May 17, 1938. E. WEBER 2,117,865

SHIELDED ASH SPRAYING DEVICE

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FIG. 1

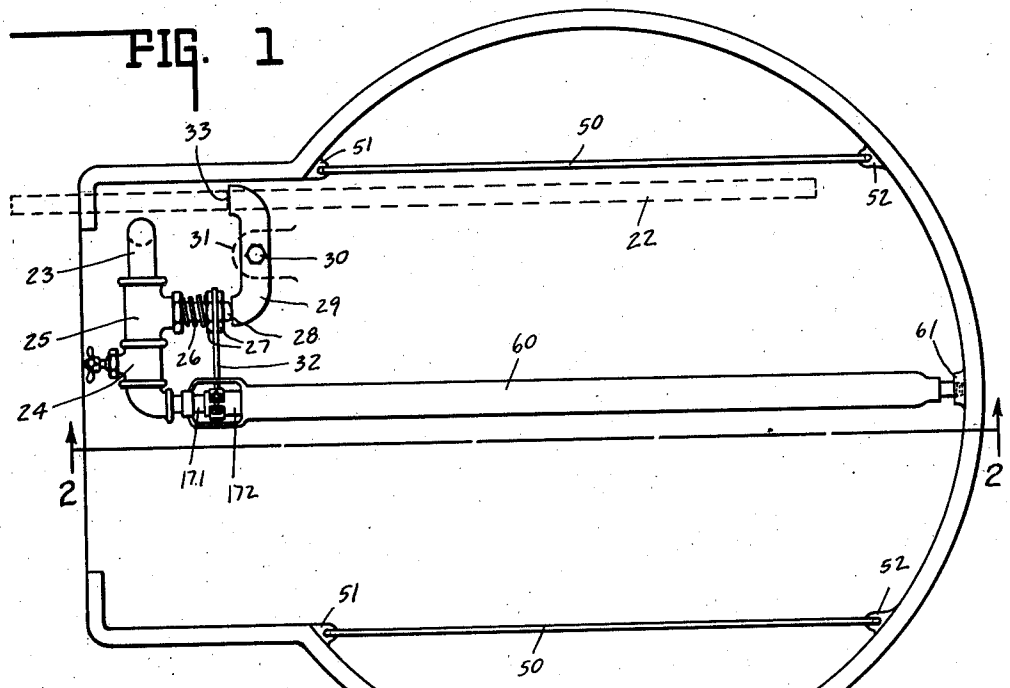



FIG. 2

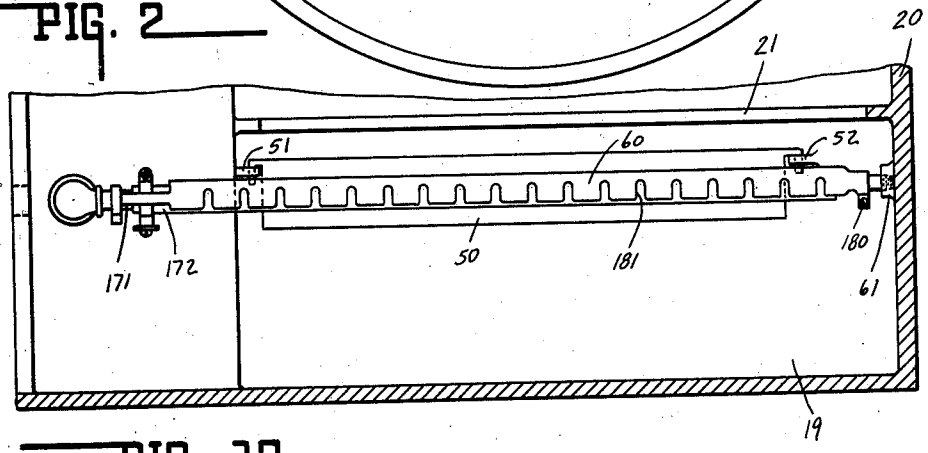
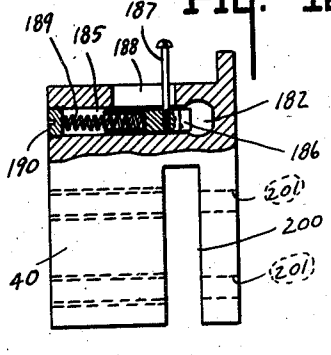



FIG. 12




INVENTOR.
EMIL WEBER.

BY
Lockwood Goldsmith & Galt
ATTORNEYS.

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FIG. 3

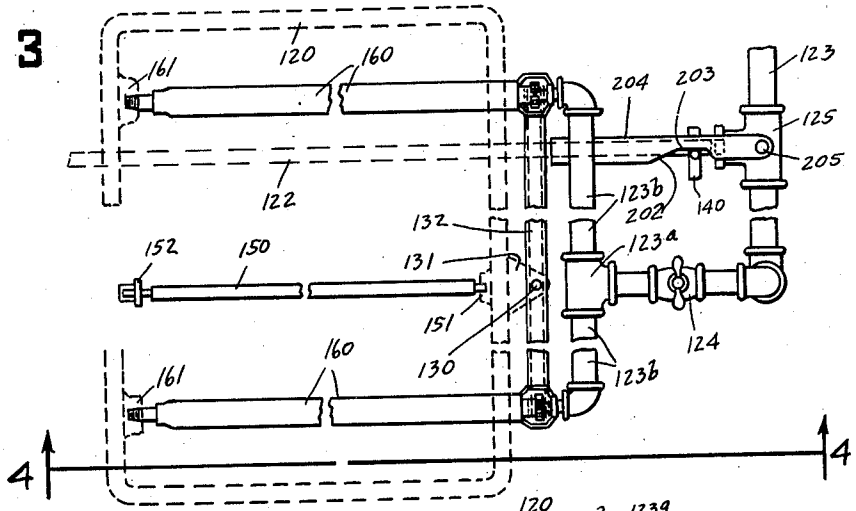



FIG. 4

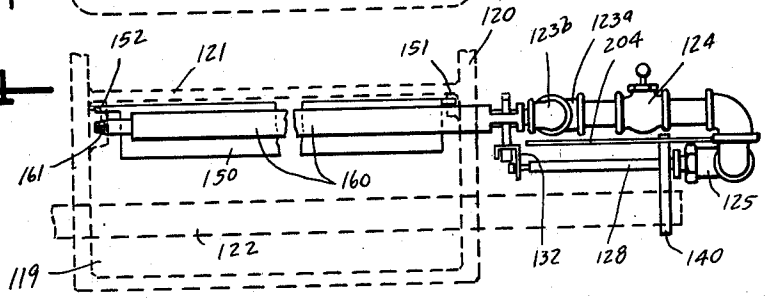
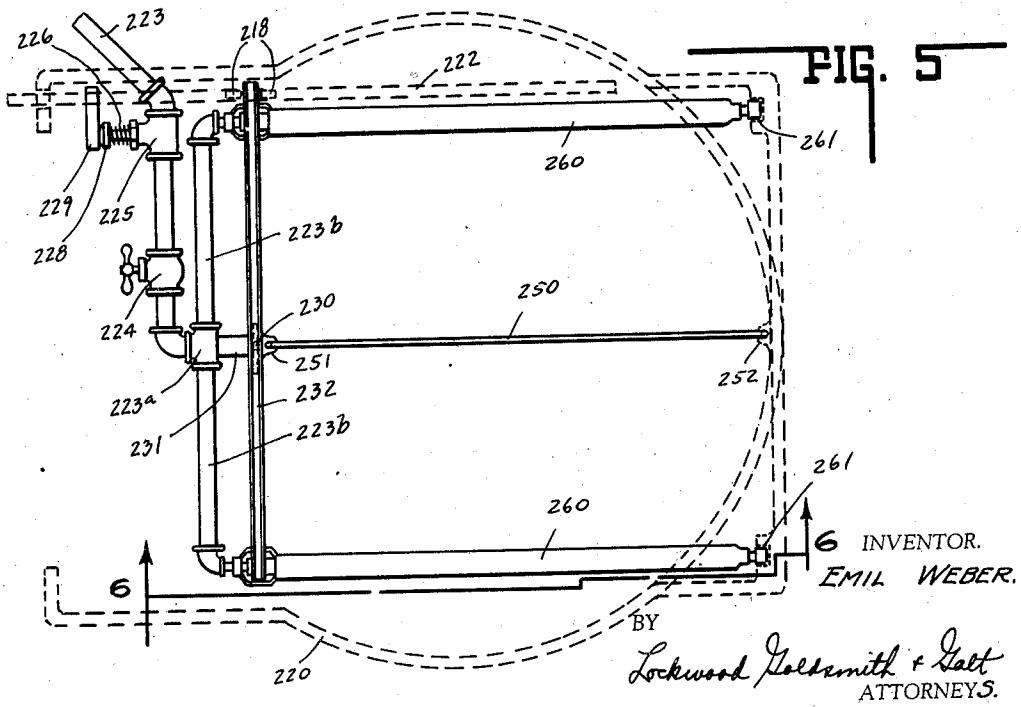



FIG. 5




INVENTOR.
EMIL WEBER.

BY
Lockwood Goldsmith & Galt
ATTORNEYS.

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FIG. 6

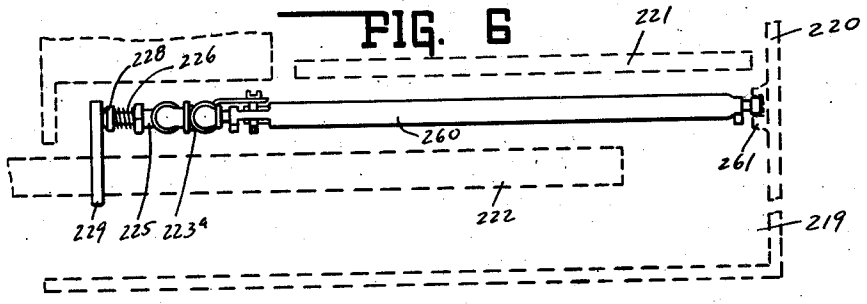



FIG. 7

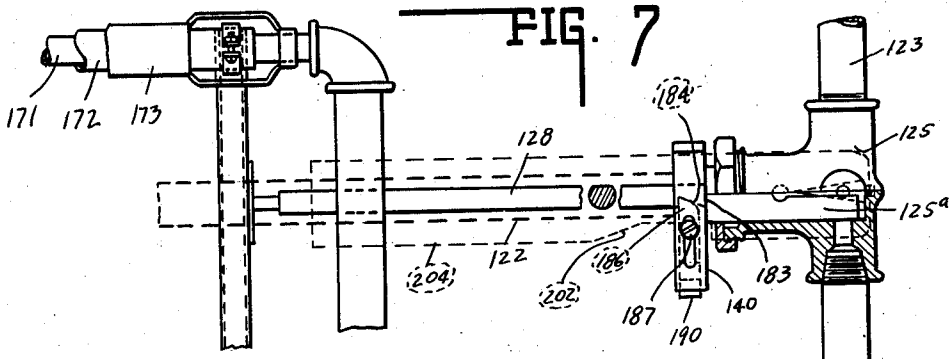



FIG. 8

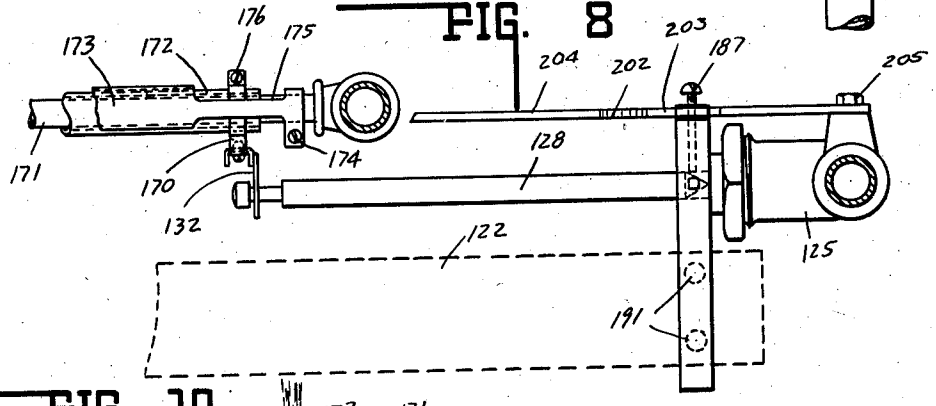



FIG. 10

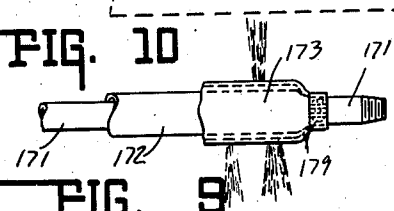



FIG. 9

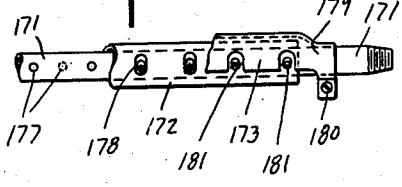
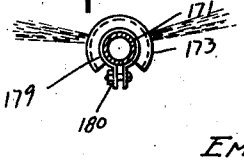



FIG. 11




INVENTOR.
EMIL WEBER

BY
Lockwood Goldsmith & Galt
ATTORNEYS.

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2,117,865

# UNITED STATES PATENT OFFICE

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## SHIELDED ASH SPRAYING DEVICE

Emil Weber, Evansville, Ind.

Application May 8, 1936, Serial No. 78,647

14 Claims. (Cl. 110—171)

This invention relates to a spraying device for spraying ashes in a furnace, boiler, stove, or the like, wherein coke, coal or wood—in other words, solid fuel—is utilized for the generation of heat.

It has heretofore been proposed to utilize water for spraying ashes in order to lay the dust incident thereto. However, such proposals have inherent objections, among which may be mentioned the following by way of example.

In certain devices, the spraying is continuous whereas ash deposition at least relative to quantity is not continuous. In other devices, the spraying liquid is manually and independently controlled relative to the volumetric movement of ashes. Subsequent failure to manually close the supply valve then results in flooding of the ash pit or ash receiver.

The major dust objection incident to ash discharge, is that when shaking the fuel supporting grates of the stove, furnace, boiler or the like, such shaking action results in the mass removal of ashes from the fire zone to the ash pit or receiver and the shaking is accompanied by a large cloud of ash dust.

The purpose of the invention is to lay this dust. In heat generating devices of this character, the incidental and continuous minor discharge of ash and dust from the fire bowl to the ash pit or receiver, does not ordinarily create a cloud of dust that is objectionable and consequently, the present device is intended to function only whenever there is co-incidentally created by grate shaking a relatively large amount of dust in the discharge of a relatively large amount of ash from the fire bowl.

Also, this invention is directed to a foolproof arrangement, wherein first, the spraying liquid control is automatically actuated by and with the shaking of the grates so that when the grates are not shaken, there is no spraying medium discharged from the device.

Another foolproof arrangement consists in protecting the discharge ports of the spraying device from the deposition of ashes, dust and the like during all intervals when shaking of the grate does not take place and this prevents clogging of the ports. For this purpose, there is associated with the spraying device a port guarding shield which, upon shaking of the grate, is moved to expose the ports so that the spraying medium may be discharged through the ports for the accomplishment of the function of the device, to-wit, the laying of the dust.

Other advantages will appear more fully hereinafter.

The chief object of the invention is to provide a spraying device for ashes discharged from the fire bowl of a furnace, boiler, stove, or the like, and which is substantially foolproof, has a relatively long life and has many advantages over other devices heretofore employed in an attempt to accomplish substantially the same purpose.

One feature of the invention in addition to the accomplishment of the foregoing object, consists in the construction of the device so that it may be readily applied as an attachment to standard furnaces, boilers, stoves, and the like.

The full nature of the invention will be understood from the accompanying drawings and the following specification and claims:

In the drawings,

Fig. 1 is a top plan view of the ash pit portion of the invention embodied in a furnace.

Fig. 2 is a sectional view thereof taken on line 2—2 of Fig. 1 and viewed in the direction of the arrows.

Fig. 3 is a view similar to Fig. 1 and of a modified multiple form of the invention shown applied to a slightly different form of heat generator.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3 and viewed in the direction of the arrows.

Fig. 5 is a top plan view of a modified form of the invention, somewhat similar to that shown in Fig. 3 but applied to a heat generator of the general type shown in Fig. 1.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5 and viewed in the direction of the arrows.

Fig. 7 is a view of a portion of the device illustrated in Fig. 3 shown in larger scale.

Fig. 8 is an elevational view thereof.

Fig. 9 is a side elevation of a dust protected spray pipe, parts being shown in spraying position.

Fig. 10 is a top plan view thereof.

Fig. 11 is an end view thereof.

Fig. 12 is an elevational view of the connecting block between the shaker bar, valve and sliding shield operating connection.

In Figs. 1 and 2 of the drawings, 20 indicates a furnace structure, 21 a diagrammatic indication of a furnace grate, 19 the ash pit therebeneath, and 22 the grate shaker member which is of reciprocatory character. A supply pipe 23 is adapted to supply water to a spray device positioned within the ash pit and above the bottom thereof and relatively close to the furnace grate, as shown in Fig. 2.

The supply pipe 23 includes a manual regulating valve 24 and an automatic valve 25. The automatic valve 25 has an exposed stem 28 and

concentric therewith is the spring 26 which bears against a pair of nuts 27 to normally return the member 28 to the cutoff position. A spray port protecting ash shield moving member 32 is, in this instance, secured to the exposed portion of stem 28 by means of nuts 27. The end of stem 28 is positioned adjacent one end of a member 29 pivoted at 30 upon a boss 31, or the like, and which is stationary relative to the furnace.

The other end of member 29 is adapted to engage a stop portion 33 carried by the shaker member 22. Thus, when member 22 is reciprocated to and fro in each movement of the member toward the back of the furnace, the abutment 33 engages one end of member 29 and this actuates portion 28 to open the valve so that there is supplied to the spray device within the furnace a supply of water under hydrant pressure, unless such pressure be reduced by means of regulating valve 24.

Before proceeding to a detailed description of the spray device and the ash guard shield assembly, reference first will be had to other forms.

In Figs. 3 and 4, 120 indicates the interior of a furnace structure having an ash pit 119, the grate being diagrammatically illustrated and indicated by the numeral 121 and the grate shaking member by the numeral 122.

In this form of the invention there are two spray pipe structures and the supply pipe thereto is indicated by 123 and includes the automatic valve 125. The pipe also includes the regulating valve 124, a T 123*a* and two branches 123*b*, each of which communicates with a spraying device, hereinafter to be described in detail.

In this form of the invention, the shaking member 122 suitably supports a connecting member 140—see also Fig. 12—which is operatively associated with the extension 128 of the valve 125. There is no spring in this form of the invention—see Figs. 7 and 8—to constrain the valve toward closed position.

Member 128 is extended—see Fig. 4—and a connecting member 132 operatively connects the valve stem extension 128 to the ash guard shield, to which reference will be had hereinafter. The operative relationship between member 128 and member 140 and the associated parts will be set forth more fully hereinafter.

In Figs. 5 and 6 of the drawings, there is illustrated the interior furnace structure 220 having the ash pit 219, the grate structure being diagrammatically illustrated and indicated by the numeral 221. In this form of the invention, two spray devices are illustrated. The supply pipe to these devices is indicated by the numeral 223, the automatic valve by 225, the manual regulating valve by 224, the T by 223*a* and the two branch pipes which directly supply the spray devices by 223*b*.

In this form of the invention, a member 232 is pivoted at 230 on a support member 231. The bar 232 is operatively associated with lugs 218 and is caused to oscillate with the movement of the shaking member 222.

The shaking member 222 has rigidly secured to it a member 229 which is adapted to engage the head 228 of valve 225, the portion 228 being constrained toward the valve closing position by the exposed coil spring 26. Thus, when the member 222 is reciprocated for grate shaking, the ash guard shields are actuated for movement to expose the spray discharge ports and the water supplied by pipe 223 is automatically supplied to the spray device.

With reference to the several figures before mentioned, it frequently is desirable to employ water diverting spray shields other than dust guard shields on the spray devices before mentioned. In Fig. 1, since the spray device is of single character and medianly positioned, two such water diverting spray shields 50 are illustrated and these are suitably secured to the interior furnace structure 20, as at 51 and 52. In this form of the invention, it is to be understood the spray device is arranged to discharge the spray oppositely from the medianly positioned spray device and upwardly, if desired. Preferably, the upwardly directed spray does not, or should not when full pressure is applied, contact the undersurface of the hot grate. The spray diverting shields therefor also prevent the spray from contacting the interior side wall of the ash pit and prevent rusting and corrosion thereof.

In Figs. 3 and 4, since the spraying means is of multiple character, the spray diverting shield is medianly positioned, as indicated by the numeral 150. It is suitably suspended at the rear end as at 152 and at the forward end as at 151. In this form of the invention, it is to be understood each of the two spray devices directs the spray towards the other device and since the spray may be directed slightly upwardly, the spray diverting shield 150 interrupts the upward movement of each spray just previous to that region where it would contact the undersurface of the hot grate.

In Figs. 5 and 6 a spray diverting shield 250 is illustrated and the same is suitably suspended at its rear end as at 252 and its forward end as at 251, and this diverting shield 250 serves the same purpose relative to the inwardly directed sprays from the two spray tubes as diverting shield 150 serves relative to the two spray tubes illustrated in Figs. 3 and 4.

While three different arrangements of the invention are illustrated and have been described in considerable detail, it is to be understood that other forms of the invention may be readily constructed by persons skilled in this art so that such formations will conform to the particular heat generating installation involved and to which the invention structures are to be attached.

It will also be readily apparent from the foregoing that the invention may be applied as an attachment to any standard furnace structure without departing from the broad scope of the invention. These various modifications, which necessity will dictate to be utilized, are all considered to be within the scope of the invention.

In Figs. 1 and 2 the spray tube structure broadly is indicated by the numeral 60 and the same is suitably secured as at 61 at its rear end to the interior furnace structure 20.

Similarly, the two spray tubes shown in Figs. 3 and 4 are indicated by numeral 160 and are suitably supported at the rear end as at 161.

Similarly, in Figs. 5 and 6, two spray tubes 260 are suitably supported at their rear ends upon the furnace structure 220 as at 261. The forward ends of the tubes may be suitably supported, if, as and when necessary. Herein no support is illustrated because in the usual application of the invention, none is required.

In Figs. 7 and 8, there is illustrated a portion of the invention shown in Figs. 3 and 4 and in said figures, substantially the same numerals are utilized as were utilized with reference to the parts shown in said Figs. 3 and 4. In Figs. 7 and 8, there is illustrated a connection 140 between

the shaking member 122 and the valve stem. This specific structure is more clearly illustrated in Fig. 12. In said Figs. 7 and 8, the member 132 is suitably connected to a clamp 170 associated with an ash shield, this shield being of tubular type and being concentric with the spray tube 171, the tube shield being indicated by numeral 172. A stationary cover 173 is clampingly mounted as at 174 upon the tube 171 and is cut away as at 175 to permit member 170 to move to and fro to carry with it the ash shield 172 clampingly connected thereto as at 176.

The spray tube proper—see Figs. 9 and 10—indicated by the numeral 171, includes the ports 177 which in some forms of the invention may be upon opposite sides of the tube as shown dotted in Fig. 9, and in other forms of the invention may be upon the right or left hand side of the tube, as required.

The ash shield or sliding tube 172 includes elliptical openings 178 which are spaced apart according to the spacing of the ports 177, and these are positioned on one or both sides and when one side is so provided with the elliptical openings, then for two tubes used in a multiple spray tube device, the ports are on adjacent sides of the tubes. When the ash shield has the elliptical openings 178 registering with the ports 177, the spray can discharge from the ports and through ash shield openings and in the desired direction. This sliding arrangement also serves to clear the ports of accumulated ash and dust.

An outer dust guard or supplementary ash shield indicated by numeral 173 in Fig. 8, it will be remembered, is clamped to the tube 171 as at 174. The opposite end of this supplementary ash shield is reduced as at 179 and clamped to the opposite end of the tube 171 as at 180. The dust guard or ash shield 173 only partially envelops the sliding ash shield 172 and it is provided with notches 181 which register with the ports 177, these notches being spaced to correspond with the port spacing and also being provided on one or both sides of the dust guard shield, as required by the particular instance, and when upon one side of the ash shield, then the two adjacent ash shields have their notches or cutout portions 181 upon adjacent sides.

Reference will again be had to Figs. 3, 4, 7 and 8, and also Fig. 12. The block 140, before mentioned, includes notch 200 for reception of shaker bars 122 and openings 201 for receiving bolts 191 to secure said shaker bar to the block. The block includes an aperture 182 which slidably receives the reduced stem portion 128 of the valve member having the shoulder 183, the valve member being indicated by the numeral 125a.

The stem 128 includes a notch 184 of the ratchet tooth type. Slidably mounted in a bore 185 in the block 140—see Fig. 12—is a tooth 186 having a lateral extension 187 slidable in the slot 188 in the block. A spring 189 in the bore normally projects the tooth or dog 186 into contact with the stem 128. The spring is retained in the bore by the closure 190.

The shaker bar 122 is normally locked to the block as at 191. When the shaker bar is initially moved from the normal rest position, and the same is illustrated in Figs. 7 and 8, the tooth 186 which is seated in the notch 184 of the valve stem insures that the first initial movement of the shaker bar carries with it the stem extension 128 and the valve member 125a and the ash shield on the spray tube. This opens the valve for the discharge of the water from line 123—see Figs. 7 and 3—to the branches 123b. At the same time, member 128 through member 132 slides the inner ash shield or control tube 172 to expose the ports 177 in tube 171.

Continued movement of the shaker bar in the same direction causes pin 187 to engage the inclined face 202 of the recess 203 in member 204 secured to valve 125 at 205. This cam engagement withdraws dog 186 from the toothed notch 184 in stem 128. Thus, approximately 5/8" to 3/4" of initial shaker bar travel opens the valve and moves the inner ash shield to expose the spray ports. Approximately half that distance of additional travel automatically disconnects these parts from the shaker bar and permits shaker bar reciprocation of about 4" beyond the aforesaid initial travel without valve or shield movement.

Complete shaker bar return movement automatically reengages the stem 128 near the last 5/8" of travel thereby closing the valve and moving the inner ash shield into port shielding position.

While the invention has been illustrated and described in great detail in the foregoing specification, the same is to be considered as illustrative and not restrictive in character. The various modifications illustrated and/or described hereinbefore as well as others which will readily suggest themselves to persons skilled in this art, are all considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:—

1. In a furnace structure, having an ash pit, a grate thereabove and a grate shaking member, the combination of ash spraying means in said pit including a spray pipe with spray discharge ports therein directed diagonally toward the grate, said pipe being positioned beneath the grate, port guarding ash shield means, a water supply pipe to the spraying means, a valve in said supply line, and means operatively connecting the member valve and ash shield means for uncovering the ports and for spraying upon movement of the member.

2. A device as defined by claim 1 in which the ash spraying means is arranged along two opposite sides of the pit and directs the spray towards the center thereof, and including spray shield means centrally positioned in the pit.

3. A device as defined by claim 1 in which the ash spraying means is centrally arranged in the pit and directs the spray toward two opposite sides of the pit, and including spray shield means in the pit adjacent the opposite sides thereof for the purpose described.

4. In a furnace structure having an ash pit, a grate thereabove, and a grate shaking member, the combination of ash spraying means in said pit beneath the grate and having two substantially parallel portions, each having discharge ports directing spray diagonally toward the grate, an ash guard shield juxtaposed to each portion respectively and normally covering the adjacent ports and arranged when actuated to expose same, means connecting said shields for simultaneous operation, a water supply pipe to the spraying means, a valve controlling said supply pipe, and means operatively connecting the shaking member and the connecting means for exposing the several ports upon movement of the member.

5. A device as defined by claim 4, the connecting means including a pivoted bar connected to

the ash guard shields and which is operatively connected to the shaking member.

6. A device as defined by claim 4, each portion having ports discharging towards the other portion, and spray shield means in the pit and between said portions.

7. A device as defined by claim 4, the connecting means including a pivoted bar connected to the ash guard shields and which is operatively connected to the shaking member, each portion having ports discharging towards the other portion, ports and spray shield means in the pit and between said portions.

8. In combination, a spraying device, a control valve therefor, a grate shaking member, a movable ash guard shield for the ash spraying device controlled by the valve, a valve actuating member, a shield actuating member, and means operatively connecting the two last mentioned members to the shaking member for conjoint operation with movement of the grate shaking member.

9. In combination, an ash spraying device, a control valve therefor, a grate shaking member, a movable ash guard shield for the ash spraying device and controlled by the valve, a valve actuating member, a shield actuating member, and means operatively connecting the two last mentioned members to the shaking member for conjoint movement with the movement of the grate shaking member, said means maintaining such connection only during the initial portion of the grate shaking member movement for valve opening and ash shield movement and thereafter disconnecting same from the grate shaking member for further movement of the latter without continued movement of the ash shield and valve actuating members.

10. In combination, an ash spraying device, a control valve therefor, a grate shaking member, a movable ash guard shield for the ash spraying device and controlled by the valve, a valve actuating member, a shield actuating member, and means operatively connecting the two last mentioned members to the shaking member for conjoint movement with the movement of the grate shaking member, said means effecting such connection near the end of the movement of the grate shaking member to return the grate to normal position for movement of the actuating members to close the valve and move the ash shield into shielding position.

11. In combination, an ash spraying device, a control valve therefor, a grate shaking member, a movable ash guard shield for the ash spraying device and controlled by the valve, a valve actuating member, a shield actuating member, and means operatively connecting the two last mentioned members to the shaking member for conjoint movement with the movement of the grate shaking member, said means maintaining such connection only during the initial portion of the grate shaking member movement for valve opening and ash shield movement and thereafter disconnecting same from the grate shaking member for further movement of the latter without continued movement of the ash shield and valve actuating members, and said means effecting reconnection near the end of the movement of the grate shaking member to return the grate to normal position for movement of the actuating members to close the valve and move the ash shield into shielding position.

12. In a spraying device, the combination of an elongated spray tube having longitudinally aligned spaced spray ports therein, an elongated tubular member movable relative thereto and including elongated openings therethrough in similarly aligned and spaced relation for registration with said spray ports, and a stationary open tube shield thereon and rigid relative to the spray tube and including notches therein in similarly aligned and spaced relation and registering with the spray ports.

13. In a structure having an ash pit, a fuel supporting shakable grate therebeneath, and a grate shaking member, the combination of ash spraying means in said ash pit below the grate, a supply pipe, a valve in said supply pipe, means operatively connecting the member and valve for spraying when shaking, the ash spraying means being centrally arranged in the pit and directing the spray toward the two opposite sides of the pit, and spray shield means in the pit adjacent the opposite sides thereof for the purpose described.

14. In a furnace and like device, including a grate shaking member, an ash spraying device, and a supply pipe thereto, the combination of a valve in said device normally constrained toward cut-off or closed position and having an exposed operating portion, and means operable by the shaking member for opening and closing the valve, the ash spraying means having spraying ports, and ash guard shield means for covering the spraying ports and operable by the shaking member for exposing the spraying ports when the valve is opened and covering the spraying ports when the valve is closed.

EMIL WEBER.