

June 8, 1943.

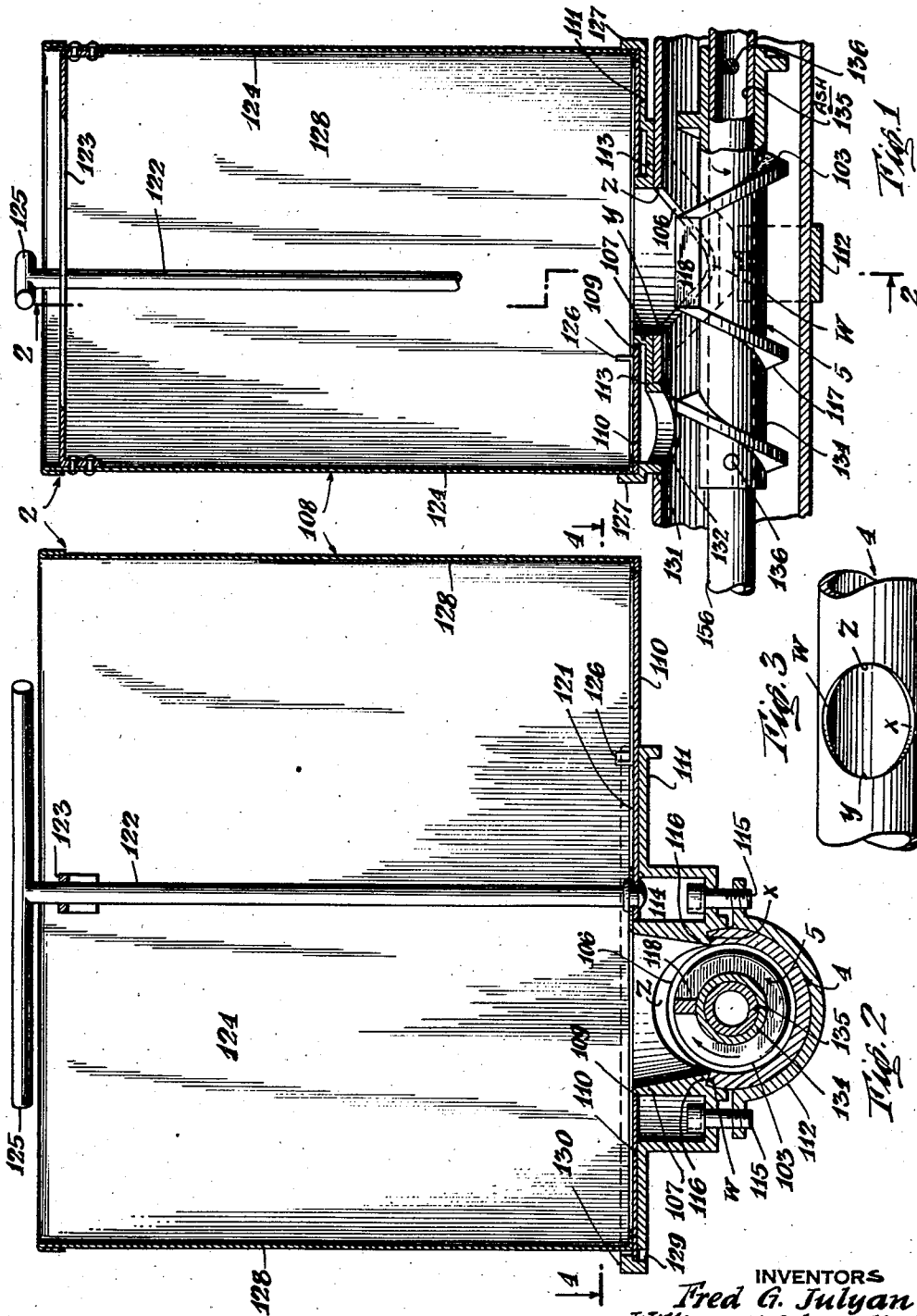
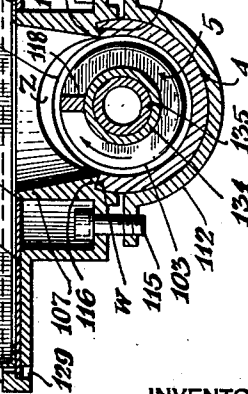
F. G. JULYAN ET AL

2,321,389

ASH DISPOSAL APPARATUS FOR STOKERS

Original Filed Aug. 3, 1940

3 Sheets-Sheet 1



INVENTORS
Fred G. Julian
William M. Schweickart
BY Edwards, Bruce & Pool
ATTORNEYS

June 8, 1943.

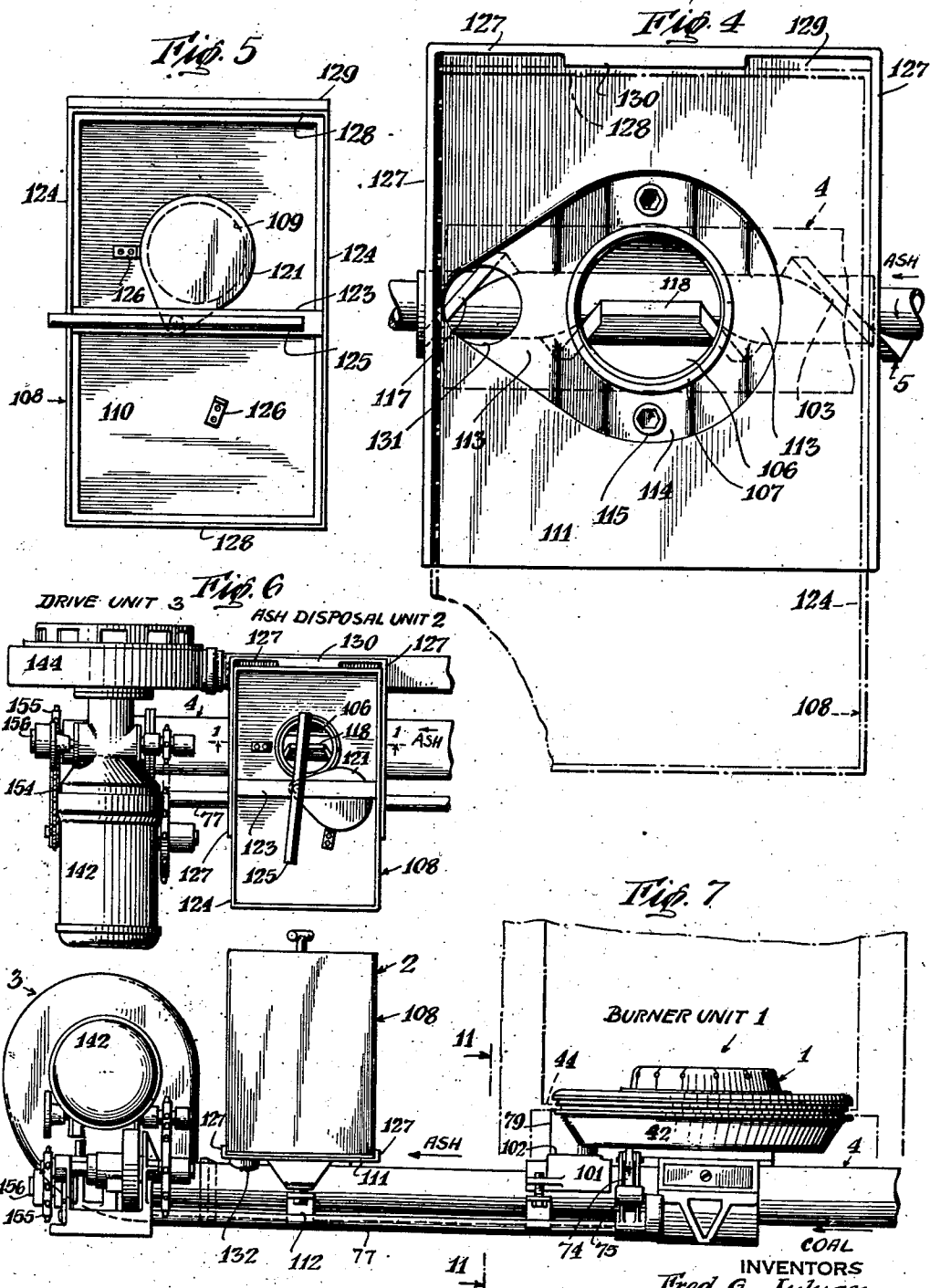
F. G. JULYAN ET AL

2,321,389

ASH DISPOSAL APPARATUS FOR STOKERS

Original Filed Aug. 3, 1940

3 Sheets-Sheet 2



INVENTORS
 Fred G. Julyan
 William M. Schweickart
 BY Edwards, Bruce & Paul
 ATTORNEYS

June 8, 1943.

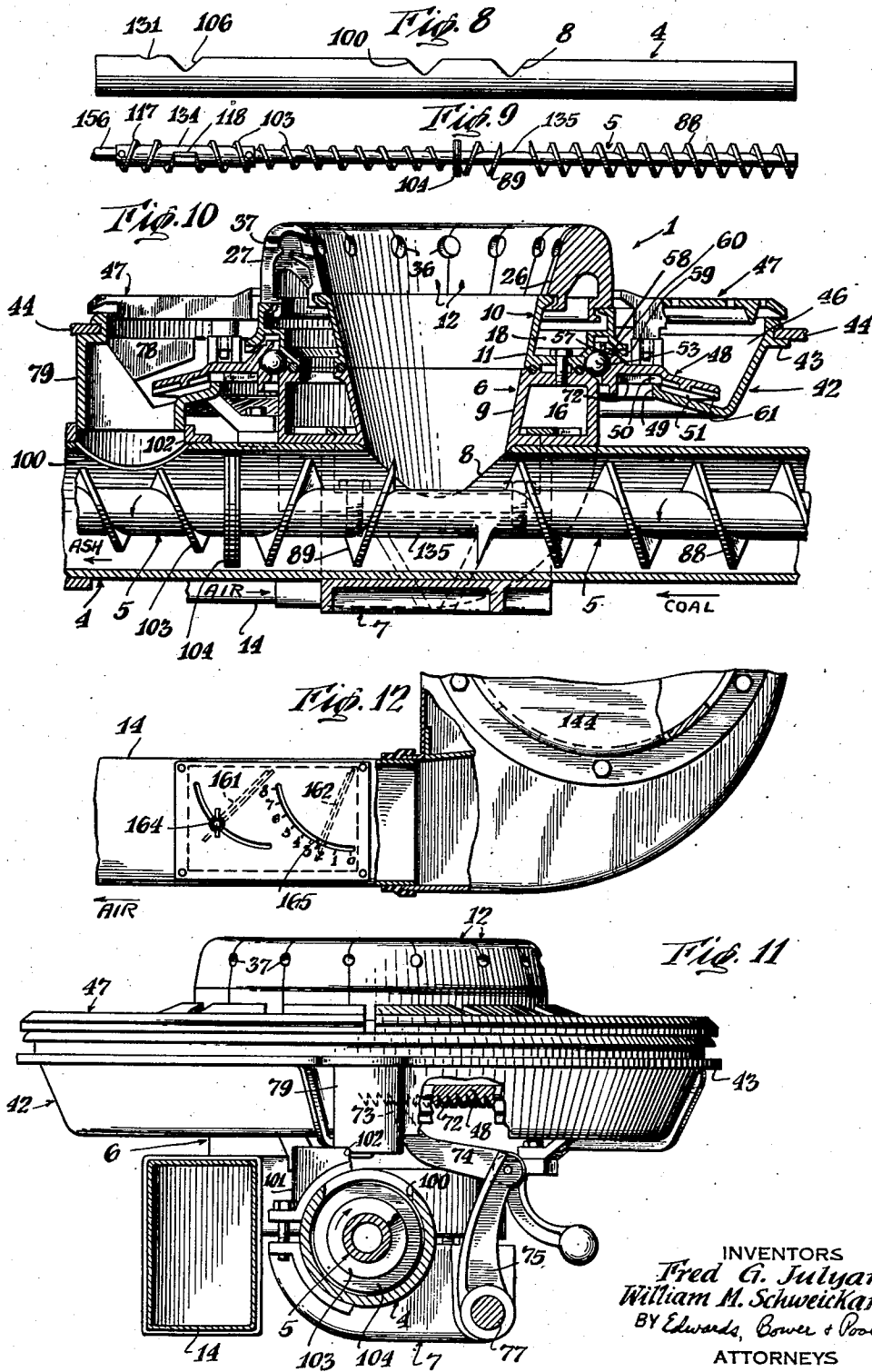
F. G. JULYAN ET AL

2,321,389

ASH DISPOSAL APPARATUS FOR STOKERS

Original Filed Aug. 3, 1940

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,321,389

ASH DISPOSAL APPARATUS FOR STOKERS

Fred G. Julyan and William M. Schweickart,
Euclid, Ohio, assignors to Pocahontas Fuel
Company Incorporated, New York, N. Y., a cor-
poration of Virginia

Original application August 3, 1940, Serial No.
350,500. Divided and this application March
21, 1941, Serial No. 384,468

12 Claims. (Cl. 110-165)

This invention relates to ash disposal means and particularly to ash disposal means for stokers made for domestic and analogous uses.

The object of the invention is to provide an ash disposal means for a domestic type of stoker which is simple, easy and inexpensive to make and install, which is rugged and durable, which is clean and efficient in operation and which requires a minimum of attention.

In the accompanying drawings,

Fig. 1 is a vertical, sectional view of the ash disposal unit of a stoker, taken along the axis of the screw conveyor conducting the ashes thereto, as indicated by the line 1-1 in Fig. 6;

Fig. 2 is a vertical sectional view of the ash disposal unit taken transverse to the conveyor as indicated by the line 2-2 in Fig. 1;

Fig. 3 is a plan view of the ash output opening in the conveyor pipe;

Fig. 4 is a plan view of the ash disposal unit taken as indicated by the line 4-4 in Fig. 2, with the ash can removed but its position indicated in broken outline;

Fig. 5 is a plan view of the ash can alone, on reduced scale, with its ash opening closed;

Fig. 6 is a plan view of the drive and ash disposal portions of a stoker embodying the invention;

Fig. 7 is a side elevation of a stoker shown in Fig. 6 including in addition a side elevation of a burner unit with which the ash disposal unit may be employed;

Fig. 8 is a side view of the conveyor pipe employed in the stoker shown in Fig. 7;

Fig. 9 is a side view of the conveyor screw employed in the stoker shown in Fig. 7;

Fig. 10 is a vertical sectional view of the burner unit of the stoker shown in Fig. 7, taken along the axis of the screw conveyor;

Fig. 11 is a front elevational view of the burner unit of the stoker shown in Fig. 7, taken transverse to the axis of the screw conveyor as indicated by the line 11-11 in Fig. 7; and

Fig. 12 is a side elevational view of the blower and air control mechanisms for the stoker shown in Fig. 7.

Referring to Figs. 1-6 inclusive, the ash to be disposed of is conveyed toward the ash disposal unit 2 by a conveyor screw 5 having an ash flight 103 operating within a conveyor tube or pipe 4 extending from beneath the burner or other source of ashes (not shown in these figures), to and under the ash disposal unit.

This ash disposal unit 2 includes a substantially circular ash output opening 106 positioned

at the top of the conveyor pipe 4, a substantially circular ash output tube 107 communicating with the ash output opening 106 and extending vertically above the same a short distance, and an ash can 108 having a substantially circular opening 109 in its bottom 110, the ash can being positioned with its bottom 110 adjacent the top of the ash output tube 107 with the ash can opening 109 communicating with the top of the ash output tube 107.

The ash can 108 rests upon a table-like support 111 which is secured to the conveyor pipe 4 by the clamp 112. The ash output tube 107 conveniently is an integral part of the ash can support 111, the two parts being joined by an annular portion 113 formed with two pockets 114 at opposite sides of the conveyor pipe 4 through the bottom of which extend the clamping bolts 115 engaging the clamping strap 112.

The ash output tube 107 is provided with two shoulders 116 at opposite sides of the conveyor pipe 4 which fit over the adjacent edge of the ash output opening 106. These shoulders insure the proper positioning of the tube 107 over the ash output opening 106. These shoulders taper in thickness, being a maximum thickness at the two lowermost portions *w* and *x* of the ash output opening 106 and tapering to extinction over the two uppermost portions *y* and *z* of the ash output opening 106 (see Figs. 1, 2 and 3, the latter being a plan view of the opening 106). It is to be noted that the edge of the ash output opening 106 is substantially radial at every point along its circumference, and that the dimension of the opening 106 transverse to the conveyor pipe 4 is nearly equal to the diameter of the pipe, with the result that the edge of the opening 106 at the lowermost portions *w* and *x* presents a substantial flange for engagement by shoulders 116 while at the uppermost portions *y*, *z* there is no flange for engagement by the shoulders 116.

The ash flight 103 on the conveyor screw 5 terminates short of the center of ash output opening 106 but within the nearest portion (2) of the edge thereof. The conveyor screw 5 also has a reverse ash flight 117 starting beyond the center of the ash output opening 106 but within the furthest portion (y) of the edge thereof. The adjacent ends of the ash flight 103 and reverse ash flight 117 are in axial alignment and are joined by a parallel bar 118 parallel to the axis of the conveyor screw 5, this bar 118 being secured to the ends of the adjacent flights and to the shaft portion of the conveyor screw. Par-

allel bar 118 is centered under the ash output opening 106 and extends across a substantial portion thereof.

In operation, the ash disposal unit 2 conveys the ash from under the burner unit to under the ash can 108 by means of the ash flight 103 on the conveyor screw 5. The ash is then forced upwardly through the ash output opening 106 and up through the bottom of the ash can 108 by the action of ash flight 106, reverse ash flight 117 and parallel bar 118 on conveyor screw 5, this upwardly forcing action at the same time desirably altering the physical characteristics of the ash so as to substantially reduce its bulk or, expressed in another fashion, to increase the specific gravity of the ash so that a given bulk weighs substantially more after having passed through the ash disposal unit than it otherwise would. This may be shown by comparing the weight of a given bulk of ash forced up into ash can 108 with the same bulk of ash which may be discharged through an opening in the bottom of the conveyor pipe 4 down into ash cans placed in a suitable recess below the floor level. The ash forced up into the ash can 108 as described weighs about 1.6 to 2 times (and under some circumstances up to nearly 3 times) as much as the same volume of ash discharged into the cans under the floor level.

It is observed, in looking down on top of the ash output opening 106 during operation of the stoker, that the ash wells up through the ash output opening 106 and the ash output tube 107 into the bottom of the ash can 108, and then the ash subsides, the welling up and subsiding occurring alternately and in synchronism with the rotation of the conveyor screw 5. In other words, a complete cycle of welling up and subsiding coincides with one revolution of the parallel ash bar 118 about the axis of conveyor screw 5. The subsidances are less than the welling up of the ash for there is an incremental building up of the ash in the can 108. This occurs until the ash can 108 is full.

It is also observed that the ash which is forced up into ash can 108 through its bottom is much finer than the ash which drops down into the top of the ash can, as described, some of the ash being so fine as to be powdery-like. Generally, the ash is composed of fine particles of free ash and very small particles of granular clinkers not in excess in size of a pea. There may also be a small amount of coke in particles not exceeding one-half inch in size.

Apparently the upward forcing of the ash into the ash can through its bottom is accompanied by a disintegration of the ash into finer particles and elimination of the air spaces in the ash itself; this disintegration apparently being due to the pressures to which the ash is subjected in the region of the ash output opening 106.

The ash can 108 is provided with a sliding gate 121 at its bottom for closing the ash can opening 109 to prevent the ash from leaking out of the can during and after its removal from the ash can support 111. This gate is secured to a vertical gate shaft 122, as by welding, and the lower end of shaft 122 is rotatably secured to the ash can bottom 110, as by passing through an opening therein and having a washer welded to the gate shaft below the can bottom. The gate shaft 122 extends up to the top of the can, where it passes through an opening in cross member 123 which is secured to the tops of the two long sides 124 of the can. Just above this cross mem-

ber 123 the gate shaft 122 is provided with a handle 125 transverse to the shaft 122. The bottom 110 of the can is provided with gate stops 126 for the open and closed portions of the gate and the front edge of the gate is preferably ground to a sharp edge to facilitate the closure of the gate when the can is full of ashes.

The ash can 108 is rectangular in plan view, with the cross member 123 and gate shaft 122 at the midpoint between the ends of the long sides 124. Cross member 123 thus serves as a handle for lifting the ash can, and gate operating handle 125 is aligned with this cross member 123 when the gate is closed so that the two handles are included within the grasp of the hand of the person lifting and removing the ash can, with the result that the ash can gate is not accidentally moved from closed position during removal of the can.

The ash can 108 is held in position on the ash can support 111 by the guide walls 127 thereon extending around the two long and one of the two short sides thereof. The bottom 108 of the ash can extends a short distance outwardly beyond the short side 128 of the can nearest the opening 109 therein, this extension forming a flange 129. A portion of the guide wall 127 engaged by this flange 129 is provided with a lip 130 extending over the top of the flange 129 so as to prevent tipping of the can. In this connection it is to be noted that the can extends over beyond the short side of the ash table support which does not have a guide wall 127.

In removing a full ash can 108 from its support 111 the gate operating handle 125 is first rotated so as to cause the gate 121 to close the ash can opening 109, then the can is raised slightly and pivoted about the lip 130 so as to raise the edge of the ash can opening 109 above the top of ash output tube 107, and then the can is moved transversely to the conveyor pipe 4 sufficiently to move the ash can flange 129 from under the lip 130. The ash can may now be removed and laid aside for emptying and an empty ash can put back in place of the full one.

One end of gate operating handle 125 preferably extends beyond one side 124 of the ash can when the handle is in gate-closed position (see Fig. 5). A cover (not shown) is provided which fits over the ash can when the latter is in place on the support 111. This projecting end of handle 125 prevents the replacement of this cover over the can when the ash can gate is in closed position. Thus, this serves to insure the opening of the ash can gate after an empty can is put in place.

The conveyor pipe 4 is provided with an ash return opening 131 at the top smaller than the ash output opening 106 and beyond the same so that the ash return opening 131 is above the reverse ash flight 117. A spout 132 formed on the ash can support 111 fits into the ash return opening 131, this spout communicating with the annular portion 113 of the ash can support 111. That part of this annular portion 113 which is not formed into pockets 114 is formed into a canal around the ash output tube 107 to collect any ash that may spill over the top of the tube 107, as when a can is removed while the stoker, and thus conveyor screw 5, is in operation. When the ash in this canal rises to the level of the ash can support 111, the ash in the canal may be pushed around to the spout 132 so that it drops down through the ash return opening 131 into the conveyor pipe 4. The reverse ash flight 117

then moves this ash over into the mass of ash under ash output opening 106, where it joins the ash being moved up into the ash can.

Preferably the parallel bar 118, the reverse ash flight 117 and a corresponding length of ash flight 103 are separable from the remainder of the conveyor screw 5 so as to form a removable ash tip portion for the conveyor screw. This is conveniently effected by mounting these parts on a sleeve 134 which fits over the tubular shaft portion 135 of conveyor screw 5 and is secured thereto by the bolts 136. This ash tip portion may then be readily specially treated to withstand the wear to which it is subjected and may also be replaced, if necessary, without replacing the entire conveyor screw 5.

As an example of an ash disposal unit embodying this invention the following details for unit 2 are shown and described are given:

13" high

15" long

9" wide

Ash can opening 109

32 $\frac{1}{2}$ " diameter

Ash output tube 107

3 $\frac{1}{8}$ " inside diameter at top

2 $\frac{1}{8}$ " distance from axis of conveyor pipe 4 to top of tube

Conveyor pipe 4

3" inside diameter

$\frac{1}{4}$ " thick

Ash output opening 106

Lowermost portions *w* and *x* are on radii to axis of conveyor pipe 4 which are at angles of 16° with a horizontal plane through the conveyor pipe axis

Removable ash tip for conveyor screw 5 (sleeve 134 and attached parts)

1 $\frac{3}{8}$ " inside diameter of sleeve 134

1 $\frac{1}{8}$ " outside diameter of sleeve 134

2 $\frac{3}{8}$ " outside diameter of ash flight 103 (removable tip portion) and of reverse ash flight 117

2 $\frac{1}{4}$ " pitch of ash flight 103 (all, including removable tip portion) and of reverse ash flight 117

$\frac{1}{4}$ " thickness of ash flight 103 (all, including removable tip portion) and of reverse ash flight 117

4 $\frac{1}{2}$ " axial length of removable tip portion of ash flight 103 and of reverse ash flight 117

2" axial length of parallel bar 118

$\frac{1}{4}$ " thickness of parallel bar 118

$\frac{1}{2}$ " height of parallel bar 118

Material—S. A. E 1040, carbonized and hardened, for parallel bar 118, and, if desired, the same for the removable tip portion of ash flight 103 and for the reverse flight 117.

The foregoing ash disposal unit has been especially effective in handling, without excessively loading the stoker motor used, the ash from Pocahontas bituminous coal varying from yard degradation to regular, mine-prepared stoker coal, the ash content of this coal varying from 2% in the former to 5% in the latter. A can 108 filled with the ashes from such coal will weigh around 60 to 70 pounds.

The size of ash can 108 may be increased in length and width, if desired, without impairing the operation of the ash disposal unit. The height of ash can 108 is preferably not materially increased from the height stated when the ash

disposal unit is constructed as shown, for as the ash can height is increased there develops a tendency for the can to be pushed upwardly after the ash has reached a certain height.

The ash disposal unit 2 is simple, easy and inexpensive to make and install and provides a means of disposing of the ashes which is clean, rugged and requires attention very infrequently. Materially contributing to the infrequent attention is the fact that the ashes are substantially reduced in bulk by the ash disposal unit, so that it requires a relatively long time to fill the ash can.

Conveyor screw 5 is conveniently driven from its ash discharge end (as shown in Figs. 6 and 7). An extension 156 of the tubular shaft portion 135 of conveyor screw 5 (Figs. 1 and 9) has a sprocket 155 (Figs. 6 and 7) mounted thereon and driven by a chain 154, which in turn is driven by the stoker motor 142 of the drive unit 3 through suitable speed reducing mechanisms not necessary to describe here, but described in detail in the original application, Serial No. 350,500, filed August 3, 1940, of which this application is a division.

When the conveyor screw 5 is driven in this manner, this screw 5, and its surrounding conveyor pipe 4, may extend beyond the ash input opening 100 in the conveyor pipe (Figs. 8 and 10) and so serve, by means of the coal flight 88, to convey coal from the coal bin or other coal container up to the burner unit 1, and then, by means of the coal flight 88 and reverse coal flight 89, to push the coal up through the coal output opening 8 into the burner unit 1 (Figs. 9 and 10). Dam 104 on the screw separates the coal and ash portions of the conveyor pipe 4.

Ash disposal unit 2 not only disposes of the ashes, as described, but also, when used with burner units of certain types, cooperates therewith in controlling the combustion of the coal by preventing the leakage of air from the ash can to the fuel above the grate of the burner unit.

Illustrative of such a burner unit is the burner unit 1 shown generally in Fig. 7 and shown in more detail in Figs. 10 and 11. Briefly, it comprises an ash chamber 46 beneath grates 47 surrounding a retort having tuyère openings 36, 37 through which pass the air for burning the fuel, together with ash mechanisms for conveying and discharging into the conveyor pipe 4 the ash which drops down into the ash chamber 46, these mechanisms providing normal air communication between the ash chamber 46 and the top of the conveyor pipe 4.

It is to be noted that this upward forcing of the ash into the ash can through its bottom automatically provides a seal of ash preventing the leakage of air from the furnace room and the top of the ash can 108 into ash chamber 46 of the burner unit. Thus, although the ash in the conveyor pipe 4 in the region of the burner unit 1 does not fill the pipe, and although the ash can 108 may be empty or nearly so, the conveyor pipe 4 in the region of the ash output opening 106 is completely filled with ash, with much of this ash closely compacted. As a result air cannot pass from the ash can 108 down through the opening 106 into the top portion of conveyor pipe 4 and thence up into the ash chamber 46. As any air which leaks into ash chamber 46 affects the combustion of the fuel above grates 47 and counteracts the control over this combustion afforded by the air passing from the air tube 14 through the tuyère openings 37, this air seal action of the ash disposal unit 2 is particularly desirable.

That the foregoing cooperation of the ash disposal unit 2 and of the burner unit 1 in controlling the combustion may be more readily understood, the burner unit 1 and its associated parts are described in more detail.

The burner unit 1 consists of a burner body 6 fitting over the conveyor pipe 4 and clamped in position by the burner body yoke 7 so that the inner annular retort surface 9 in the body 6 communicates with the coal output opening 8 in the conveyor pipe 4. Secured to the top of the burner body 6 is the retort base 10 the interior annular surface 11 thereof forming an upward continuation of the retort surface 9. Positioned above and secured to retort base 10 are the tuyère segments 12 which, when assembled side by side as shown in Figs. 10 and 11, form a tuyère ring with the inner surfaces 26 of the tuyère segments forming a surface which is substantially an upward extension of retort surfaces 9 and 11. Also when assembled, the tuyère ring has a plurality of inner tuyère openings 36 in the inner tuyère surface 26 and a plurality of outer tuyère openings 37 in the outer tuyère surface 27, each communicating with the interior of the assembled retort ring, these tuyère openings passing air for combustion to the burning coal within the upper region of the retort and around the outside of the retort.

This air for combustion passes through fan 144, into the air tube 14, past the two dampers 162, 161 (Fig. 12) within the air tube 14, and in the order stated, then up into and around burner air chamber 16 in burner body 6, up through air passageway 18 in retort base 10 and under the ring of tuyère segments 12, and thence through the inner and outer tuyère openings 36, 37 to the fire. Damper 161 is arranged to be clamped in any desired position by the clamping nut 164 so as to regulate the amount of air delivered by the fan to the burner unit. Damper 162 floats on the current of air so that the position of its pointer 165 is a relative indication of the amount of air being delivered by the fan to the burner unit. This indicating damper 162 is of insufficient length to block off the flow of air in the air tube when the stoker, and thus the fan, is not in operation. Thus, under these conditions the natural draft of the furnace draws air through the fan, under the indicating damper 162, along pipe 14 and through the tuyère openings 36, 37 into the fire.

Surrounding the retort and below the crest of the tuyère segments 12 are the grates 47 which are supported for rotation about the retort. This is conveniently accomplished by supporting the grates upon an annular ash table 48 which is rotatably supported upon the exterior of the retort by a ball bearing construction including the balls 53. The ash table serves to carry the ash which passes through the grates 47 around to the ash discharge conduit 79, where the stationary blade 78 scrapes the ash off the ash table 48 into the ash conduit 79, the ash then passing down this conduit and down through ash input opening 100 into the ash portion of conveyor pipe 4. Preferably the opening 100 is provided with an ash receiving member 101 clamped to the conveyor pipe 4 and having a flange 102 fitting around the sides of the ash discharge conduit 79 so as to prevent ash leakage at this point.

The ash table 48, and thus the grates 47, are rotated in intermittent steps, while the stoker motor is in operation, by means of the grate

pawl 74 (Fig. 11), the tip 73 of which engages the teeth 72 on the underside of the ash table. The grate pawl 74 is pivotally mounted upon the pawl yoke 75 which is secured to shaker shaft 77, this shaker shaft extending over to the drive unit 3 where it is caused to oscillate by suitable mechanisms driven by the stoker motor 142.

The area beneath the grates 47 is enclosed to form the ash chamber 46 (Fig. 10), this being accomplished by a stationary dead ring 42 which extends from just under the outer radius of the grates, inwardly and downwardly to beneath the outer edge of rotating ash table 48, and then inclines inwardly and upwardly substantially parallel to the outer portion of the ash table 48, with the inner edge 49 of the dead ring extending vertically into a groove 50 in the ash table. There is thus formed an annular pocket 51 which maintains a seal of ashes between the rotating ash table 48 and the stationary dead ring 42. The underside of the portion of the ash table 48 lying above the ash pocket 51 is formed with ribs 61 substantially tangent to the inner edge 49 of the dead ring and so directed that the ribs 61 tend to move the ashes outwardly from the pocket 51 and thus tend to prevent the leakage of ash past this seal.

The outer annular wall of the retort base 10 has a downwardly and outwardly extending projection 58 generally lying above the upper fork 57 of ash table 48. These surfaces thus cooperate to form an annular space 60 which maintains a seal of ashes between the stationary retort base 10 and the rotating ash table 48, and also to prevent the ash from leaking into the ball bearing support for the ash table. The bottom outer portion of projection 58 is formed with a plurality of ribs 59 inclined about 60° from the radius, so as to tend to feed the ash outwardly and thus further tend to prevent the leakage of ash past this seal.

The outer edge of dead ring 42 has a shoulder 43 on which rests the dead plate 44 of the furnace in which the burner unit is positioned (Figs. 7 and 10). The furnace dead plate 44 seals the furnace between the burner unit 1 and the interior walls of the furnace.

For further details of the burner unit 1 and its associated parts, as well as of the shaker shaft driving mechanism, reference is made to the original application, Serial No. 350,500 filed August 3, 1940.

In operation, the coal is thus drawn to the burner unit 1 by the coal flight 88 and then pushed up into the enclosed portion or retort 9, 11, 26 of the burner unit by the coal and reverse coal flights 88, 89. Some of the coal is burned within the retort, while the rest of it is burned above and outside of the retort. When the coal is a coking coal, much of the coking occurs within the retort, the coke then burning above and outside of the retort. The ash resulting from the combustion sifts or is shaken through the grates 47 into the ash pocket 46, is carried by the ash table 48 around to the ash discharge conduit 79 and is there removed from the table by the scraper or blade 78, and dropped into the ash portion of conveyor pipe 4. The ash is then conveyed away from the burner unit to the ash disposal unit 2, where the ash is compacted and forced up into the ash can 108, and where the ash at the same time forms the ash seal which prevents leakage of air from the

furnace room to the combustion zone over a path through the ash disposal unit.

The ash seals at the annular spaces 51 and 60 preventing leakage of air from the furnace room and the furnace ash pit to the combustion zone over a path around the edges of the rotating ash table 48, the ash seal at the base of ash removal unit 2 thus cooperates with these other two ash seals so that together they prevent leakage of air from the furnace room to the combustion zone through any part of the ash disposing system, and thereby cooperate to aid the control of the air to the combustion zone afforded by the dampers 161, 162 in the air tube 14. This control is fairly complete as dead plate 44 prevents leakage of air from the furnace room and the furnace ash pit to the combustion zone over a path between the burner unit and the furnace walls, so that substantially no air reaches the combustion zone except through the air tube 14, past the dampers 161, 162 and through the tuyère openings 36, 37.

This is a division of application Serial No. 350,500, filed August 3, 1940.

We claim:

1. In a stoker an ash disposal system comprising a substantially horizontal ash duct receiving ashes at one end and discharging them at the other end through a discharge outlet in the top of the duct, a support for an ash can adjacent said discharge outlet, an ash can removably and replaceably mounted on said support and having a lower end with an opening therethrough, a passageway leading upward from said ash duct discharge outlet and discharging upward into said opening of said ash can, and a conveyor moving within the ash duct and forcing the ashes upward through said outlet passageway and opening and into the ash can to fill the latter by the introduction of ashes from below the top level of the ashes already therein.

2. The ash disposal system as set forth in claim 1 in which the ash conveyor includes a cyclically operating mechanism for intermittently forcing the ashes up through the passageway into the ash can.

3. The ash disposal system as set forth in claim 1 in which the passageway increases in cross sectional area from a minimum area at the ash duct and in which the ash conveyor includes a cyclically operating mechanism for intermittently forcing the ashes up through the passageway into the ash can.

4. The ash disposal system as set forth in claim 1 in which the ash conveyor includes an ash removing screw positioned in the ash duct and a member actuated by the screw for intermittently forcing the ashes up through the passageway into the ash can during continuous operation of the screw.

5. The ash disposal system as set forth in claim 1 in which the ash conveyor includes an ash removing screw positioned in the ash duct and having a bar mounted on the screw shaft parallel to the axis thereof and axially positioned thereon so as to be substantially within a prolongation of the passageway toward the screw shaft.

6. The ash disposal system as set forth in claim 1 in which the ash duct is completely enclosed between the ash entrance end thereof and the discharge outlet opening therein and in conjunction with a stoker burner unit having an ash chamber which is beneath a grate structure and

which is in communication with the upper portion of the ash duct at the entrance end thereof for the unobstructed passage of ashes from, and air to, the ash chamber, whereby the ash disposal system, in handling the ash and forcing it up into the ash can, also forms an ash air seal preventing leakage of air from the ash can through the ash disposal system to the fuel above the grate structure of the burner unit.

7. Ash handling apparatus comprising a substantially horizontal enclosed ash duct having a discharge outlet through the top of the duct, means including a conveyor within the ash duct for conveying the ashes along the duct and forcing them upwardly through the discharge outlet, and an ash container removably mounted over the ash duct at said discharge outlet and having a filling opening in its bottom, said container when in position over the ash duct having its bottom in close proximity to the top of the ash duct and having said filling opening above and communicating with the ash duct discharge outlet, the bottom of the ash container having an area substantially greater than the area of said filling opening therein.

8. The apparatus set forth in claim 7 in which the communication between the ash duct discharge outlet and the ash container filling opening comprises a short substantially vertical tube the exterior of which fits within the ash container filling opening.

9. The apparatus set forth in claim 7 in which the communication between the ash duct discharge opening and the ash container filling outlet comprises a short substantially vertical tube the exterior of which fits within the ash container filling opening and which terminates substantially flush with the inside surface of the ash container bottom.

10. In a stoker unit having an underfeed burner unit, a conveyor pipe and a conveyor screw therein with an ash flight for withdrawing ashes from under the burner unit, an above-floor ash disposal system including a part formed with an outlet at the top of the pipe, a removable and replaceable ash can positioned above said pipe outlet with the ash can bottom positioned substantially down upon the pipe, said ash can having an opening in its bottom directly communicating with said pipe outlet, a reverse ash flight on said screw beyond said opening, and a bar on said screw parallel to the axis of the screw and connecting the adjacent ends of the ash and reverse ash flights and positioned beneath said pipe outlet whereby the conveyor screw forces the ash up through the pipe outlet and into the ash can through the ash can bottom.

11. The apparatus of claim 10 in which the conveyor screw has a removable ash tip formed of a sleeve which fits over the shaft portion of the screw, said sleeve having affixed thereto the reverse ash flight, a section of the ash flight, and the bar parallel to the axis of the screw and connecting the adjacent ends of the two flights on the sleeve, said sleeve being positioned so that the parallel bar is positioned beneath said pipe outlet.

12. In an above-floor ash disposal system, a substantially horizontal ash duct for the passage of ashes to a discharge point, said duct having two openings through its top at the discharge point spaced apart along the line of passage of the ash in the duct, the opening which is first in the line of passage of the ash in the duct being an ash discharge opening and the other

opening being an ash return opening, an ash can table secured to the ash duct so that the table is directly over the ash duct at the discharge point, said table having two openings therein each communicating with the corresponding ash duct opening directly beneath the same and said ash can table being adapted to removably support an ash can so that an opening in the ash can bottom is directly over the ash discharge opening in the ash duct and the corresponding 10

opening in the ash can table, and a screw conveyor positioned within the ash duct for conveying the ashes along the duct to the discharge point and forcing them up through the ash discharge opening and through the corresponding opening in the ash can table into the bottom of the ash can, said conveyor including a reverse flight positioned beneath the ash return opening.

FRED G. JULYAN.

WILLIAM M. SCHWEICKART.

CERTIFICATE OF CORRECTION.

Patent No. 2,321,389.

June 8, 1943.

FRED G. JULYAN, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 21, 22 and 23, for

" 13" high		-- Ash can 108
15" long	read	13" high
9" wide "		15" long
		9" wide --;

page 5, second column, line 34, claim 9, for "opening" read --outlet--; line 34-35, for "outlet" read --opening--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of August, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.