(No Model.) 2 Sheets—Sheet 1.

G. A. JENCKS & G. W. PARKER.

WATER RETURN SYSTEM.

No. 524,718. Patented Aug. 21, 1894.

Fig. 3.

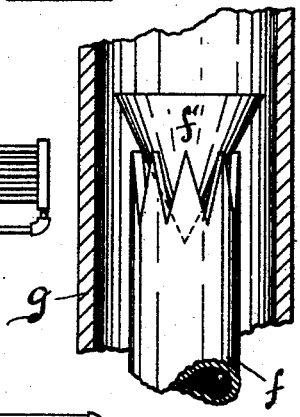

Fig. 1.

Witnesses

Howard M. Luther.

Allen Tenny.

Inventors

George A. Jencks,
George W. Parker.

By Attorneys

Frank H. Allen

(No Model.) 2 Sheets—Sheet 2.

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Fig-2-

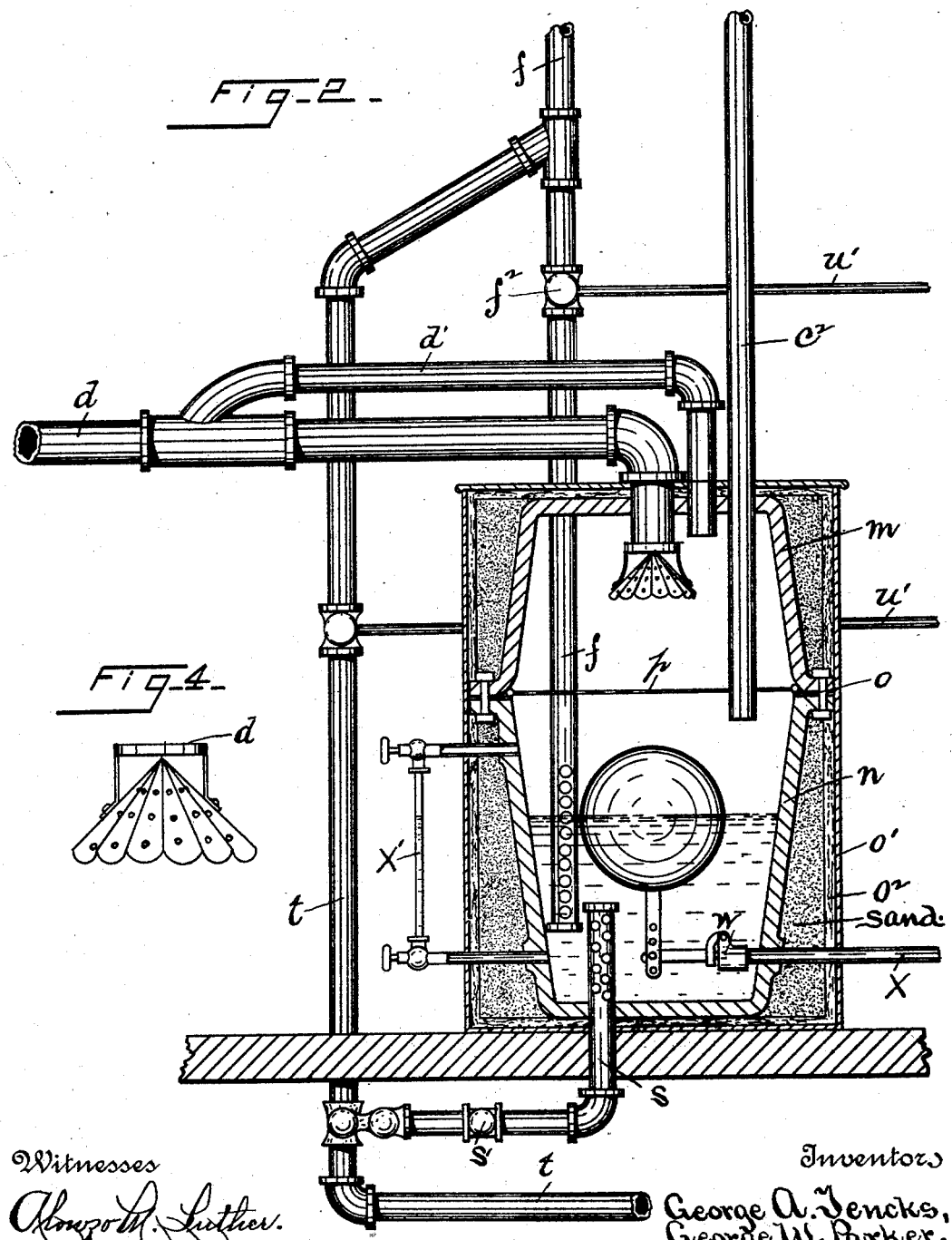

Fig-4-

Witnesses

Alonzo M. Luther.

Allen Penny.

Inventors

George A. Jencks,
George W. Parker.

By Attorney

Frank H. Allen.

UNITED STATES PATENT OFFICE.

GEORGE A. JENCKS AND GEORGE W. PARKER, OF PAWTUCKET, RHODE ISLAND.

WATER-RETURN SYSTEM.

SPECIFICATION forming part of Letters Patent No. 524,718, dated August 21, 1894.

Application filed May 15, 1894. Serial No. 511,287. (No model.)

To all whom it may concern:

Be it known that we, GEORGE A. JENCKS and GEORGE W. PARKER, both citizens of the United States, and residents of Pawtucket, Providence county, State of Rhode Island, have invented certain new and useful Improvements in Water-Return Systems, which improvements are fully set forth and described in the following specification, reference being had to the accompanying two sheets of drawings.

The object of this invention is to provide a system of steam heating, the construction of which system shall be such that all drip or condensation from radiators or pipe coils shall be automatically returned to the boiler.

To assist in explaining our invention, we have provided the accompanying drawings, in which—

Figure 1 illustrates in a comprehensive way our complete system of steam heating and shows the relation of the boiler or boilers and steam pipes to what is termed a receiver, which latter forms an essential feature of this invention. Fig. 2 shows enlarged in vertical, central section the said receiver. Fig. 3 is an enlarged sectional view of a stand pipe used in connection with our improved system and shows the manner in which steam and hot water are introduced therein. Fig. 4 is a detached view of a perforated, corrugated cone sprayer.

An important element in our system is the receiver above mentioned, but before describing the same in detail, it is thought best to first explain its particular office and its relation to the various pipes, valves, radiators, pipe-coils, &c., comprising our complete system.

The description immediately following relates particularly to the operation of our system and in connection with such description we would make particular reference to Fig. 1 of the drawings.

The letter *a* denotes an ordinary boiler, one or a series of which may be used and from which steam is conducted through a pipe *b*. Should it be desired to use steam for heating purposes only, pipe *b* may lead directly to all pipe coils or radiators of the complete system under high or low pressure as regulated at boilers, but should it be desired to use steam for both heating and power purposes, pipe *b* may conduct steam directly to be used as power and a pipe *c* provided, leading from pipe *b* and through which steam is carried to all radiators or pipe coils of the system, from which radiators all drip or condensation is drained by a pipe *d* into the above mentioned receiver which is indicated as a whole by letter *e*. A portion of the drip which is drained into the receiver is converted into steam therein (as explained hereinafter in the description of said receiver) from which it passes upward together with water therefrom through a pipe *f* said pipe *f* terminating within a condensing jacket *g* located considerably above the water level in the boiler, which jacket *g* also serves as a stand pipe.

The end of pipe *f* within jacket *g* is formed with a serrated edge and into the open end of said pipe is introduced, point downward, a cone-shaped section *f'*. When steam and water, rising in pipe *f*, reach this cone shaped section, the same serves to throw or spray said steam and water out through the serrations into the stand pipe as readily understood by reference to Fig. 3, all steam rising to the upper portion of said stand pipe and all drip settling in the lower portion of the same from which, through a pipe *h*, it is carried back to the boiler or boilers. Such steam as is not condensed in the stand pipe passes from the upper portion thereof through a pipe *j* into a radiator or pipe coil *k* and, by reason of the increased condensing surface of the latter, steam that passes therein is rapidly condensed and a vacuum created which aids in drawing the steam from the upper end of the stand-pipe.

The water which accumulates in the coil or radiator *k* passes off through a pipe *k'* uniting with that in pipe *h* and flows thence through pipe *h* to the boiler or boilers to be again converted into steam. When only one boiler is used, pipe *h* leads directly thereto, but in case a series of boilers is used, said pipe drains into a tank k^2 leading from which, to the several boilers, are pipes k^3. Tank k^2 is also provided with a pipe k^4 by means of which the same may if desired be drained.

It has already been stated that this system

can be used for both power and heating purposes and when thus used an ordinary reducing valve c' is introduced in pipe c which valve is set to deliver the number of pounds pressure which it is desired to use for heating purposes. Steam under high pressure is conducted to power as understood through pipe b, but the pressure of that which is carried to radiators will be regulated by the valve c', such pressure being either high or low in accordance as the valve c' may have been set.

Having now described in a general way the manner in which steam is conducted from the boilers and introduced into the radiators or pipe coils at any desired pressure and the manner in which condensation from said radiators and pipe coils is returned to the boiler, we will now proceed to explain more fully the manner of returning said condensation, such explanation embodying also a more complete description of the receiver e, particular reference being had to Fig. 2. This receiver consists of a chamber inclosed by two sections m and n bolted together as shown and a washer or gasket o introduced at their point of abutment to insure a water-tight joint.

The complete receiver is inclosed in a metallic case o' lined with felt or similar material o^2, while all space between said sections m—n and the felt lining, is packed with sand, this construction preventing heat within the chamber from passing therefrom except by the prescribed means of exit. Said chamber is heated by means of steam introduced therein by means of a pipe c^2 leading from pipe c' and it will be readily seen that by means of said pipe there will be at all times a pressure of steam within receiver e equal to the pressure on the radiators.

It will be noted that pipe d is forked near its entrance to the chamber of the receiver and extending from said fork is a branch pipe d' that enters the said chamber close to pipe d. Steam from said chamber introduced therein by pipe c^2 will pass into branch d' and thence into the pipe d, thereby serving to heat the drip flowing therein, so that a large portion of said drip finally enters the chamber as steam, from which it may again pass into pipe d' as just explained or escape from the receiver with any surplus steam which may have accumulated therein, through the above described pipe f, which pipe extends downward nearly to the bottom of the chamber and is perforated as shown to permit the entrance therein of water and steam (see Fig. 2). That portion of the drip which is not thus converted into steam falls from the end of pipe d onto the corrugated cone shaped sprayer, which is suspended beneath the end of said pipe, down which corrugations the drip trickles to a screen p, located midway the height of the chamber, the latter serving to again strain the drip, thereby converting it into a large number of very small globules, many of which by action of heat within the chamber are turned to steam, so that only a very small percentage of the drip finally settles in the bottom of the chamber. The water or drip which thus settles in the chamber is taken care of as follows:—Located in the bottom of the chamber and extending downward therefrom is a pipe s provided with perforations through which water enters said pipe from the receiver, which pipe s enters a pipe t, the latter extending from the upper portion of main pipe b down beneath the receiver, where it is joined by pipe s as explained and thence upward uniting with pipe f, said pipe t being shown most clearly in Fig. 1.

Under certain conditions (as fully explained hereinafter) steam passes from pipe b through pipe t to the pipe s from which point it serves to force all drip which may have settled in said pipe s up into the pipe f and thence into stand pipe g, where it is disposed of as already explained, such pressure of steam being prevented from forcing drip in pipe s back into the receiver by reason of an ordinary check valve s' located in said pipe s. To control this pressure of steam, which is to eject water from the receiver as just explained, the following described constructions of pipes, valves, &c., has been provided, most clearly illustrated in Fig. 1.

Extending from pipe t is a pipe t' leading to a case u which latter contains a steam gage and a number of electro pneumatic valves indicated by circles in said case, which electro pneumatic valves are connected by tubes u' with valves t^2 and t^3 in pipe t and valve f^2 in pipe f. The electro pneumatic valves in the case u are adjusted to open when the pressure of steam thereon is equal to that on reducing valve c', said pressure being indicated by the steam gage located within the case. When the pressure in the electro pneumatic valves is sufficient to open the same, as just explained, currents of air are forced through their respective tubes, such currents of air serving to open the valves t^2 and t^3 which are normally closed and to close valve f^2, which is normally open, thereby allowing steam to pass from pipe b through pipe t to the pipe s, from which it forces before it any water which may have settled therein, up into the pipe f and thence into the stand pipe as already described; valve f^2 being closed prevents any water after entering pipe f from flowing down into the receiver.

We have thought it unnecessary in the description of the electro-pneumatic valves just described to explain and illustrate the same in detail nor the manner in which they are acted upon by steam pressure, as the same are now on sale and commonly used for other purposes well known, nor do we wish to confine ourselves to this method of controlling the valves t^2, t^3 and f^2 as other means could be as well employed for controlling the same either electrically or by steam pressure.

To guard against the possibility of too much drip accumulating in the receiver and thus

preventing steam from entering the perforations in the lower end of pipe *f*, we have provided the following described relief for said receiver consisting of the well known ball float which as the water rises (carrying upward with it said float) serves to operate in the usual manner a valve *w*. Should said ball rise beyond a certain point this valve is gradually opened and the water in the receiver allowed to escape through relief pipe *x*. As the water escapes and its level commences to fall the ball will be correspondingly lowered and the valve *w* likewise closed, the construction and operation of said safety device consisting of the relief pipe *x*, valve, ball float and connections, and the manner in which said valve is controlled by the ball float, being clearly understood by reference to Fig. 2.

The receiver *e* is provided with an ordinary water glass *x'* by means of which the amount of water in the chamber can at any time be readily ascertained.

From the above description it will be seen that steam under any desired pressure within the capacity of the boiler or boilers may be introduced to the radiators or coil pipes and also that all drip therefrom will be automatically returned to the boilers to be again converted into steam.

Having described our invention, we claim—

1. A receiver, for use in steam heating apparatus of the class referred to, consisting of a chamber having a central, horizontal partition of screen form, a drip-pipe with cone sprayer as set forth, leading into the upper portion of said receiver, and both outlet and ejector pipes connecting the lower portion of said chamber with the stand-pipe of the said apparatus; all substantially as specified.

2. In steam heating apparatus of the class referred to, in combination, a boiler, radiators, pipe connections, a stand-pipe, all as set forth, and a receiver located intermediate the boiler and stand-pipe; said receiver consisting of a chamber having a partition of screen form and having an inlet drip-pipe and also an ejector pipe leading thence to said stand-pipe, all substantially as specified.

3. In combination in and with a steam heating system embodying drip returning apparatus substantially as herein set forth, a receiver consisting of a chamber divided into upper and lower compartments by a central, horizontal screen, an ejector pipe, connecting the lower compartment with the condensing stand-pipe of said system and adapted to convey accumulated water from the receiver to said stand-pipe, an outlet pipe (*f*) also connecting the receiver and stand-pipe and serving to convey steam from the former to the latter and a drip-pipe with cone sprayer, as set forth, leading into the upper compartment of said receiver.

4. In combination, a boiler, radiators, a stand-pipe, a receiver and pipe connections for the same, all substantially as set forth; said receiver being divided into upper and lower compartments by a horizontal screen and having inlet drip-pipes and also outlet pipes for steam and water as set forth, and a relief pipe *x* controlled by a ball-float cock whereby a given water level is maintained in said receiver for the purpose specified.

5. In a steam heating system embodying drip returning apparatus, in combination, a receiver consisting of a chamber divided into upper and lower compartments by a horizontal screen, and having inlet drip-pipes, a condenser consisting of an outer casing and an inner stand-pipe having its upper serrated end mounted by an inverted cone as set forth, and an outlet pipe connecting the said receiver and stand-pipe substantially as specified.

GEO. A. JENCKS.
GEORGE W. PARKER.

Witnesses:
CHAS. P. MOIES,
ANDREW E. JENCKS.