe j' . The circulation water passes up through one of the pipes i and i' and descends through the pipes j and k . In the case of the pipe j as shown in Fig. 4, the descending water coming down through the pipe j , flows through the pipe j' and by the end of the induction pipe j^5 through which the return water is flowing and thus acts as an injector to draw in the return water to the boiler.

The same connection shown in Fig. 4 is made at the lower end of the pipe k and of the two similar circulation pipes at the other end of the boiler so that the return water is being drawn in at four different points and the heating system is kept clear of the water of condensation.

It is evident that the connection between the return pipes and the circulation pipes

may be made in many different ways so that the flow of the circulation water will have an injector effect on the return water and I do not intend to limit myself to the particular manner of making this connection as herein shown.

The invention is applicable to hot water boilers and boilers of other types wherein the boiler or local circulation takes place through pipes or ducts where the connection with the return pipes of the distribution system can be made.

In Figs. 5 and 6 I have shown my invention as applied to a common hot water supply system. The coil n connects by the pipe n' with the pressure boiler m and the return comes back through the pipes m' n^2 . This constitutes the local circulation. The distribution system starts from a pipe m^2 from the top of the boiler and connects with the various service taps as m^3 , m^3 .

According to my invention I connect the end of the distribution system with the local circulation through a pipe m^4 which enters a T o , the latter forming the casing of the injector.

The injector is formed by the relatively small induction pipe m^5 which extends from the end of the pipe m^4 into the end of the pipe n^2 . The circulation water descending through the pipe m' passes by the end of the pipe m^5 moving in the same direction as the return water is moving and the motion of the latter is thus accelerated.

I desire it to be understood that in the use of the word "injector" I intend to cover any arrangement where two ducts come together and the flow of water through one tends to induce the flow through the other.

I claim:—

1. In a heating system the combination of a boiler including a heating section, circulation pipes for creating a local water circulation in said boiler, distribution pipes including a return pipe discharging into said heating section, said return pipe connecting directly with one of the circulation pipes by means of an injector whereby the velocity of the water in the return pipe is accelerated solely by the velocity of the water in the local circulation pipe.

2. In a heating system, the combination of a boiler including a heating section, circulation pipes for creating a local water circulation in said boiler, distribution pipes including a return pipe discharging into said heating section, said return pipe connecting directly with one of the circulation pipes by means of an injector whereby the velocity of the water in the return pipe is accelerated by the velocity of the water in the local circulation system.

3. In a heating system, the combination of a boiler having an upper and a lower section, circulation pipes connecting the upper

and lower sections for creating a local circulation, distribution pipes including a return pipe, and an ejector connecting the return pipe with one of the circulation pipes to utilize the force of said local circulation to promote the return of the condensed water thereto from the distribution pipes.

4. In a heating system, the combination of a boiler including a heating section, circulation pipes for creating a local water circulation in said boiler, distribution pipes including a return pipe discharging into said heating section, a return pipe of the local circulation connecting directly with a return pipe of the distribution pipes by means of an injector whereby the velocity of the water in the distribution pipes is accelerated by the velocity of the water in the local circulation pipes.

5. In a heating system, the combination of a boiler including a heating section, pipes for creating a local circulation in said boiler, distribution pipes including a return pipe which has direct connection with one of the pipes of the local circulation, and an ejector means located directly at the point of connection between the return pipe of the

distribution system and one of the pipes of the local circulation system whereby the velocity of the water in the distribution return pipe is accelerated by the velocity of the water circulation between and through said sections.

6. In a heating system, the combination of a boiler including a casing and a heating section within the casing, a pipe arranged exteriorly of the casing connecting with said heating section, distribution pipes including a return pipe which has direct connection with said exteriorly arranged pipe, and an ejector means located at the point of connection between the return pipe of the distribution system and said exteriorly arranged pipe whereby the velocity of the water in the distribution return pipe is accelerated by the velocity of the water circulation between and through said sections.

In testimony whereof I have affixed my signature, in presence of two witnesses.

WALTER S. JACKSON.

Witnesses:

F. S. WHITNEY,
C. H. LEARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."