

April 10, 1928.

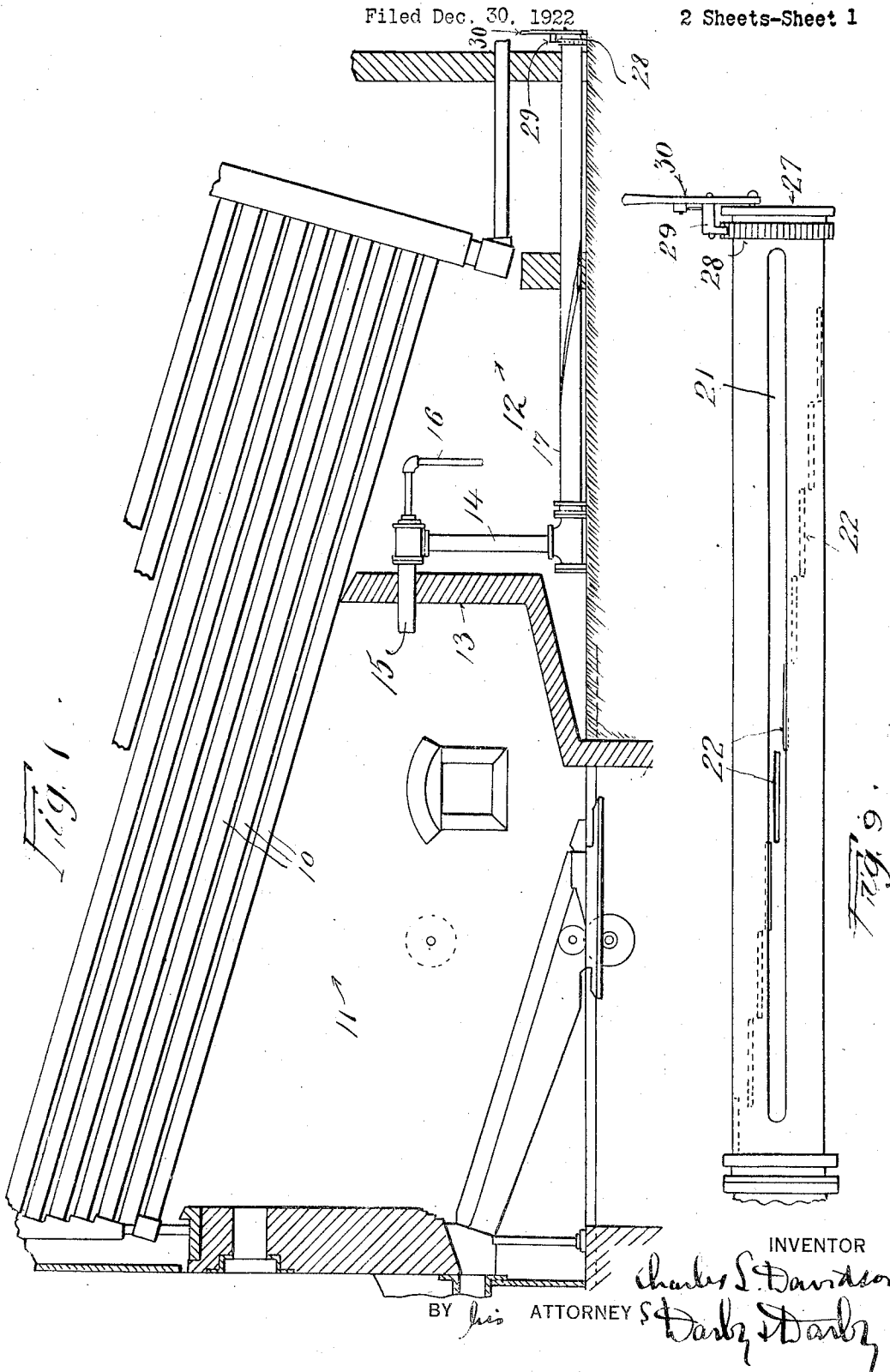
1,665,625

C. L. DAVIDSON

SOOT AND SIFTING EJECTOR FOR BOILERS

Filed Dec. 30, 1922

2 Sheets-Sheet 1



INVENTOR

Charles S. Davidson

BY his

ATTORNEY

Stark & Stark

April 10, 1928.

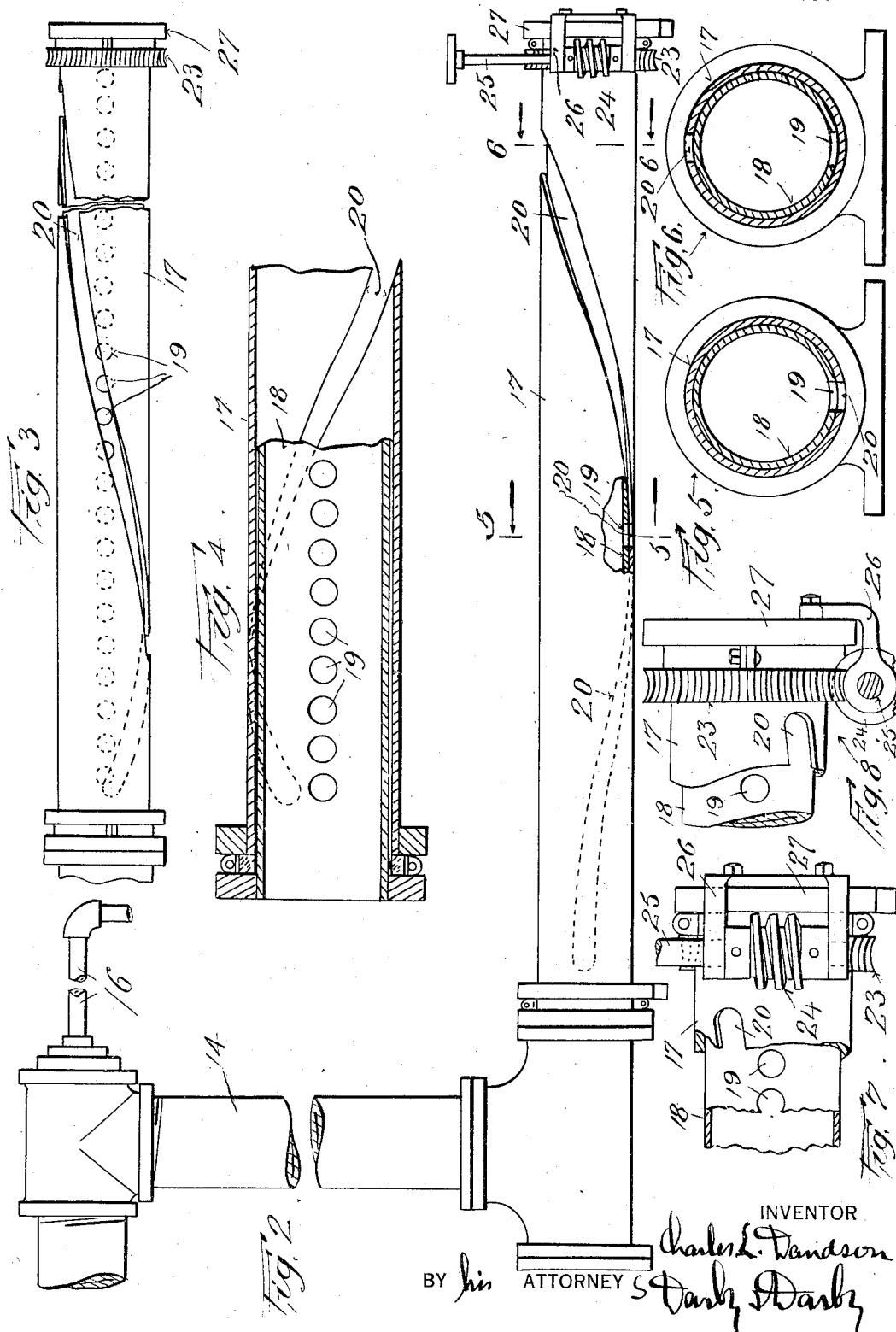
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2 Sheets-Sheet 2



Patented Apr. 10, 1928.

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UNITED STATES PATENT OFFICE.

CHARLES L. DAVIDSON, OF NEW YORK, N. Y.

SOOT AND SIFTING EJECTOR FOR BOILERS.

Application filed December 30, 1922. Serial No. 609,799.

This invention relates to means for ejecting dirt, ash, siftings, etc., from boilers, or from the casings of boiler furnaces.

The object of the invention is to provide means which are simple and efficient for ejecting accumulations of soot, ash, siftings, dirt, etc., which collect in furnace chambers.

A further object of the invention is to provide an ejecting mechanism of the nature and character referred to which is simple and efficient in operation, and is controllable to accomplish the removal of deposits or accumulations of soot, dust, dirt, siftings, ashes, and the like, throughout a considerable area.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings:

Fig. 1 is a view partly in elevation, partly in section, showing one type of boiler setting and furnace chamber, and the application thereto of an ejecting mechanism, embodying the principles of my invention.

Fig. 2 is a view in elevation, parts broken out, and parts broken off, and in section, of an ejector mechanism embodying my invention.

Fig. 3 is a plan view of a portion of the ejecting mechanism.

Fig. 4 is a broken view in longitudinal section of the portion of ejecting mechanism shown in Fig. 3.

Fig. 5 is a view in transverse section on line 5, 5, Fig. 2, looking in the direction of the arrows.

Fig. 6 is a view similar to Fig. 5 on the line 6, 6, Fig. 2, looking in the direction of the arrows.

Fig. 7 is a broken detail view in elevation of means for controlling the ejecting mechanism.

Fig. 8 is a top plan view of the same.

Fig. 9 is a view similar to Fig. 3 showing a slightly modified arrangement embodying my invention.

The same part is designated by the same reference numeral wherever it occurs throughout the several views.

In the use of boilers, accumulations of soot, unburned particles of carbon, and other

products of unconsumed fuel, collect, or are deposited upon the boiler tubes, and other portions of the interior surface of the furnace chamber, fire walls, etc. Various devices have been employed for the purpose of removing these deposits and accumulations. In some cases a forced draft of air has been proposed. Steam jets have also been employed. Various mechanical devices have been proposed and used for the purpose of detaching the accumulations from the surfaces of the tubes. In the use of such devices the accumulations which are removed from the boiler tubes and other surfaces of the setting become deposited usually at the rear of the boiler, gradually building up a soot bed around the rear ends of the tubes, which in time clogs the draft of the furnace. Such accumulated deposits have necessitated in most types of boiler furnaces access to the rear of the boiler tubes to enable the bed of accumulated material to be scraped out and removed from the tube chamber. Such deposits, however, consist chiefly of unconsumed particles of fuel and contain considerable heat value which varies approximately from 5,000 to 13,000 B. t. u. per pound. The loss and waste of this heat value becomes an important item of fuel economy. It is among the special purposes of my present invention to provide an ejector mechanism which is simple in structure, efficient in operation, and which is readily and easily applied to any of the modern types of steam boiler furnaces for ejecting the accumulations of deposited or detached soot and other unburned particles of fuel, siftings, and the like, from their point of accumulation, and delivering the same into the fire bed for consumption and utilization of their heat values.

In my pending application, Serial No. 332,270, filed October 21, 1919, I have shown, described and claimed a structure of ejector mechanism directed towards the objects and purposes above noted, but in said structure the ejecting application or operation is localized at certain points only of the system. It is among the special purposes of my present invention to provide an apparatus which is controllable and progressive in its action throughout the entire area or space in which the deposits and accumulations take place.

In accordance with my present invention, I propose to dispose within the area where

such accumulations of soot, unburned particles of fuel, and the like, collect, tubular members telescoped the one over the other, and relatively revoluble with respect to each other, and having openings which are brought into register with each other successively and progressively from end to end of the telescoping members as said members are rotatively moved with respect to each other. By imposing an ejecting force within said tubular members, either vacuum or pressure, and within a delivery connection therefrom, I am enabled to quickly and efficiently and progressively eject such accumulations throughout the entire area or space controlled by the mechanism. Through the delivery connection from the tubular members the accumulations are delivered into the fire chamber of the boiler furnace where they may be again ignited and the heat values thereof utilized.

In the drawings I have shown various structures embodying the principles of my invention. Referring particularly to Fig. 1, 10 designates the boiler tubes of a boiler furnace, which may be arranged within the boiler setting in any suitable, convenient, or well known manner, and in proper relation to the fire chamber 11, according to well known types of boiler furnaces. In the type shown, the boiler tubes 10 are disposed at a downward inclination through and from the furnace chamber 11. In the operation of a boiler furnace of this type soot and other unburned particles of fuel accumulate within the chamber or space 12 outside of the fire wall 13 of the boiler setting and beneath the lower ends of the boiler tubes. Such accumulations of soot and other deposits occur in this chamber or space 12 either from the action of the natural or forced draft, or from the action of steam or air jets applied to remove deposits of soot and the like from the boiler tubes, or from mechanical scraping devices sometimes employed for this purpose. Within this chamber 12 I arrange an ejector device having a delivery connection 14 delivering as at 15 into the furnace chamber 11. Cooperating with the delivery connection 14 is a pipe connection 16 for delivery of air, steam, or other ejecting power force, in the operation of which an ejecting action is exerted within the ejector device.

In the arrangement shown in Figs. 2, 3 and 4, the ejector device comprises tubular members 17, 18, telescoped the one within the other, and mounted for relative axial rotation, the delivery connection 14 communicating with the bore of said telescoping members. The telescoping tubular members 17, 18, are respectively provided with openings through the walls thereof and extending throughout the length of said tubular members. By arranging the opening or openings in one of the tubular members in a straight

line parallel with the axis of said member, and the opening or openings in the other of the tubular members in a spiral extending from end to end of said member, it will be seen that the openings in the two tubular members are brought into register with each other progressively from end to end as the one or the other of the tubular members is axially rotated. It is immaterial in which member the spiral opening or openings is employed, and in which the straight line of opening or openings is employed. As shown in Figs. 2, 3 and 4, the inner member 18 is formed with a series of holes or openings 19 which extends in a straight line from end to end of said member, while the outer tube 17 is formed with a continuous spiral opening 20 extending from end to end thereof. It is obvious that other arrangements and relations of the successively registering openings may be employed without departure from the spirit and scope of my invention, for example, in Fig. 9 I have shown the outer tubular member formed with a straight slot or opening 21 extending from end to end thereof, while the inner tubular member is formed with a successive series of straight slots 22, arranged in staggered or successively offset relation with respect to each other. When a suction force is applied to the bores of the telescoping tubular members, it will be seen that any soot or accumulation lying adjacent to any registering openings 19, 20, or 21, 22, will be drawn into the bore of the tubes and through the discharge connection 14 and delivered through the portion 15 into the furnace chamber, such ejection and delivery action being localized at the point where the openings 19, 20, register with each other. Now, by rotatively moving one of the tubular members, this point of localization of the suction action will progress from end to end of the telescoping tubes as the rotative movement continues to bring successive portions or openings of the two tubes into register with each other. As shown in Figs. 2 and 5, the register of the openings in the two tubular members occurs at approximately the midlength of the tubes. Now, by reason of the spiral arrangement and relation of the opening or openings in one of the tubes, in this case, the outer tube, the rotation of said tube causes the point of register, and hence of the localization of the ejecting action, to progress towards one end or the other of the tubes according to the direction of rotation imparted to the tube. From the foregoing description it will be seen that I am enabled to secure a wide range of ejecting action, in fact, substantially throughout the area or space within which accumulations and deposits ordinarily occur.

The tubular members 17, 18, or one of them, may be rotatively actuated in any suitable or convenient manner, to control

the range of ejecting action secured from a point outside the setting of the boiler. In Figs. 2, 7 and 8 I have shown one arrangement wherein a worm wheel 23 is mounted upon the end of the tubular member 17. With this worm wheel meshes a worm gear 24 carried by a shaft 25, which may be easily rotated by hand. The shaft 25 is journaled within a suitable bracket 26 mounted upon the end of the casing 27 within which the end of the tube 17 is journaled.

In Figs. 1 and 9 I have shown a ratchet wheel 28 mounted upon the outer tubular member arranged to be engaged by a pawl 29 carried by a hand lever 30 pivotally mounted upon the journal casing 27. Of course, it will be understood that other forms of rotating mechanism may be employed for rotatively actuating one or the other of the tubes. The arrangements shown, however, are simple and efficient and economical to construct, install and maintain. By reference to Fig. 1, it will be seen that the means for rotatively actuating the tubular member are located outside of the boiler furnace setting, and hence in convenient position for proper and suitable manipulation.

It is obvious that an ejecting mechanism of the nature referred to may be employed in connection with any standard type of boiler furnace and may be used in connection with any method or form employed for dislodging the accumulations of soot and other deposits from boiler tubes and is equally effective for use where no special means are employed for the removal of accumulations of soot deposits from the tubes. Of course it will be understood that the worm gear structure for rotating one of the tubular members is employed where the end of the tubular member is not conveniently

accessible. Where such accessibility exists the simpler and more economical pawl and ratchet arrangement would be preferable.

Having now set forth the objects and nature of my invention and structures embodying the principles thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is,—

1. A soot collecting device for boiler furnaces comprising a hollow member, a delivery connection therefrom, means to create gas currents in said connection, said hollow member having intake openings along the length thereof, and means to progressively open and successively close said intake openings.

2. A boiler furnace having a fire chamber and a soot collecting chamber, in combination with a suction device disposed in the soot collecting chamber and delivering into the fire chamber, said suction device having openings along a portion of its length, means to create a suction in said suction device, and means to progressively uncover and successively cover the openings in the suction device.

3. A boiler furnace having a fire chamber and a soot collecting chamber, in combination with a hollow member disposed in said collecting chamber and having openings along its length, a delivery connection from said member into the fire chamber, means to create an ejecting force in said delivery connection and to produce a flow of gases into and through said hollow member, and means to progressively uncover and successively cover the openings along the length of said hollow member.

In testimony whereof I have hereunto set my hand on this 27th day of December A. D., 1922.

CHARLES L. DAVIDSON.