June 9, 1925. 1,541,337

E. FEIX

CINDER PRECIPITATOR

Filed Oct. 18, 1924

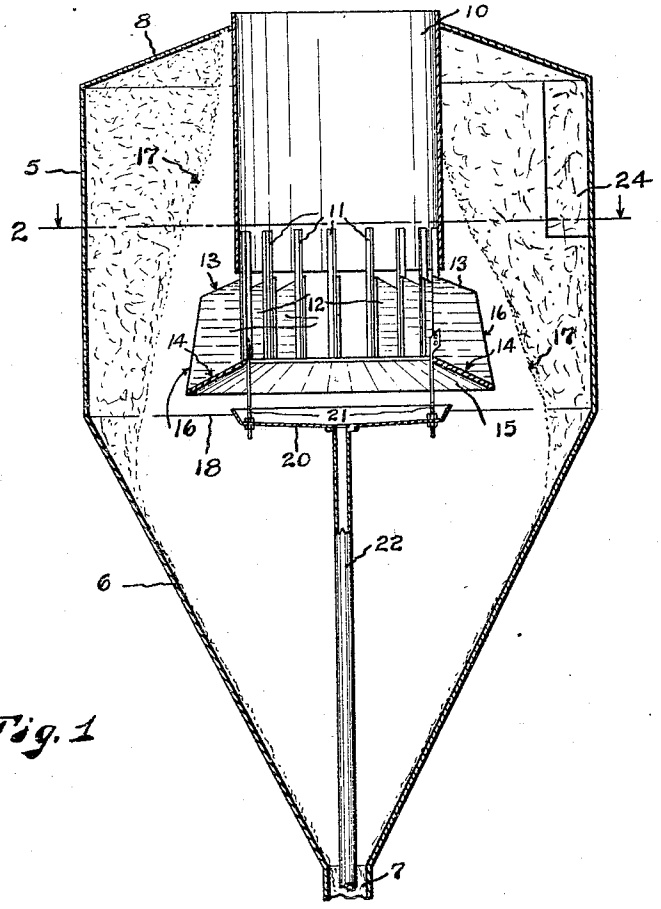


Fig. 1

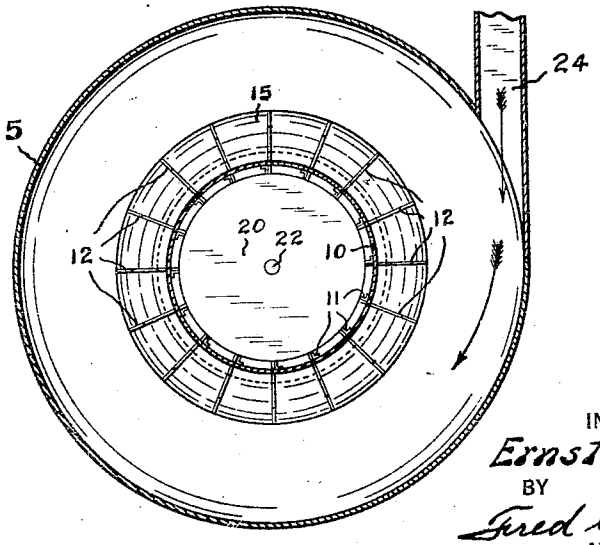


Fig. 2

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CINDER PRECIPITATOR.

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To all whom it may concern:

Be it known that I, ERNST FEIX, a citizen of the United States, and a resident of Tacoma, in the county of Pierce and State of Washington, have invented certain useful Improvements in Cinder Precipitators, of which the following is a specification.

My invention relates to improvements in cinder precipitators and the object of my invention is to provide a centrifugal cinder precipitator of simple and substantial construction that is unusually efficient in operation and in which the back pressure against the smoke laden air which is drawn by mechanical means, such as a fan, from the fire and discharge into the cinder precipitator for the purpose of clearing the air from the cinders and heavy smoke before discharging into the atmosphere is reduced to an absolute minimum thereby resulting in a saving of power.

A further object is to provide a cinder precipitator having a centrally arranged air discharge passageway and having at the bottom of said air discharge passageway a plurality of radially disposed vanes arranged to catch the air and direct the same out through the air discharge passageway with the least possible agitation of the air and with the least possible back pressure against the fan that drives such air, said vanes having outer edges that are inclined to conform substantially to the line or cone which marks the division between the air that is laden with solid matter and the cleaner air.

Further objects are to provide an inclined or conical plate forming a support at the bottom of the deflectors and arranged so that solid matter will not lodge thereon and to provide means for catching and discharging the moisture that enters the precipitator through the centrally arranged air discharge passageway.

Other and more specific objects will be apparent from the following description taken in connection with the accompanying drawings.

Precipitators of this nature are necessarily required to handle a large volume of air or gas at comparatively high speed in the smallest possible space and must be capable of removing practically all cinders soot and solid matter and of dissipating or breaking up the smoke so that it will not be objectionable in congested districts. The foul air or by-products of combustion are usually driven to these precipitators by a fan and it is well known that the efficiency of a fan decreases very rapidly as back pressure against said fan or against the column of air that is driven by the fan is increased. For this reason it becomes a problem of great importance in the construction of precipitators of this nature to keep back pressure within the precipitator and against the fan down to a minimum. In the design of this invention every possible precaution has been taken to reduce back pressure to an absolute minimum.

In the drawings Figure 1 is a view in vertical mid section of a cinder precipitator constructed in accordance with my invention.

Fig. 2 is a view in cross section of the same substantially on broken line 2—2 of Fig. 1.

Referring to the drawings, throughout which like reference numerals designate like parts, I show a cinder precipitator comprising a cylindrical section or drum 5 having a conical bottom end 6 terminating in a relatively small outlet 7 for solid matter.

The cylindrical section 5 is provided with a relatively flat frustro-conical shaped top wall 8 that supports a relatively large axially arranged air discharge pipe or conduit 10 that extends downwardly into the cylindrical drum 5 slightly more than half the distance from the top to the bottom of said drum and is open at both the top and bottom ends.

A plurality of supports 11, preferably angle bars, are secured to the inside of the air discharge pipe 10 and extend downwardly therefrom and a plurality of radially disposed vanes 12 are secured to said supports 11 and project outwardly below the end of the discharge pipe, an open area substantially as large as pipe 10 being left in the center of the vanes. The upper edge 13 of each vane 12 is inclined downwardly from the inner to the outer side and the bottom edge 14 of each vane is similarly inclined downwardly. An annular plate 15 is secured to the bottom of vanes 12 and forms a frustro-conically shaped bottom having a centrally arranged opening 19 of substantially the same diameter as the air outlet pipe 10 said bottom 15 being pitched at a sufficient angle so that any solid matter

that settles thereon will slide off. I find that if the bottom 15 is flat or has only a slight angle cinders may collect thereon and be carried out through air discharge pipe 10. The bottom 15 braces and supports the vanes and helps to guide and direct the air into discharge conduit 10 and tends to prevent the discharging air from sweeping down into the conical bottom portion 6 thereby preventing eddies which might otherwise produce back pressure against the incoming air.

The outer edges of the vanes 12 are inclined outwardly from top to bottom as at 16, the angle of said edges 16 being substantially the same as the angle of separation between the cinder laden air and the clear air as indicated at 17 and the object of thus inclining the edges of the vanes 12 being to extend the vanes as close as possible to the strata of cinder laden air without actually disturbing the cinders or solid matter or producing eddies that will disturb the same. I have found the incline of the outer edge of the vanes 12 to be an important feature of the invention and to affect vitally the efficiency of the device as compared to the amount of power required to operate the same.

It will be noted that the vanes 12 and bottom plate 15 are entirely within the drum 5 and above the bottom plane of said drum as represented by the line 18 and do not extend down into the conical portion 5 where they would restrict the area through which the descending solid matter passes, and, as I have found, decrease the efficiency of a precipitator or necessitate the provision of a larger precipitator to perform the same work.

I also find that it is desirable although not necessary, to prevent moisture that enters through conduit 10 from falling on the walls of conical bottom portion 6, and causing the solid matter to adhere thereto. To accomplish this I provide a drip pan 20 adjustably suspended below the bottom 15 by supports 21 and having an outlet pipe 22 through which moisture may discharge. The provision of this pan eliminates the necessity of using a hood over conduit 10 or using any device that will change the course of the discharging air, all of which devices I find will increase back pressure within conduit 10 and drum 5.

Pan 20 is adjustably supported because it is found that said pan must be adjusted or set for each precipitator to insure maximum efficiency for the conditions under which that precipitator is to operate. Ordinarily no further adjustment will be necessary unless the conditions under which the precipitator operates are changed. Obviously the moisture receptacle may be dispensed with if conditions do not require the same.

An outlet conduit 24 for air or gas laden with solid matter as cinders, soot and smoke is arranged to deliver tangentially into the upper peripheral portion of the drum 5, it being understood that the same is connected with means not shown, as with a fan or blower by which a velocity may be imparted to the air or gas.

In the operation of this device when air or gas laden with solid matter is delivered tangentially and at a relatively high velocity into the drum 5 a centrifugal or whirling motion will be imparted thereto and the particles of solid matter will be urged by centrifugal force toward the circumference of drum 5 and will, I find form a cone of separation of the solid matter from the cleaner air or gas substantially as indicated by the line 17 in Fig. 1. The particles of solid matter collecting in the peripheral portion of the drum 5 and cone 6 slide down the sides of cone 6 and pass out through discharge vent 7 while the cleaner air passing inwardly through vanes 12 finds an unobstructed opening through conduit 10 and discharges freely with the least possible amount of back pressure against the incoming air and against the fan that drives such air.

The separation begins the instant the air or gas enters the drum 5 and the air should practically all discharge before it has passed more than once around the drum 5.

The foregoing description and accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that changes in this device may be made within the scope and spirit of the following claims.

I claim:

1. In a device of the class described, a drum having a conical bottom portion, tangential air inlet means connected with said drum, a centrally arranged air discharge conduit open at both ends and extending downwardly into said drum from the top end, and radial vanes projecting outwardly beyond said air inlet conduit below the bottom end thereof, the outer edges of said vanes being inclined outwardly from top to bottom relative to the axis of the drum.

2. In a device of the class described, a drum having a conical bottom portion, tangential air inlet means connected with said drum, a centrally arranged air discharge conduit open at both ends and extending downwardly into said drum from the top end, and radial vanes projecting outwardly beyond said air inlet conduit below the bottom end thereof, the top and bottom edges of said vanes being inclined downwardly from inside to outside and the outer edges of said vanes being inclined outwardly from the top to the bottom.

3. In a device of the class described, a drum having a conical bottom portion, tan-

gential air inlet means connected with said drum, a centrally arranged air discharge conduit open at both ends and extending downwardly into said drum from the top end and radial vanes projecting outwardly beyond said air inlet conduit below the bottom end thereof, the outer edges of said vanes being inclined outwardly from the top to the bottom on an angle that corresponds substantially to the line of separation of the solid matter from the air in said drum.

4. In a device of the class described, a drum, a conical extension on the bottom end of said drum, tangential air inlet means at the upper end of said drum, a relatively large air outlet conduit open at both ends and extending downward centrally into said drum, and a plurality of radial vanes supported below the lower end of said air outlet conduit and projecting outwardly therefrom, the bottom edges of said vanes being inclined downwardly from the center outwardly and an annular conical bottom plate secured to the bottom edges of said vanes said bottom plate having an open center.

5. In a device of the class described, a drum, a conical extension on the bottom end of said drum, tangential air inlet means at the upper end of said drum, a relatively large air outlet conduit open at both ends and extending downward centrally into said drum, a plurality of radial vanes supported below the lower end of said air outlet conduit and projecting outwardly therefrom, and a shallow circular receptacle supported below said vanes to catch moisture that enters through said air discharge conduit.

6. In a device of the class described, a drum, a conical extension on the bottom end of said drum, tangential air inlet means at the upper end of said drum, a relatively large air outlet conduit open at both ends and extending downward centrally into said drum, a pluarlity of radial vanes supported below the lower ends of said air outlet conduit and projecting outwardly therefrom, the bottom edges of said vanes being inclined downwardly from the center outwardly, an annular conical bottom plate secured to the bottom edges of said vanes said bottom plate having an open center and a shallow circular receptacle supported below said vanes to catch moisture that enters through said air discharge conduit.

The foregoing specification signed at Tacoma, Washington, this 8th day of October, 1924.

ERNST FEIX.