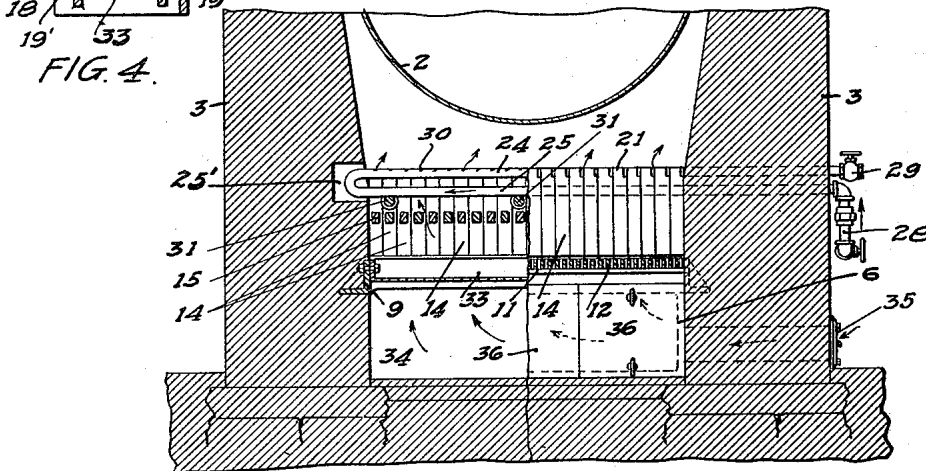
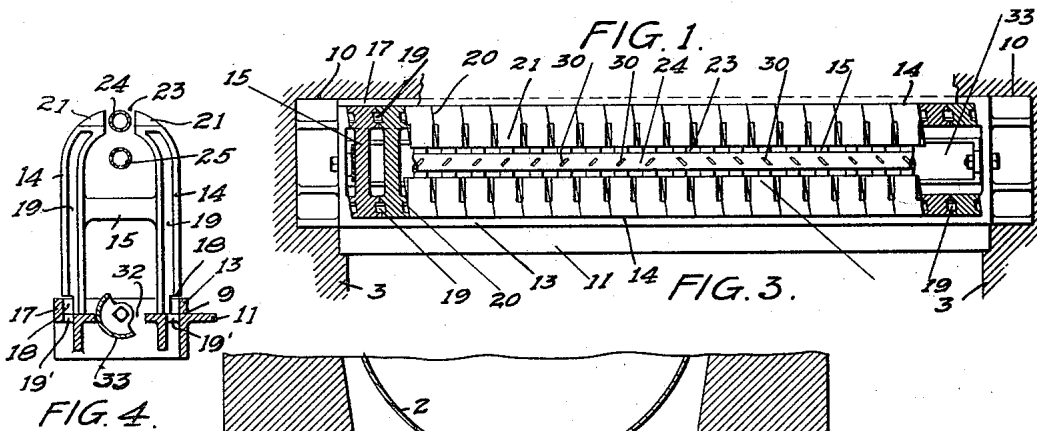
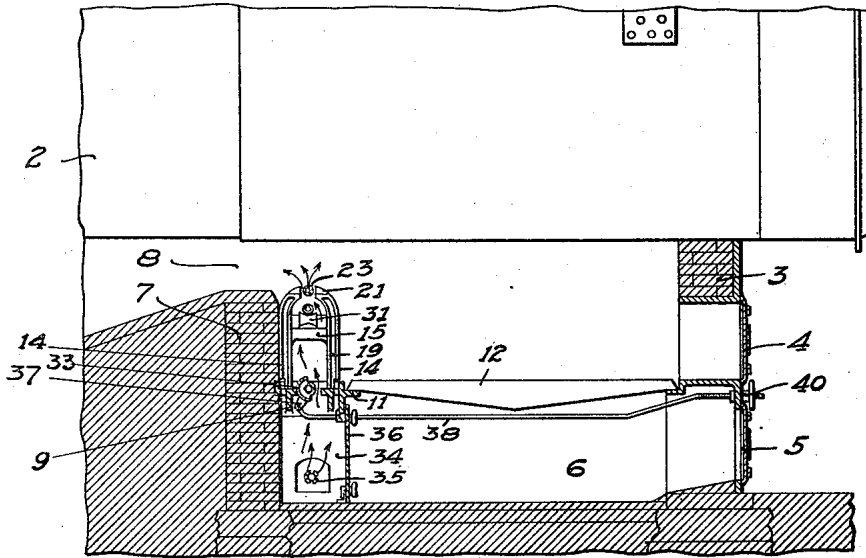


O. OLSON.
SMOKE CONSUMER.

APPLICATION FILED DEC. 13, 1912. RENEWED FEB. 26, 1915.

1,134,553.

Patented Apr. 6, 1915.



WITNESSES
M. R. McInnis
W. E. Sorensen

FIG. 2

INVENTOR
OTTIN OLSON
BY Paul H. Baugh
ATTORNEYS

UNITED STATES PATENT OFFICE.

OTTIN OLSON, OF MINNEAPOLIS, MINNESOTA.

SMOKE-CONSUMER.

1,134,553.

Specification of Letters Patent.

Patented Apr. 6, 1915.

Application filed December 13, 1912, Serial No. 736,606. Renewed February 26, 1915. Serial No. 10,869.

To all whom it may concern:

Be it known that I, OTTIN OLSON, a citizen of the United States, and resident of Minneapolis, Hennepin county, Minnesota, have
5 invented certain new and useful Improvements in Smoke-Consumers, of which the following is a specification.

My invention relates to smoke consumers adapted for use with high or low pressure
10 boilers, and the object of the invention is to provide an apparatus which can be easily applied to a boiler that is being set up, or one that is already set up and in use.

A further object is to provide a smoke
15 consuming apparatus of simple, durable construction and so mounted in the boiler that it is easily accessible for examination or repairs.

Another object is to provide a smoke consuming apparatus in which expansion and contraction of the parts will not affect the proper working of the apparatus.

A further object is to provide improved means for conducting the air to the smoke
25 consuming apparatus, and heating it during its passage.

A further object is to provide improved means for regulating the delivery of the air to the apparatus.

Other objects of the invention will appear
30 from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed
35 out in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a longitudinal, sectional view through a boiler setting showing my invention applied thereto,
40 Fig. 2 is a transverse sectional view of the same, Fig. 3 is a detail plan view, partially in section showing the preferred manner of mounting the smoke consuming attachment in the fire box of the boiler, Fig. 4 is a detail
45 sectional view showing the preferred form of damper for regulating the admission of air to the smoke consuming attachment.

In the drawing, 2 represents a tubular boiler having the usual brick setting 3, provided with a fuel door 4, and a door 5 leading to the ash pit 6.

7 represents the bridge wall separated from the boiler 2 by the usual throat or narrow passage 8.

In carrying out my invention I deliver
55 jets of steam into the fire box and preferably at the point where the products of combustion pass to or over the bridge wall.

9 represents a casting having its ends seated in recesses 10 in the setting of the
60 boiler and seated on one side against the bridge wall and provided with a longitudinal flange 11 on the opposite side, which supports one side of the grate 12. The upper side of the casting is provided with a
65 longitudinal upright flange 13, and between this flange and the bridge wall I provide a series of knees 14, arranged in pairs, the knees of the same pair being connected by a cross bar 15. The lower ends of the knees
70 are set on the casting 9, between the flange 13 and a similar flange 17, provided at the inner edge of the casting and set preferably within a recess in the bridge wall when the casting is set up. The flange 13 holds the
75 knees in place and each knee is preferably provided with a notch or recess 18 in its lower end and is adapted to receive the flange 13 and allow for expansion of the knees. I prefer to provide each knee with
80 the recess 18 to permit reversal of the pairs of knees in case the one adjacent to the grate becomes damaged or worn by exposure to the fire. The knees also are provided with vertical recesses 19 in their abutting edges and
85 said edges are beveled or inclined as indicated at 20, to allow them to slide upon one another and permit expansion and contraction without binding or cramping the knees.

The recesses 19 in the adjacent knees will
90 register when the knees are placed on their support, and as the recesses are open at the bottom a series of vertical passages or ducts will be formed, into which any ashes which may collect on the upper ends of the knees,
95 will fall and be conducted through the slots 19' to the chamber beneath. The upper ends of the knees have inwardly turned portions 21 which are thinner or narrower than the lower portions, whereby cracks or open-
100 ings will be formed between the upper portions of adjacent pairs of knees when they

are set up on their support, and through which spaces the air will flow from the chamber beneath to mingle with the steam jets and the products of combustion, the upper portions of the knees becoming heated to a high degree and serving to heat the air and the steam supply pipe and insure rapid combustion. The knees of the same pair have an opening or gap 23 between them, forming, when the knees are set up, a comparatively long space that is adapted to receive a loop, comprising an upper section 24 and a lower section 25. The inner end of the loop is loosely supported within a recess 25' in the boiler setting and the outer end of the loop projects through the boiler setting and may be readily withdrawn for cleaning or repairs without disturbing the knees. The section 25 has a coupling connecting it to the steam supply pipe 28 which communicates with a suitable source of steam supply, while the outer end of the section 24 may be closed by suitable means such as the valve 29. The section 24 normally lies in the space between the ends of the knees and is provided with a series of diagonally arranged slots 30 at suitable intervals therein. These slots are placed in such relation to one another that the jets of steam discharged therefrom will lap by one another and if the products of combustion should escape contact with one jet it would immediately come in contact with another jet. The loop, being loosely mounted in the boiler setting, is free to expand and contract without being bent or warped, and the space between the knees being open and unobstructed above the pipe section 24, the change of position of the jet opening 30, due to expansion and contraction of the pipe will not interfere in any way with the free discharge of the steam. This I regard as an important feature of my invention. The coil is preferably of copper tubing and will be heated to a high degree by the knees and the lower section of the coil will operate as a superheater to dry the steam before delivery to the section 24 and the jet openings.

The part 25 of the coil rests upon anti-friction rollers 31 mounted between the upper portions of the knees and adapted to revolve freely and allow the convenient insertion of the loop into the space between the knees, or its withdrawal therefrom. A casting is also provided with a longitudinal opening 32 in which a damper 33 semi-cylindrical in form is journaled. This controls the admission of air to the space between the knees from an air chamber 34 arranged beneath the knees and having a fresh air intake 35. Access to this air chamber and damper may be obtained by the removal of the plate 36, which separates the air chamber from the ash pit. I have found this damper, semi-cylindrical in cross section, to be

an important feature of my invention, as it not only will not bind, as a flat damper will do, but, owing to its form, any ashes or other refuse which may collect therein may be easily discharged when the damper is rotated sufficiently.

The plate 36 will be heated by the fire in the grate and will raise the temperature of the air passing through the chamber 34, and this heating of the air will be continued by a radiation from the knees, so that by the time the air reaches the point where it mingles with the steam it will be at the proper temperature to insure the best results, and I have also found it a decided advantage to take the air in through an independent opening instead of through the ash pit door.

The damper is provided with an arm 37 to which a rod 38 is attached. This rod projects out through the front of the boiler and is provided with an adjusting wheel 40 by means of which the damper may be rocked to close the air opening entirely, or regulate its size according to different conditions.

It is important in an apparatus of this kind to properly proportion the air and steam supply, that is, if steam of a certain pressure and velocity is delivered to the coil and the nozzle therein, then a certain amount of air should be supplied to the nozzle to obtain the best combustion. By means of this damper I can regulate the air supply to a nicety, and deliver a suitable volume to the steam nozzles to meet all requirements.

In the operation of the apparatus the steam flowing through the coil will be discharged in jets to meet the products of combustion and with a suitable supply of air combustion will take place sometimes close to the steam jets and often at a considerable distance therefrom, depending upon the flow of the smoke and products of combustion in the chamber. The knees and the steam coil may expand and contract freely without interfering with one another and there will be no obstruction of the steam jets due to the change of position of the holes in the pipe in the expansion and contraction therein. The coil can be readily removed to clean out the holes or for any other purpose and whenever desired the knees may be reversed to present a new surface to the fire.

In various ways the details of construction may be modified, such as the manner of supporting the knees and the shape of the knees and the coil, and still be within the scope of my invention.

I claim as my invention:—

1. The combination, with a boiler setting, bridge wall and grate, of inverted U-shaped members supported adjacent to said grate, an air passage being formed between the legs of said members and provided with an air inlet opening in said setting, independent of the inlet opening to said grate, the upper por-

tions of said members having an unobstructed transverse gap or opening communicating with said air passage, a perforated steam pipe mounted in said gap, said unobstructed opening allowing an unimpeded flow of steam from said jets during the expansion and contraction of said pipe.

2. The combination, with a boiler setting and a bridge wall and grate, of a series of knees supported between said bridge wall and grate, each knee comprising upright legs and cross bars between them, the upper ends of the legs of each knee being spaced apart, forming, when the knees are arranged side by side, a continuous, comparatively narrow gap or opening, and a perforated steam pipe mounted in said gap and having freedom for expansion and contraction therein.

3. The combination, with a boiler setting, bridge wall and grate, of a series of knees supported between said bridge wall and grate, the upper portions of said knees having transverse openings therein forming, when the knees are placed side by side, a continuous, comparatively narrow gap or opening, said knees having bearings mounted therein near said opening, a steam pipe having an elongated loop therein fitting within said opening, the upper section or leg of said loop having perforations therein, the lower section of said loop resting upon said bearings and forming a superheating section, said loop having freedom of longitudinal expansion and contraction.

4. The combination, with a boiler setting, bridge wall and grate, of a series of knees supported between said bridge wall and grate, the upper portions of said knees having transverse openings therein forming, when the knees are placed side by side, a continuous, comparatively narrow gap or opening, a steam pipe having an elongated loop therein fitting loosely within the wall of said setting and capable of longitudinal movement therein and projecting into said continuous gap or opening, the upper portion or leg of said loop having perforations therein and provided with a draw-off valve on the outside of said boiler setting, the lower leg or section of said loop forming a superheater and having a coupling outside said setting connecting it with a source of steam supply, and a regulating valve adjacent to said coupling.

5. In a boiler, the combination, with a grate, of inverted U-shaped knees mounted adjacent thereto and having a transverse unobstructed opening between the upper portions of their legs, and a perforated steam pipe mounted in said transverse opening and having freedom for expansion and contraction therein, said opening allowing an unimpeded flow of steam from said pipe during said expansion and contraction.

6. The combination, with a boiler setting, bridge wall and grate, of a series of knees supported between said bridge wall and grate, the upper portions therein forming, when the knees are placed together, a continuous, comparatively narrow gap or opening, the wall of said setting having a recess therein adjacent to said opening, a steam pipe in the form of an elongated loop fitting within said opening and projecting into said recess, the upper section of said loop having perforations therein and the lower section thereof forming a superheater and communicating outside said setting with a source of steam supply, said loop having freedom of longitudinal movement in the wall of said setting and in said recess, and in the opening in said knees, for the purpose specified.

7. The combination, with a boiler setting, bridge wall and grate, of a series of inverted U-shaped members supported between said bridge wall and grate, a vertical air passage being formed between the legs of said members on one side and the opposite legs on the other side of said members and having an air intake opening, a perforated steam pipe mounted in said passage, the legs of said U-shaped members having vertical passages therein, a support for said members having openings therein leading to the passages in said legs, and to a space beneath said support, through which passages and openings the ashes collecting on said members may be directed into the space beneath said support.

8. In a boiler, the combination, with a bridge wall and grate, of a series of knees arranged between said grate and bridge wall, said knees being in the form, substantially, of an inverted U and reversible on their support and having a space communicating with the throat or passage above said bridge wall, and means for directing jets of steam through said space into said passage.

9. The combination, with a setting, bridge wall and grate, of a support interposed between said grate and bridge wall and having a longitudinal opening therein, a series of inverted U-shaped knees having legs resting upon said support and straddling said opening, and provided with a gap communicating with the space above said bridge wall, a perforated steam pipe arranged between the legs of said knees to direct jets of steam through said gap, and a damper mounted in said opening between the legs of said knees and regulating the flow of air to said steam pipe.

10. The combination, with a setting, bridge wall and grate, of a support interposed between said grate and bridge wall and having a longitudinal opening therein, a series of inverted U-shaped knees provided with upright legs having their lower ends resting upon said support and straddling said open-

ing, a perforated steam pipe arranged between the legs of said knees to direct jets of steam into the space above said bridge wall, and a rotating damper mounted in the
5 opening in said support and regulating the flow of air to said steam pipe.

In witness whereof, I have hereunto set my hand this 7th day of December 1912.

OTTIN OLSON.

Witnesses:

GENEVIEVE E. SORENSEN,
EDWARD A. PAUL.

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