E. H. THOMPSON.

ECONOMIZER SOOT CLEANER.

APPLICATION FILED JULY 11, 1914.

1,189,752.

Patented July 4, 1916.

2 SHEETS—SHEET 1.

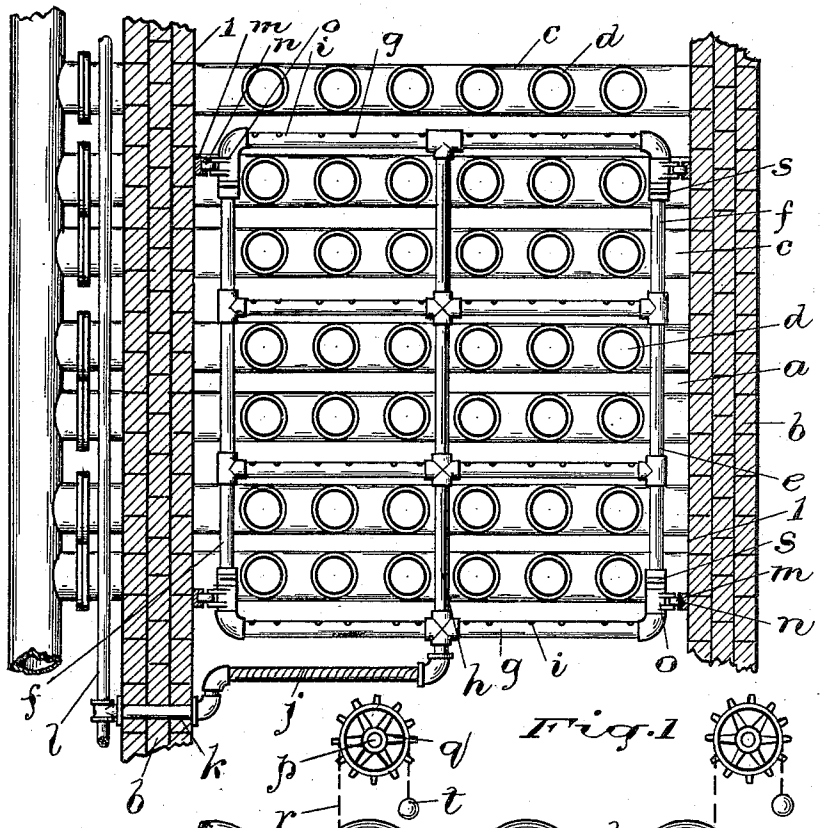


Fig. 1

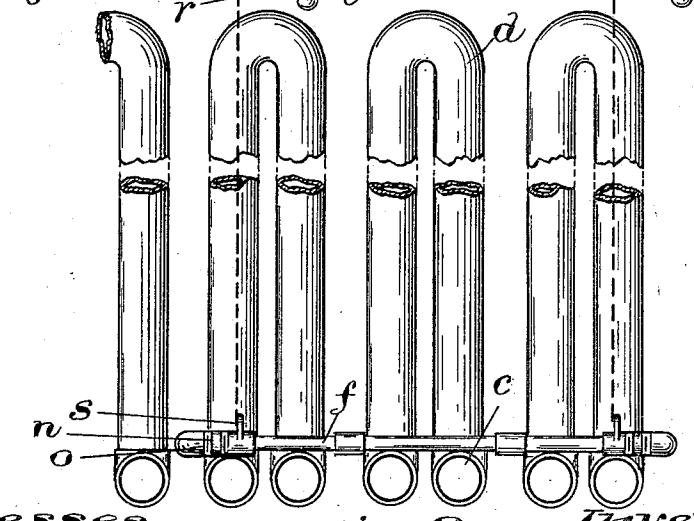


Fig. 2

Witnesses

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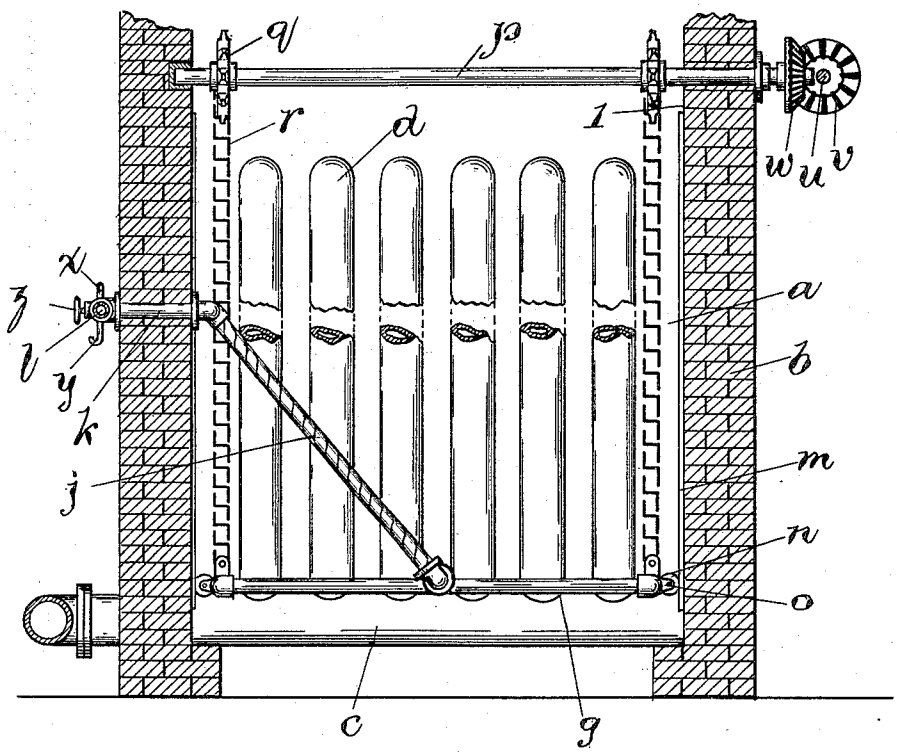


Fig. 3

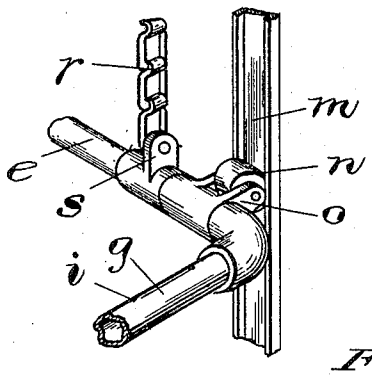


Fig. 5

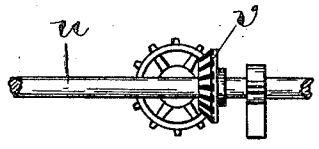


Fig. 4

Witnesses

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UNITED STATES PATENT OFFICE.

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ECONOMIZER SOOT-CLEANER.

1,189,752. Specification of Letters Patent. Patented July 4, 1916.

Application filed July 11, 1914. Serial No. 850,524.

To all whom it may concern:

Be it known that I, EDWARD HENRY THOMPSON, a subject of the King of Great Britain, residing at Toronto, in the county of York and Province of Ontario, Dominion of Canada, have invented a new and useful Improvement in Economizer Soot-Cleaners, of which the following is a specification.

This invention relates to a certain new and useful improvement in economizer soot cleaners, by which the radiating tubes situated in the economizer chamber may be cleaned from the particles of soot and other elements of the products of combustion, which readily adhere to the tubes in passing through the chamber in making their escape to the stack.

I make no claim to the nature of the chamber or the arrangement of the tubes.

I am aware of other patents having been allowed on tube cleaners for economizers, but experience has proven their lack of ability to perform the work for which they were intended, from the fact that the majority of cleaning parts are stationary among the tubes.

In my device, I provide a tubular frame coupled together in circuitous combination, comprising a series of sections adapted to interpose among the radiating tubes of the economizer. The frame is situated whereby it may be readily adjusted vertically by a flexible connection adapted to engage with a sprocket wheel or drum keyed upon a shaft extending across the economizer chamber, preferably in the top part and actuated by a bevel gear or other suitable means situated on the exterior walls of the chamber.

In cases where the interval between the top of the chamber and the tops of the tubes is not sufficient to admit the introduction of the shaft or sprocket wheels, I may introduce into the lower part of the chamber a means for elevating and lowering the frame.

The cleaning agent by which carbonaceous products are removed from the tubes consists preferably of dry steam discharging obliquely from the nozzles in the different branches of the adjustable frame.

For supplying the steam to the frame, I prefer to couple a flexible tubular connection from the side wall of the chamber with any convenient part of the frame.

As the radiating tubes are located within the travel of the products of combustion, the outer surfaces very readily collect soot, particles, thus preventing the maximum amount of heat against the tubes. It is for this specific purpose that I have provided my device, which may readily be actuated from the exterior of the chamber and dislodge the soot and particles from the tubes in traveling to and fro lengthwise of the tubes.

For the purpose of economy in respect to the use of the cleaning agent, namely the steam, I prefer to arrange the tubular frame in separate sections whereby the different sections may be actuated at will, whereby steam pressure will be concentrated at one part of the chamber, and be greater than where the steam would be distributed over the entire chamber at one time.

In the accompanying drawings: Figure 1 is a sectional top plan view of a section of the cleaning frame; Fig. 2 is a side elevation showing the cleaning frame among the tubes; Fig. 3 is a sectional elevation showing the means for actuating the cleaning frame; Fig. 4 is a sectional detail of the gear mechanism for actuating the frame; and, Fig. 5 is a perspective detail of a corner of the frame, showing a flexible connection and parts for engaging against the side walls of the chamber.

Like letters of reference refer to like parts throughout the specification.

The economizer chamber *a*, which is situated contiguous with the combustion chamber and flue from the furnace may be constructed from brick or metal. For the purpose of illustration, I show a chamber *a* formed of brick side walls *b* suitably adapted to inclose a series of horizontal and vertical water tubes *c* and *d* respectively. The vertical tubes *d* are arranged within the chamber in various ways, some being clustered zig-zag, others following one behind the other and also arranged at different intervals crosswise and lengthwise. It will be necessary of course to construct the parts comprising my cleaning device to meet with the different arrangements of the tubes.

e designates a tubular nozzle frame divided into any desirable number of sections.

For all practical purposes and to adapt the usual arrangement of the tubes, I provide a rectangular frame consisting of side tubes *f*—*f* joined together by a series of cross or nozzle tubes *g*—*g* united down the middle by tubular connections *h*,

Formed in the nozzle tubes *g*—*g* are a series of orifices *i* being arranged in different relation so that the discharge of the elements from the orifices will be caused to strike tangentially against the outer faces of the tubes and dislodge the said particles and soot, and cause them to float away in the currents caused by the products of combustion in passing through the chamber.

It may be found advisable in practice to introduce projecting distributing nozzles into the orifices for the purpose of directing the elements of steam among the tubes.

j designates a flexible tubular connection adapted to be coupled with the tubular frame *e* at any convenient point. The tubular connection *j* also couples with a branch *k* extending through one of the side walls *b* from the supply conduits *l* extending along the exterior walls of the chamber.

I have described a flexible tubular conduit as a means of supplying the steam for discharging from the nozzle tubes *g*—*g* as the most practical for the purpose, where it is necessary that the frame *e* should be actuated up and down within the chamber, but any other means of connection may be introduced without deviating from the nature of the device.

Fitted against the interior walls *l* of the chamber *a* are tracks or guide ways *m* in which ride rollers *n* journaled in brackets *o* fitted on the opposite ends of the side tubes *f*—*f* of the frame *e*.

The engagement of the rollers *n* in the tracks *m* provide against lateral or other misplacement of the frame *e* either by the pounding of the steam in escaping through the nozzle orifices *i* or while being actuated up or down among the tubes.

Journaled in the side walls *b* of the chamber *a* and extending across the back part of the chamber *a* are shafts *p* on which are keyed sprocket wheels *q*.

r designates a sprocket chain one end being fastened to a bracket *s* engaging with a side bar *f* of the frame *e*, while the opposite end is adapted to engage around a sprocket *q*, the outer end being fitted with a weight or other means to check the travel over the sprocket *q* when the frame *e* has reached its lowest position.

While I have shown a sprocket wheel and chain as a means by which the frame *e* may be raised and lowered in the chamber among the tubes *d*, any other principle may be introduced, such as cable and drum or rack-pinion, but I would prefer in all cases to provide a means whereby no part of the device would extend through the crown or top of the chamber.

Extending along the exterior walls of the chamber in longitudinal direction is a shaft *u* on which is set a bevel gear *v* adapted to mesh with a corresponding gear *w*, keyed on the end of the shaft *p* extending out through the side walls *b*.

I have not shown any means by which the shaft *u* may be turned. It is obvious that the shaft may be connected with any suitable power means, or a crank handle may be used.

x and *y* represent an air valve and drip valve respectively fitted in the supply conduit *l*. *z* designates a valve also fitted in the supply conduit *l* to open or close the supply of steam to the tubular frame *e*.

In the operation of the cleaning device as herein shown, the valve *z* will be opened to allow the steam to pass through the conduit *l*, through the flexible tubular connection *j* into the tubular frame *e*. The steam on entering the frame *e* will disburse to all parts comprising the frame, as it is coupled together in thorough circuit. The steam is then free to escape through the orifices *i* formed in the nozzle tubes *g*—*g* forming a part of the frame, so that the steam will discharge in divergent relations against the radiating tubes *d*. The shaft *v* is then rotated either by hand or motive power, in the event of the shaft being coupled up in that manner. As the shaft is rotated, the bevel gear *v* keyed to the shaft *u* meshing with the bevel gears *w* keyed on the shaft *p*, will cause the shaft *p* to rotate and cause the sprocket wheels *q* to rotate therewith.

By the rotation of the sprocket wheels *q*, the sprocket *r* connecting therewith, will travel in the direction of the rotation of the sprocket wheels, and in the event of the frame *e* being in the lower position in traveling upward, the steam escaping from the orifices of the nozzle tubes, will discharge continuously around the radiating tubes and cause the entire surface to be cleaned as the discharge continues.

It will be understood that the tubes may be cleaned both in the upward and downward travel of the frame *e*, and the downward travel of the cleaning frame will be effected by the rotation of the shaft *u* in the opposite direction from that in which the frame is caused to travel upwardly in the chamber among the tubes. The nozzle tubes *g*—*g* as well as the other tubes may be water jacketed if desired.

What I claim as new and desire to secure by Letters Patent is:—

1. An economizer soot cleaner, comprising a perforated tubular frame, said frame coupled together in complete circuit, said frame adapted to be interposed among the radiating tubes of the economizer, a sprocket chain extending from the said frame and engaging with sprocket wheels or other means, extending through the said economizer chamber and adapted to be operated from the exterior of the said economizer chamber, a flexible tubular connec-

tion connecting the said tubular frame with a supply conduit extending along the exterior walls of the said chamber, air, drip and cut-off valves suitably arranged in said supply conduit, substantially as described.

2. An economizer soot cleaner, comprising a series of tubular sections coupled together in complete circuit, discharging orifices or nozzles extending through a series of the said tubular sections, said tubular frame adapted to be interposed among the radiating tubes of the economizer, anti-friction rollers extending laterally from the side of said frame, said rollers adapted to engage in guide-ways vertically arranged on the interior side walls of the said economizer chamber, a sprocket chain connecting the said frame with a gear and means adapted to be actuated from the exterior of the chamber for raising and lowering the said frame among the tubes, substantially as described.

3. An economizer soot cleaner, comprising a perforated tubular frame adapted to be interposed among the radiating tubes of the economizer, a tubular flexible connection coupling the said frame with a supply conduit extending along the exterior walls of the economizer chamber, a sprocket chain for actuating the said tubular frame in vertical relation with the said radiating tubes for the purpose of projecting steam from the said perforations among the radiating tubes in the vertical travels of the said frame, means for opening and closing the supply of steam from the said tubular frame, substantially as described.

Signed at Toronto, county of York, Province of Ontario, this 8th day of May, A. D. 1914.

E. H. THOMPSON.

Witnesses:
N. MacMillan,
A. A. Adams.

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