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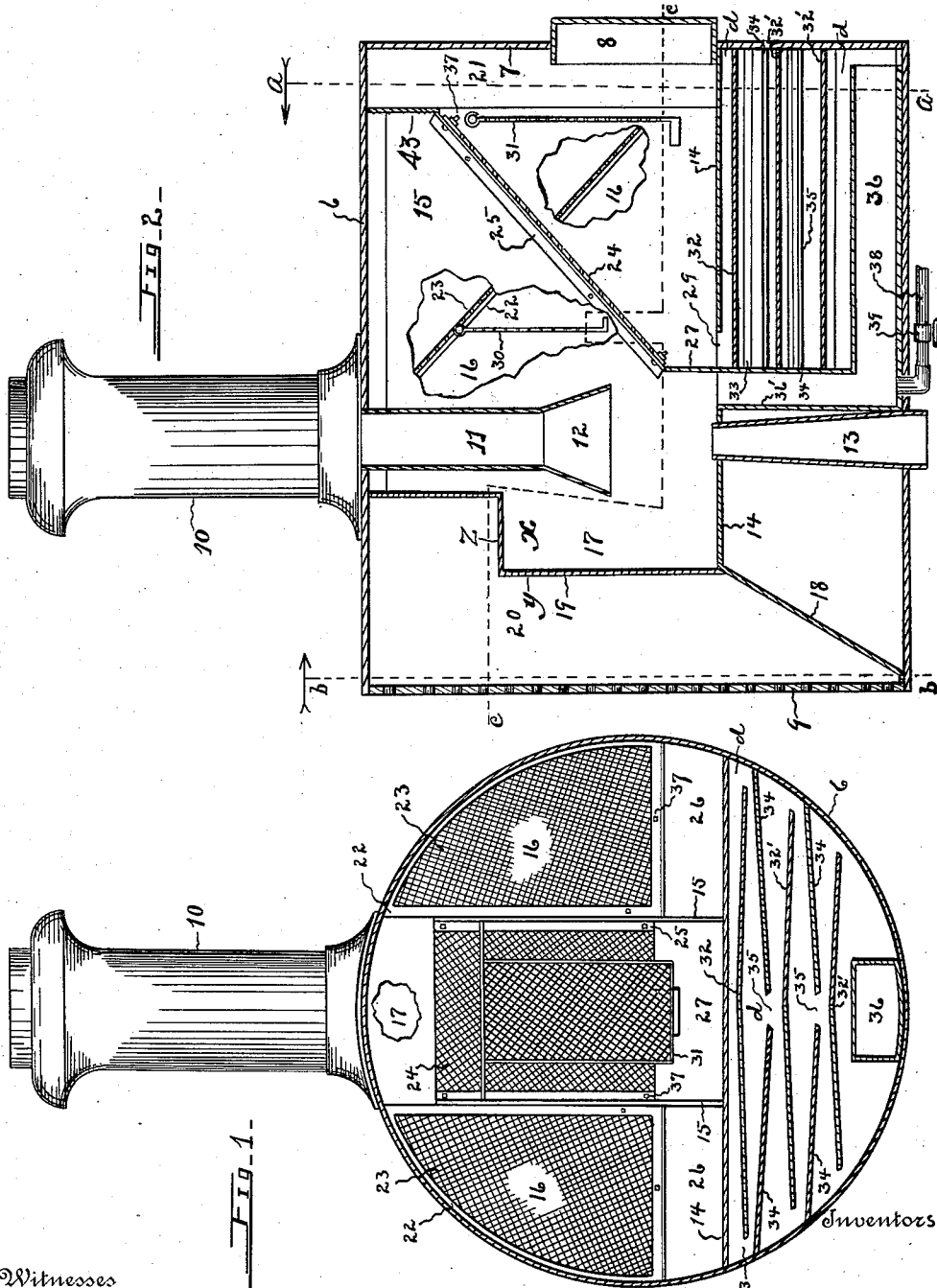
LOCOMOTIVE SMOKE BOX.

APPLICATION FILED SEPT. 12, 1910.

Patented Apr. 23, 1912.

2 SHEETS-SHEET 1.

1,023,970.



Witnesses

A. Marschner

W. S. Gibbs.

By

Benjamin F. Stannard and
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1,023,970.

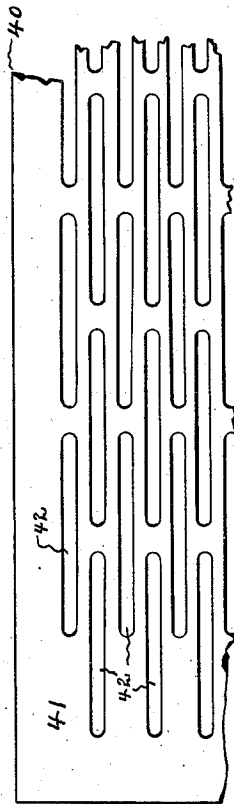


Fig. 3-

Witnesses

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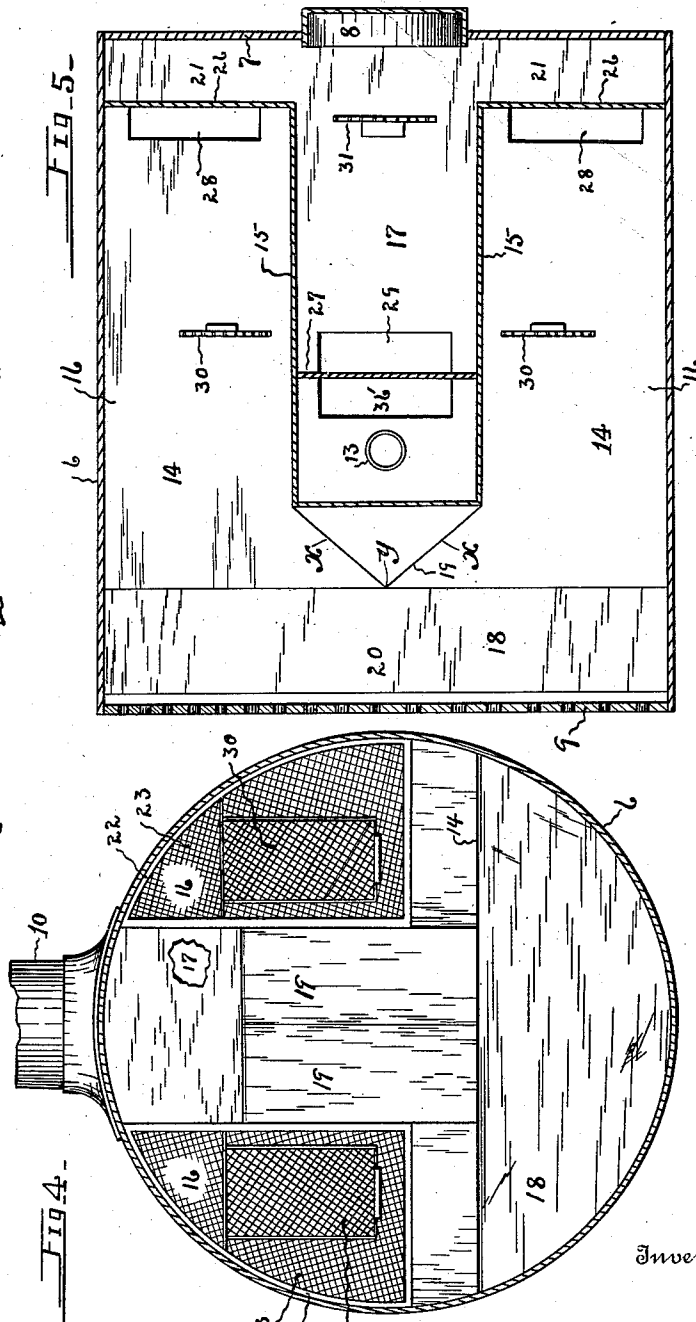


Fig. 4-

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LOCOMOTIVE SMOKE-BOX.

1,023,970.

Specification of Letters Patent.

Patented Apr. 23, 1912.

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To all whom it may concern:

Be it known that we, BENJAMIN F. STANNARD and ABRAHAM AGINSKEE, citizens of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Locomotive Smoke-Boxes, of which the following is a specification.

This invention relates to improvements in locomotive smoke boxes, and has for its object to provide means for cooling the cinders during their passage from the flues of the boiler to the smoke stack.

As is generally well known, in order that the required force of steam may be generated for drawing a train, where coal is employed as a fuel, an adequate draft must be created to force the smoke through the smoke stack from the flues of the boiler so that the fuel will be more freely consumed, the draft passing through the smoke box by intermittent discharges of steam delivered through the nozzle of the smoke box, said nozzle being in communication with the cylinders of the engine. The force of the intermittent discharges of steam is so great, however, that burning cinders are thrown out of the smoke stack to a considerable distance from the locomotive, often igniting and destroying valuable property along the line of the railway.

The invention includes the employment of devices and the formation of passageways within the smoke box, so arranged and operating, that while the movement of the smoke will not be impeded and the draft will not be reduced, the burning cinders will be extinguished before passing out of the smoke stack, the cinders and other burning particles, by reason of the construction of parts and devices employed, being separated and retained within the smoke box until they have been sufficiently cooled, and will not communicate fire.

With these objects in view the invention presents a novel construction, combination and arrangement of parts as described herein and claimed, and as illustrated in the drawing, it being understood that changes in form, size, proportion and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

In the accompanying drawing, Figure 1 is a transverse, sectional view of the smoke box, on line *a a* of Fig. 2. Fig. 2 is a view

in longitudinal section of the smoke box, one of the walls of the separating chamber being partly broken away. Fig. 3 is a detail showing a preferred kind of grating which may be employed for the stationary and swinging screens or grates. Fig. 4 is a transverse, sectional view of the smoke box, on line *b b* of Fig. 2; and Fig. 5 is a plan view of parts, being a section on the irregular line *c c* of Fig. 2.

Before describing in detail the novel features and operation of our locomotive smoke box, the principal parts commonly employed in the construction of these boxes will be pointed out.

Numerals 6 indicates the ordinary, cylindrical casing or wall of a locomotive smoke box, the front end and removable door thereof being shown, respectively, at 7 and 8. The rear end of the smoke box is provided with a flue sheet 9, the apertures thereof corresponding to the flues of the boiler of the locomotive (not shown). At 10, mounted upon the cylindrical casing 6, is indicated the discharge exit-way or smoke stack, the upright draft-flue 11 of the smoke stack extending within the smoke box and having a petticoat or expanded lower terminal 12. And mounted in the lower part of the smoke box is the steam intake or upright, elongated nozzle 13, the same being disposed in alinement with flue 11, below the expanded terminal 12 of said flue.

The parts thus described are old and well known. The boiler and cylinder and their connections are not shown in the drawing, as the invention relates wholly to an improvement in smoke boxes. It will be understood, however, that steam is discharged from nozzle 13 intermittently within the smoke box by operation of the engine and its cylinders, these discharges of steam being for the purpose of forcing the smoke through stack 10, the smoke entering the smoke box by passing the numerous apertures of flue-sheet 9.

In order that the burning particles of coal which enter the smoke box may be cooled before being expelled from the smoke stack, we provide a horizontal floor or partition 14 extending longitudinally of the cylindrical casing 6, thereby forming a lower compartment or cooling chamber *d*, the space above partition 14 being divided by the adjacent, longitudinal, vertically disposed partitions 15 to provide the two side

compartments or flue-chambers 16 segmental in cross-section, and forming the central compartment or separating-chamber 17. Horizontal partition 14 is provided at its rear end with a deflecting-plate or inclined portion 18, the same extending downwardly and rearwardly toward flue-sheet 9 to its junction with the lower part of casing 6. The rear end 19 of compartment 17 is convergent in form. This compartment is best shown in Figs. 2 and 5; the vertical side walls x of said compartment extend rearwardly to form the apex y , the horizontal partition z forming the top of said compartment. At 20 is indicated a receiving chamber, and in operation, smoke and burning particles of coal are drawn within the smoke box through the apertures of the flue sheet, first entering chamber 20. The inclination of the rear part of partition 14, or portion 18 thereof, facilitates the movement of the smoke which enters the smoke box through the apertures in the lower part of the flue-sheet; and the convergent portion 19 of compartment 17 tends to divide the smoke or draft, substantially one-half thereof passing within each of flue-chambers 16. Vertical walls 15 extend from horizontal partition 14 to the upper part of casing 6, and they extend forwardly near to the front end 7 of the smoke box as far as passageways 21. These passageways occupy almost the entire front end of the smoke box above horizontal partition 14, as indicated in Fig. 2. While passageways 21 are formed to occupy the space between the front end 7 of the smoke box and the upright barrier plates 26, as shown in Fig. 5, they have a height equal to the vertical walls 15; and their intakes are segmental in form, as clearly shown in Fig. 1, being the space or area between walls 15, the upper ends of barrier plates 26 and the cylindrical wall of the smoke box. Inclined angle irons 22 with screens or grates 23, segmental in form, mounted thereon are provided for each passageway 16, the inclination thereof, within these passageways, being forwardly and downwardly thereof, and it will be understood that smoke and a part of the cinders will pass grates or screens 23 and will enter passageways 21 from side passageways 16.

It has been stated that passageways 21 occupy almost the entire front end of the smoke box above horizontal partition 14. By referring to Fig. 5 it will be seen that compartment 17 opens upon this space, and therefore said compartment is in communication with passageways 21; and by reason of recesses or passageways 21, compartment 17 is in communication with side passageways 16, since the upright barrier plates 26, as clearly shown in Fig. 1, have a limited height and do not prevent this communication. Compartment 17 is provided with a

screen or grate 24, the same being mounted upon angle irons 25, these parts extending rearwardly and inclined downwardly toward the rear of said compartment.

Barrier plates or partitions 26 above referred to are best shown in Fig. 1. (In Fig. 5 they are shown in section.) They are substantially alike in form. They are disposed transversely of the smoke box upon horizontal partition 14, adjacent to the front end 7 of said box. They have a length substantially equal to the width of side passageways 16, and extend upward from partition 14 to form a connection with the lower end of grates or screens 23, as clearly shown in Fig. 1.

An upright partition or barrier plate 27 is provided for compartment 17. It has a length equal to the width of said compartment and has a height sufficient to form a connection with the lower end of grate or screen 24.

A transverse upright partition 43 (Fig. 2) connects the front end of grate 24 with the upper part of casing 6, and as shown in Fig. 5 an exit-way 28 is provided for each of side chambers 16, and an exit-way 29 is provided for the central chamber 17, these ways being apertures formed in horizontal partition 14, and in operation, smoke will readily pass through grates 23 and 24 from chamber 20, the force of steam which passes inwardly of nozzle 13 causing it to pass through stack 10; and cinders or particles of coal which are too large to pass through these grates or either of them will pass through exit-ways 28 and 29, their movements being aided by the upright barrier-plates or partitions 26 and 27. The openings formed in grates 23 are larger than those formed in grate 24, and, in operation, the larger particles will be detained by grates 23. The particles of coal and cinders move with great force against the screens or grates, and in practice become caught or wedged within the interstices thereof, and in order that they may become dislodged, the screens are disposed inclinedly and the swinging grates, indicated at 30, are provided. Swinging grates 30 are pivotally mounted upon the upper parts of angle-irons 22 and are disposed dependably below the upper ends of grates 23, and, preferably, they are weighted at their lower ends. The stop-and-start movements of the locomotive and vibrations incident thereto will cause occasional strokes to be delivered by these swinging members upon the lower sides of grates 23, with the result that particles of coal or cinders may be dislodged from said grates, by the contact or concussion of these parts. A similar weighted swinging-grate 31 is pivotally mounted at its upper end between walls 15 of compartment 17, below inclined grate 24, and the

smaller cinders or coal dust which may have passed through grates 23 and which may accumulate upon grate 24 may, by concussion, be dislodged therefrom, when this weighted grate swings and strikes said stationary screen or grate.

It will be seen that, while the smoke may readily pass through grates 23 and 24, and by suction will pass within flue 11, and will move out of the smoke stack, particles of coal or burning cinders will be detained. They will pass downwardly through apertures 28 and 29 into the cooling-chamber *d*. Chamber *d* is provided with a plurality of baffle plates, best shown in Fig. 1. While they are disposed substantially horizontally, transversely of the smoke box, it will be seen that they are somewhat inclined. They are arranged in pairs, the upper pair 32 and each alternate, lower pair 32' being joined at their inner edges and inclined downwardly and outwardly and extending opposite to each other near to the side walls of casing 6 to provide passageways 33, the pairs of baffle plates 34 which are located between the baffle plates mentioned, having their outer ends mounted upon casing 6 and inclined inwardly, each providing a longitudinal passageway 35 between their inner terminals. In operation, a limited amount of time is required for the cinders to pass from one baffle plate to another. They become cooled during their movements, and are finally discharged through the smoke stack by passing through flue pipe 36, located at the bottom of chamber *d*.

It will be seen that the herein described smoke box provides means for the separation of the cinders from the smoke, the cinders before being discharged from the smoke stack being moved upon horizontal partition 14 and passed downward through openings 28 and 29 thereof, and after being moved transversely of the smoke box upon inclined plates 32, 32' and 34, enter chamber 17 rearwardly of screen 24 by passing through the upright portion 36' of pipe 36. They are elevated from pipe 36 by suction, caused by the discharges of steam through nozzle 13, and in practice this force prevents accumulation of cinders within chamber *d*. While the strokes of the swinging grates or frame members 30 and 31 upon the lower sides of the respective inclined grates 23 and 24 cause dislodgment of cinders which may be wedged therein, it is necessary to clean the screens occasionally and to remove the coal dust which may adhere thereto, access to the smoke box being through door 8, and it will be seen that, since the screens or grates are mounted upon angle irons 22 and 25, by use of screw-bolts 37, the grates may be conveniently removed whenever required.

At 38, disposed below the lower part of

casing 6, is indicated an air-pipe, having a valve 39; and air from an exterior source may pass through said pipe, within the rear end of pipe 36, at the junction of said pipe and its upright portion 36'. When valve 39 is opened, air will be drawn within the smoke box with considerable force to move the cinders from chamber *d*.

At 40 (Fig. 3) is indicated a grate or screen which could be employed to advantage in the construction of members 23, 24, 30 and 31. It consists of a metallic sheet 41, having numerous apertures 42 formed therein.

It may be briefly stated that smoke which passes through the perforations of flue sheet 9 will enter receiving chamber 20; it will then pass forwardly of the smoke box through the two side passageways 16, and will enter passageways 21 by passing through screens 23. From passageways 21 the smoke will move rearwardly within compartment 17, through screen 24, and will enter draft flue 11, and from thence will pass out of the smoke stack.

Having fully described the several parts and their uses, a further explanation relating to operation is not necessary.

What we claim and desire to secure by Letters Patent is,—

1. In combination with a horizontally disposed, cylindrical receptacle having a terminal flue-sheet providing a smoke-intake, a steam intake pipe and a discharge passageway; a horizontal partition in the receptacle to provide a lower compartment; adjacent, upright partitions disposed above and connecting the horizontal partition and the wall of the cylindrical receptacle and forming longitudinal side chambers opening upon the smoke intake with exit ports communicating with the lower compartment, and forming a separating chamber between the side chambers, said separating chamber communicating with the side chambers, the steam intake and the discharge passageway, and having an exit port and an intake port communicating with said lower compartment; and a screen mounted within the separating chamber and each side chamber, the arrangement being that the exit port of each side chamber is disposed between the screen therein and the smoke intake.

2. A smoke box for locomotives, comprising, in combination with a horizontally disposed, cylindrical receptacle having at its rear terminal a transverse, apertured flue-sheet and provided with a discharge port and a steam intake, and having upper, side flue-chambers each provided with a screen and opening upon the apertured flue-sheet; a separating compartment provided with a screen 24 and disposed between and opening upon the side flue-chambers, said separating compartment being in communi-

cation with the steam intake and the discharge port of the cylindrical receptacle; a lower compartment having intake ports communicating with the side flue-chambers rearwardly of screens 23, and having an intake port communicating with the separating compartment forwardly of screen 24, and provided with an exit port communicating with the separating compartment rearwardly of said screen 24; and a plurality of baffle-plates within and disposed between the intake ports and exit port of said lower compartment.

3. In combination with a horizontally disposed, cylindrical receptacle having a terminal flue-sheet providing a smoke-intake, a steam intake pipe and a discharge passageway; a horizontal partition in the receptacle traversed by the intake pipe and forming a lower compartment; adjacent, upright partitions disposed above and connecting the horizontal partition and the wall of the cylindrical receptacle and forming longitudinal side chambers opening upon the smoke intake with exit ports communicating with the lower compartment, and forming a separating chamber between the side chambers, said separating chamber communicating with the side chambers, the steam intake, the discharge passageway, and having an exit port and an intake port communicating with said lower compartment; stationary screens disposed inclinedly within the separating chamber and side chambers; weighted screens pivotally mounted adjacent to said stationary inclined screens, the exit ports of each side chamber being disposed between the screens therein and said smoke intake.

4. A smoke box for locomotives, comprising, in combination with a horizontally disposed, cylindrical receptacle having at its rear terminal a transverse, apertured flue-sheet and provided with a discharge port and a steam intake, and having upper, side flue-chambers opening upon the apertured flue-sheet each being provided with the stationary, inclined screen 23; a separating compartment disposed between and opening upon the side flue-chambers and provided with the stationary, inclined screen 24, said separating compartment being in communication with the steam intake and the discharge port of the cylindrical receptacle; a weighted frame-member pivotally mounted adjacent to each of the stationary, inclined screens of said side flue-chambers and separating compartment; a lower compartment having ports communicating with the side flue-chambers rearwardly of said screens 23 and having an intake port communicating with the separating compartment forwardly of screen 24, and provided with an exit port communicating with the separating compartment rearwardly of said screen 24; and

a plurality of baffle-plates within and disposed between the intake ports and exit port of said lower compartment.

5. A locomotive smoke box, comprising, in combination with a horizontal, cylindrical container having an exit way, a steam intake pipe, and provided at its rear end with an upright, apertured flue-sheet, a horizontal partition in the container to provide a lower compartment; adjacent upright partitions connecting the horizontal partition and the upper part of the container to provide longitudinal side-chambers and an intermediate separating chamber, each of the longitudinal side-chambers opening upon the apertured flue-sheet and provided at its front terminal with a transverse, upright barrier-plate and having an exit way formed between said barrier-plate and said flue-sheet to communicate with said lower compartment, said separating chamber communicating with the exit way and intake pipe of the cylindrical container and with said side chambers and provided at its rear terminal with an upright, transverse barrier-plate and an exit way forwardly of said barrier-plate in communication with said lower compartment; a grate mounted upon the barrier-plates of the side chambers and said separating chamber; said lower compartment having an exit way communicating with the separating chamber rearwardly of the transverse barrier-plate thereof.

6. A device for the purpose described, comprising a horizontally disposed, cylindrical receptacle having upon its rear end a flue-sheet and provided with a discharge port and a steam intake, a horizontal partition forming a lower compartment, said partition being formed with an intake port and a discharge port and having a part of its wall disposed inclinedly to form a deflecting plate; side passageways above the horizontal partition each communicating with the flue-sheet and having an exit way communicating with the lower compartment; a separating compartment disposed between and communicating with the side passageways and with the steam intake and discharge port of the receptacle; a barrier plate disposed transversely of and within the separating compartment and projecting above the horizontal partition between said intake port and discharge port; and a rectangular screen disposed inclinedly within the separating compartment and having its lower end mounted upon the barrier plate.

7. A locomotive smoke box, comprising, in combination with a horizontal, cylindrical container having an exit way, a steam intake, and provided at its rear end with an upright, apertured flue-sheet, a horizontal partition in the container traversed by the steam intake and forming a lower com-

partment; side chambers and an intermediate separating chamber formed above said horizontal partition, each of the side chambers opening upon the apertured flue sheet and provided at its front terminal with a transverse, upright barrier-plate and having an exit way formed between said barrier-plate and said flue sheet communicating with said lower compartment, said separating chamber communicating with the exit way and steam intake of the cylindrical container and with said side chambers and provided at its rear terminal with an upright, transverse barrier-plate and with an exit way forwardly of said barrier-plate in communication with the lower compartment; a grate mounted upon the barrier-plates of the side chambers and said separating chamber; said lower compartment having an exit way communicating with the separating chamber rearwardly of the transverse barrier-plate thereof; and a plurality of baffle plates disposed inclinedly and mounted within said lower compartment.

8. A device for the purpose described, comprising a horizontally disposed, cylindrical receptacle having upon its rear end an apertured flue-sheet and provided with a discharge port and a steam intake, a horizontal partition forming a lower compartment and having a part of its wall disposed inclinedly to form a deflecting-plate; side passageways above the horizontal partition each communicating with the apertured flue-sheet and having an exit way communicating with the lower compartment; a separating compartment disposed between and communicating with the side passageways and with the steam intake and discharge port of the container, and having an exit port and an intake port communicating with the lower compartment; a screen disposed inclinedly and connected with the horizontal partition within the separating compartment between the exit and intake ports

thereof; and a plurality of baffle plates mounted within said lower compartment.

9. A locomotive smoke box, comprising, in combination with the flue-sheet, the exit passageway and steam intake thereof, a horizontal partition forming a lower compartment; segmentally-formed chambers in the upper part of the box communicating with the flue-sheet and provided with ports communicating with the lower compartment; a separating chamber in communication with the steam intake and exit passageway of the smoke box and disposed between and communicating with the lower compartment; grates disposed in the segmental side chambers and the separating chamber; and a plurality of baffle plates mounted within the lower compartment.

10. A locomotive smoke box, comprising, in combination with the flue-sheet, the exit passageway and steam intake thereof, a horizontal partition forming a lower compartment; side-chambers in the upper part of the box in communication with the flue-sheet and having exit ports communicating with the lower compartment; a separating chamber in communication with the steam intake, and exit passageway of the smoke box and disposed between and communicating with the side chambers, and having an exit port and an intake port communicating with the lower compartment; rigidly mounted, inclined grates within the side chambers and separating chamber; pivotally mounted weighted frame-members disposed adjacent to said grates; and a plurality of baffle plates disposed inclinedly within the lower compartment.

In testimony whereof we have affixed our signatures in presence of two witnesses.

BENJAMIN F. STANNARD.

ABRAHAM AGINSKEE.

Witnesses:

HIRAM A. STURGES,

A. H. BENTON.