

Aug. 14, 1934.

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1,970,488

DEVICE FOR ARRESTING CINDERS, FLY-ASH, ETC

Filed June 16, 1933

FIG. 1.

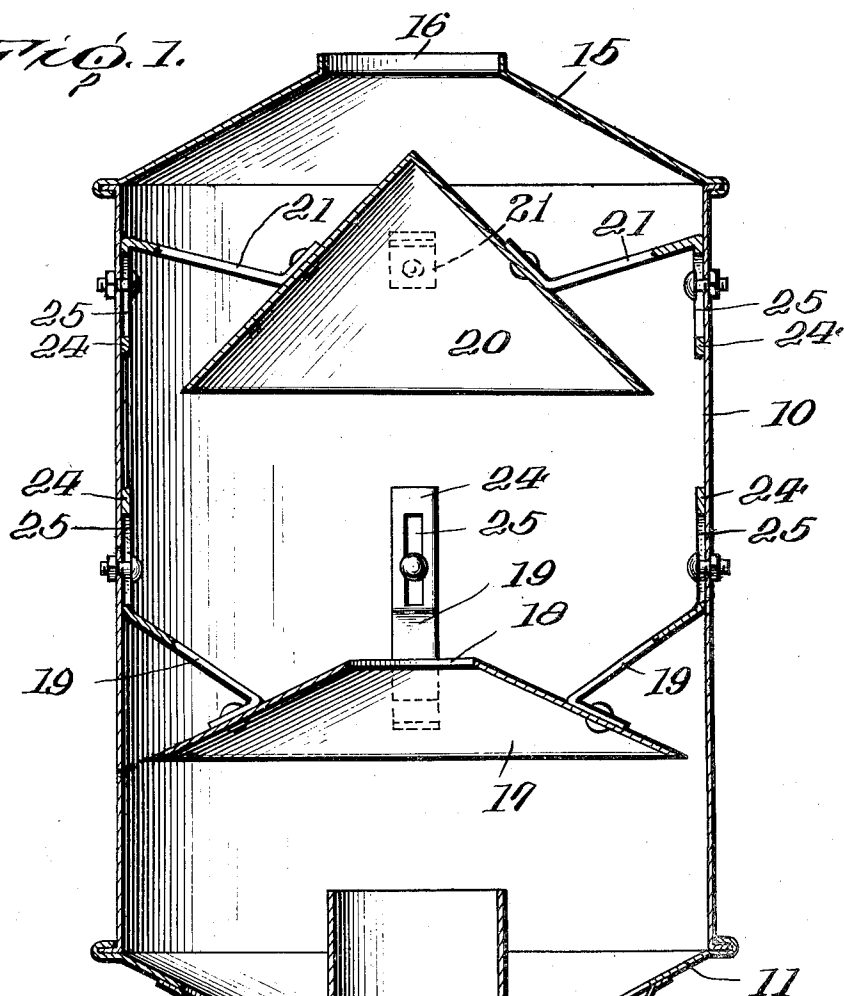
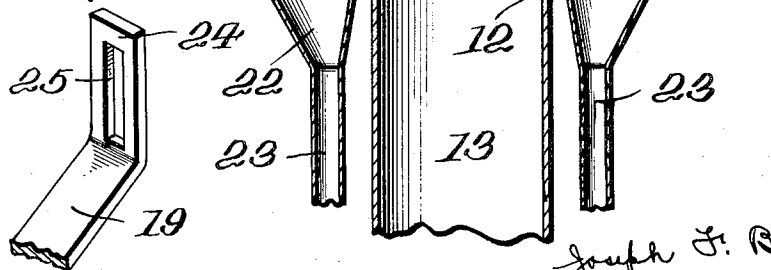


FIG. 2.



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1,970,488

DEVICE FOR ARRESTING CINDERS, FLY-ASH, ETC.

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Application June 16, 1933, Serial No. 676,188

3 Claims. (Cl. 183-103)

This invention is a device for arresting fly-ash, cinders, soot, dust and similar heavier than air particles normally discharged into the surrounding atmosphere from chimneys, stacks and the like.

In many municipalities considerable attention is devoted to abating the smoke nuisance and its ramifications, in order that the fire hazard and smoke and cinder damage to surrounding neighborhoods may be reduced, and to also at the same time prevent damage to the health of the community, incident to contamination of the air.

One of the objects of the invention is to abate such nuisances by providing a device of simple construction, capable of being applied to any stack or chimney, and so constructed and arranged that it will prevent substantially all distribution into the surrounding atmosphere, of cinders, soot, fly-ash, dust and other heavier than air particles, which are discharged from a stack during the normal functioning thereof, and precipitated into the surrounding territory. A further object is to provide a device of the character described constructed and arranged to collect the objectionable materials and to direct them to a place for convenient storage and eventual removal.

The invention will be hereinafter fully set forth and particularly pointed out in the claims. In the accompanying drawing:—

Figure 1 is a vertical longitudinal sectional view illustrating a device constructed in accordance with the invention. Figure 2 is a detail view illustrating the arrangement for adjustably supporting the arrester cones.

Referring to the drawing, 10 designates a chamber of any desirable cross sectional shape. As shown, it consists of a cylindrical sheet metal casing having a downwardly and inwardly sloping bottom wall 11 of approximately inverted frusto-conical form, said bottom wall being provided with a central opening 12 of proper proportions to fit around and closely engage the discharge end of a chimney, stack or the like, indicated at 13. It will be observed also that the discharge end of the stack 13 extends into the chamber 10 a substantial distance. The top of the chamber 10 is provided with an upwardly and inwardly sloping wall 15 of frusto-conical form, terminating in a central outlet opening 16, surrounded by a collar 16, as shown. The outlet opening is of approximately the same diameter as the stack 13, the chamber 10 being of considerably greater diameter than said stack.

Located within the chamber 10 above the dis-

charge opening of the stack 13 is a hollow baffle member 17, having a downwardly and outwardly inclined wall. Said baffle member 17 is provided with a central opening 18 at its top, and is suspended within the chamber 10 by means of straps 19, attached to the vertical wall of the casing 10. The base of said baffle member is of such diameter as to lie adjacent to the said walls, but out of contact therewith, as shown.

Located above the baffle member 17 is a closed hollow baffle member 20 shown with an outwardly and downwardly shaped wall, and suspended in position by means of straps 21 attached to the wall near the top of the chamber 10. It will be noted that the baffle member 20 is open at the bottom and that the inclination of the outer wall thereof is at a much sharper angle than the inclination of the outer wall of the baffle member 17. Excellent results have been obtained by arranging the outer surface of the baffle member 17 at an approximate angle of $22\frac{1}{2}$ degrees, and the angle of the outer surface of the baffle member 20 at an angle of 45 degrees. It is to be understood, however, that these figures are merely given by way of example and without intending to limit the invention, because the inclinations of the respective top surfaces may be varied without departing from the spirit of the invention. It will be observed that the inlet and outlet openings, and the baffle members are arranged in axial alignment with each other.

Leading downwardly from the inclined bottom wall 11 are a plurality of hopper-like attachments 22, discharging into collection pipes 23, which lead to a suitable location for storage of collected cinders, etc. (not shown).

In order to arrange for adjustability of the baffle members, the suspending straps 19 and 21 respectively are provided with angular ends 24 constructed and arranged to engage the walls of the casing 10. Said bent portions 24 are provided with slots 25, for slidable engagement with anchor bolts 26 passed through the chamber wall.

It is to be understood that it is preferred to construct each casing 10 and its associated elements of such dimensions as will meet the requirements of the particular installation, and that the disclosure in the drawing is illustrative only and without intent to limit as to dimensions or relative proportions and spacing of the parts. It is also to be understood that although the casing is shown as of cylindrical shape, the invention is not limited in this respect because it may be made of any desired polygonal cross section,

in which event the baffles 17 and 20 will conform to the cross-sectional contour thereof.

In practice, the outlet end of a smoke stack, chimney, or other similar outlet for a furnace or similar fluid consuming installation, is projected through the opening 12 in the bottom wall of the chamber 10, said end being spaced from baffle 17. As the products of combustion from the stack pass through the stack and are discharged into the chamber 10, they normally carry with them varying percentages of fly-ash, cinders, soot and other particles normally heavier than air, and which, unless arrested, are discharged into the surrounding atmosphere, thereby constituting a serious nuisance, not only with respect to the dirt disseminated into the surrounding neighborhood, but also with the problem of a fire hazard to be considered.

In operation, the objectionable particles which are carried by the products of combustion, are discharged from the stack 13 into the chamber 10, and in such manner that they strike against the inner or under surface of the baffle 17. It will be noted that the space between the lower edge of the baffle 17 and the wall of casing 10 is so small that the smoke and products of combustion will not pass therethrough as they are discharged from the stack, but will vent upwardly through the opening 18. The impact of the heavier particles against the underside of baffle 17 will cause them to rebound and to be deflected outwardly and downwardly outside of the suction influence of the gaseous current passing centrally upward through said baffle. Thus, they drop by gravity to the bottom 11, from which point they will gradually move downwardly through the hoppers 22, into and through the collection pipes 23. At the same time the products of combustion and the lighter particles will continue through the opening 18 in the baffle 17 and be caused to strike against the inner surface of the cone 20, with a very similar result. That is, the particles will rebound and drop by gravity to the outer surface of the baffle 17 and be deflected outwardly thereby, out of the line of travel of the main volume of the products passing through the opening 18. Inasmuch as the space between the lower edge of baffle 17 and casing 10 is practically free of the suction influence created by the gaseous currents passing through the opening in the baffle 17, those particles which fall on top of said baffle are appreciably free of any influence tending to draw them into said currents. Therefore, said particles, no matter how light, are subjected only to the influence of gravity, so that they will fall into the space below the baffle, the space between the baffle and the casing constituting sufficient clearance for this purpose. The travel of the lighter particles to the last mentioned location is aided by the influence of the downward movement of the heavier particles, as they rebound from the underside of the baffle 17. Inasmuch as the products of combustion cannot flow through the baffle 20, they are deflected downwardly and outwardly beneath said baffle, until they clear the lower edge thereof, and then pass upwardly and out of the opening 16.

It will be observed that as the particles rebound from the baffles they are deflected into the areas at the peripheries of the baffles at which there is a substantial pressure drop, as stated, and they will fall to the bottom 11 and be directed through the hoppers 22 into the pipes 23, by which they are conducted to a point of storage for later disposal.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, it will be noted that a very simple and inexpensive arrester is provided, which is capable of being attached to any type of chimney or flue, and built to the capacity required for any particular installation, the device being so constructed and arranged that there is practically a complete arresting and recovery of the fly-ash, cinders, soot, dust and the like normally discharged into the atmosphere by a chimney or stack functioning in the usual way. A further advantage is that instead of merely arresting the projected particles and causing them to drop in external localities close to the stack, they are actually collected and stored until they may be suitably disposed of, either by reintroducing them into the furnace as fuel, or by other means if unsuitable for fuel purposes.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. A device for arresting cinders, fly-ash, etc. comprising a cylindrical casing having a centrally disposed opening in its bottom wall constructed and arranged to receive the discharge end of a stack, a shell-like baffle of frusto-conical form located within said casing and having an opening in its top wall of smaller diameter than the stack, the lower edge of said baffle being spaced from said stack and having its periphery extended close to but not touching the adjacent wall of said casing, in such manner as to provide a slight clearance between the casing and said lower edge, a second shell-like closed baffle of approximately conical form also suspended within the casing above the first mentioned baffle, the base of said conical baffle being spaced a substantial distance above the top of the first baffle, and of less diameter than the base of said first baffle, said conical baffle being also of greater height than the other baffle, the angle of inclination of the wall of the conical baffle being greater than the angle of inclination of the wall of the other baffle, said casing having an outlet opening above the conical baffle, said openings and said baffles being in axial alignment, the clearance between the frusto-conical baffle and the casing being so positioned and proportioned with respect to the opening in said baffle, that said clearance is practically free of the suction influence of the gaseous currents passing through said opening, so that solid particles rebounding from the conical baffle will drop through said clearance by gravity, the proportions of said clearance being such as to practically prevent upwardly flowing smoke and gases from passing therethrough.

2. A device for arresting cinders, fly-ash, etc. comprising a cylindrical casing having a conical bottom provided with an opening therein of a diameter to closely receive the discharge end of a stack, and discharge openings spaced from the first mentioned opening, a shell-like baffle of frusto-conical form located within said casing and having an opening in its top wall of smaller diameter than the stack, the lower edge of said baffle being spaced from said stack and having its periphery extended close to but not touching the adjacent wall of said casing, in such manner as to provide a slight clearance between the casing and said lower edge, a second shell-like closed

- 5 baffle of approximately conical form also suspended within the casing above the first mentioned baffle, the base of said conical baffle being spaced a substantial distance above the top of the first baffle, and of less diameter than the base of said first baffle, said conical baffle being also of greater height than the other baffle, the angle of inclination of the wall of the conical baffle being greater than the angle of inclination of the wall of the other baffle, said casing having an outlet opening above the conical baffle, said openings and said baffles being in axial alignment, and chutes leading from the discharge openings in said bottom wall, the clearance between the frusto-conical baffle and the casing being so positioned and proportioned with respect to the opening in said baffle, that said clearance is practically free of the suction influence of the gaseous currents passing through said opening, so that solid particles rebounding from the conical baffle will drop through said clearance by gravity, the proportions of said clearance being such as to practically prevent upwardly flowing smoke and gases from passing therethrough.
- 10 3. A device for arresting cinders, fly-ash, etc. comprising a cylindrical casing having a centrally disposed opening in its bottom wall of a size to closely receive the discharge end of a stack, a shell-like baffle of frusto-conical form located within said casing and having an opening in its top wall of smaller diameter than the stack, the lower edge of said baffle being spaced from said stack and having its periphery extended close to but not touching the adjacent wall of said casing, in such manner as to provide a slight clearance between the casing and said lower edge, a second shell-like closed baffle of approximately conical form also suspended within the casing above the first mentioned baffle, the base of said conical baffle being spaced a substantial distance above the top of the first baffle, and of less diameter than the base of said first baffle, said conical baffle being also of greater height than the other baffle, the angle of inclination of the wall of the conical baffle being greater than the angle of inclination of the wall of the other baffle, said casing having an outlet opening above the conical baffle, said openings and said baffles being in axial alignment, arms secured to the baffles, and means whereby said arms are adjustably secured to the casing, the clearance between the frusto-conical baffle and the casing being so positioned and proportioned with respect to the opening in said baffle, that said clearance is practically free of the suction influence of the gaseous currents passing through said opening, so that solid particles rebounding from the conical baffle will drop through said clearance by gravity, the proportions of said clearance being such as to practically prevent upwardly flowing smoke and gases from passing therethrough.
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