Aug. 29, 1961 P. E. McNALL, JR., ET AL 2,998,098

GAS CLEANING APPARATUS

Filed Nov. 17, 1958

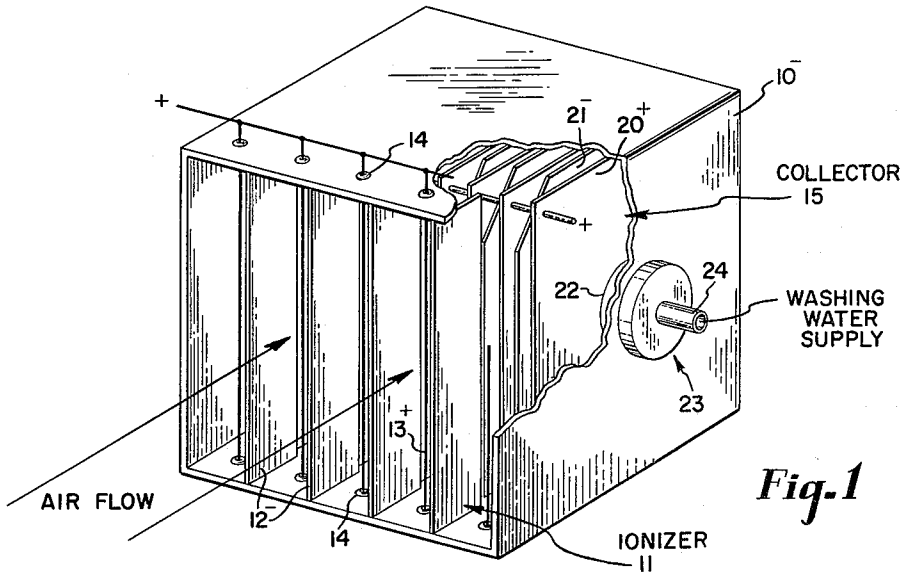

Fig. 1

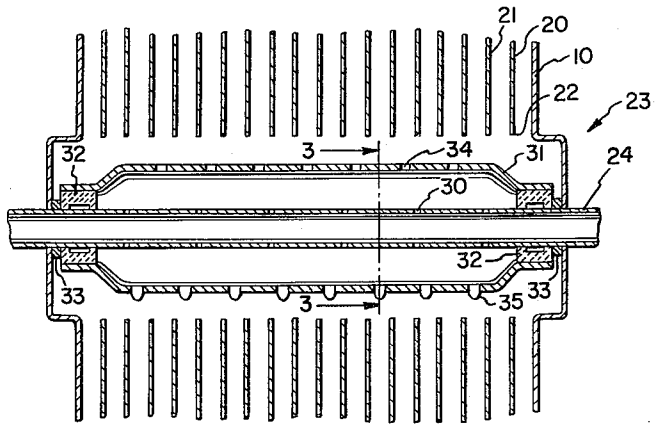

Fig. 2

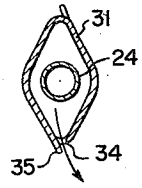

Fig. 3

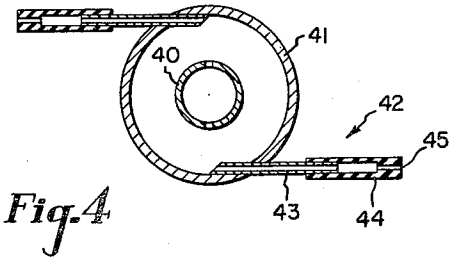

Fig. 4

INVENTORS
PRESTON E. MC NALL, JR.
ASBJORN M. SEVERSON

BY Clyde C. Blinn

ATTORNEY

United States Patent Office 2,998,098 Patented Aug. 29, 1961

2,998,098

GAS CLEANING APPARATUS

Preston E. McNall, Jr., Minneapolis, and Asbjorn M. Severson, Hopkins, Minn., assignors to Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., a corporation of Delaware

Filed Nov. 17, 1958, Ser. No. 774,529
1 Claim. (Cl. 183—7)

The present invention is concerned with an improved fluid treating or washing apparatus for use with an electrostatic gas cleaner; in particular, an opening is provided across the collecting unit into which a distribution apparatus is placed for distributing treating fluid between the parallel plates of the unit from the opening towards the outer edges of the parallel plates.

Fluid treating apparatus or washing mechanisms for use with electrostatic air cleaners are quite common. Where the collecting cell plates are long in the direction of air flow, the conventional apparatus spraying the treating fluid or water into the front of the gas cleaner in the direction of gas flow does not always deliver the treating fluid or water to the downstream area of the collecting plates. In order to insure proper treating or washing, the pressure of the fluid leaving the distribution or spraying apparatus must be high enough to force the fluid completely through the cell along all of the surface of the plates. Where a cell has long collecting plates, the pressures needed to provide the proper fluid treatment or washing are often quite high, and a high pressure fluid source is not always available.

In the present invention, an improved fluid treating or washing apparatus is provided by the insertion of the spraying or distribution mechanism into a hole or opening across the cell in a direction perpendicular to the plates and the air flow. During washing water is directed from the opening through the center of the cell outward toward the edges of the parallel plates to wash the dirt off of the surface of the parallel plates. The water pressure can be reduced considerably with such an invention since the distance the water must travel across the plate surfaces is substantially less than that of a conventional washing apparatus for a similar gas cleaning apparatus.

An object of the present invention is to provide an improved fluid treating apparatus for an electrostatic air cleaner.

Another object of the present invention is to provide a fluid treating apparatus for an electrostatic air cleaner in which the fluid is directed from an opening across the collecting unit in a direction parallel to the plates and toward the outer edges of the plates.

And still another object of the present invention is to provide an improved washington apparatus for electrostatic air cleaner in which a rotating sprinkler type device is inserted in an opening at the center of the collecting unit; so that, the water is sprayed in between the plates toward the outer edges of the plates.

These and other objects will become apparent upon the study of the following specification and claim of which:

FIGURE 1 is a perspective view of an electrostatic gas cleaning apparatus with a schematic showing of the improved fluid treating apparatus.

FIGURE 2 is a cut away view of the collecting unit shown in FIGURE 1 to show the rotating distribution head for the fluid treating apparatus.

FIGURE 3 is a sectional view of the distribution head shown in FIGURE 2.

FIGURE 4 is a sectional view of a distribution head for another embodiment of the fluid distribution apparatus which can be mounted in the opening of the collecting unit in the manner shown in FIGURE 2.

Referring to FIGURE 1 of the drawing, an electrostatic gas cleaning apparatus is shown having a casing **10**. Mounted in the upstream end of casing **10** is a conventional ionizer **11**. The ionizer has a pluality of spaced parallel plates **12** which are connected to the grounded case **10**. In between each of the parallel plates is strung an ionizing wire **13**. The wires are mounted at their extremities to the casing **10** by electrical insulators **14**. The wires are connected to a positive source of power; so that, as gas or air passes through the ionizer, the foreign particles in the gas are charged.

Downstream of the ionizer and mounted in casing **10** is a collecting unit or collector **15** which is made up of a plurality of oppositely charged parallel plates. One set of plates **20** which consists of every other plate is connected to the positive source of power. The other set of plates **21** spaced between the positive plates are connected to the casing **10** and thus ground. As the charged foreign particles in the gas pass into the collecting unit, they are attracted to the plates of the opposite charge and are collected on the plates.

An opening which is formed by a series of holes such as **22** in plate **20** exists across the collector from one side to the other perpendicular to the plate surfaces and the direction of air flow. Mounted in the opening is a distribution or spraying apparatus **23** which is connected by a conduit **24** to a source of fluid or water for treating the plates of the collector.

A cross sectional view of washing apparatus **23** of FIGURE 1 is shown in FIGURE 2. Conduit **24** is shown extending from the opposite sides of casing **10**. The conduit has a series of holes therein for supplying water to a rotary spraying head **31** which is journalled on conduit **24** at its extremities by bearings **32**. Suitable spacers at each end of the spraying head **31** positions a series of nozzles **34** in the head in line with the spaces between the parallel plates of the collecting unit. The orifices **34** are formed by bending a portion of the spraying head outward as shown in FIGURE 3. An ear **35** forming part of the orifice is bent at a slight angle with respect to a radius of the conduit **24**; so that, as fluid flows from the conduit openings **30** into the spraying head **31**, it will flow out of the orifices **34** in such a direction producing a tangential or jet-like reaction force to propel the spraying head **31**. The head **31** will then rotate about conduit **24** to produce a spraying action. The orifices on each side of the spraying head are offset; so that, water is directed from the spraying head between all of the plates of the collector.

In order to properly treat the surface of the plates of the collector, the fluid must reach the complete surface area of the plates. In order to do this, the pressure needed depends greatly upon the distance between the spraying apparatus and the edges of the plates. With the spraying head **31** mounted in the opening formed by the holes **22** in the plates, the distance the fluid must be forced is minimized and thus the force or pressure necessary to obtain adequate plate treating is greatly reduced. The lower pressure requirement is quite important where electrostatic gas cleaning apparatus is used in localities where water pressure is not too high.

Referring to FIGURE 4, another embodiment of a spraying head is shown. Conduit **40** supports the housing **41** which has a plurality of orifices **42**. The orifices are made up of a straight section of pipe **43** mounted at an angle substantially tangent with the housing **41**. Attached to the straight pipe is a flexible rubber hose or nozzle **44** which has a restricted discharge opening **45**. When the fluid or water flows from conduit **40** into the pipe **43** to exhaust from the nozzle opening **45**, a tangen-

tial force is obtained to rotate the head **41** about the conduit **40** in a manner similar to head **31** of the apparatus shown in FIGURE 2. As the angular velocity of head **41** increases, the centrifugal force on nozzle **44** increases. The nozzle will bend outward to change the direction of water flow. Since the direction of the water discharges from nozzle opening **45** determines the rotary propelling force applied to head **41**, the speed of the head will eventually reach a maximum speed depending upon the design of the components. A rotating distributing mechanism such as heads **34** and **41** of FIGURES 2 and 4 have a certain speed for providing the most efficient washing operation. By the proper design of the nozzles of the embodiment shown in FIGURE 4, a selected speed of head **41** can be attained at a predetermined water pressure. The self-correcting action of the nozzles tends to make the speed of rotation less dependent upon water pressure and friction of the spray head on the conduit.

The present invention has been described in a particular manner; however, the intention is to limit the invention only by the scope of the appended claim in which I claim:

In a plate surface treating apparatus for use on a parallel plate collecting cell of an electrostatic gas cleaner, a conduit for supplying treating fluid from a source, means adapted to support said conduit in a cavity in the cell between the upstream and downstream edges of the plates so the axis of said conduit is perpendicular to the plates, and a distribution head attached to said conduit and contained in the cavity for distributing treating fluid between the plates, said fluid being distributed from said head toward the outer edges of the plates so that the distance said fluid must travel to cover the surface of the plates is a minimum, said distribution head being pivotally mounted on said conduit and having a number of orifices for directing fluid between the plates, said orifices being attached to said head generally tangential with respect to the axis of said conduit so that upon the flow of fluid from said orifices a tangential force causing rotary motion of said head is obtained, an end portion of said orifices being flexible so that when the centrifugal force applied to said end portion of said orifices reaches a predetermined value said fluid flow is directed away from said head to reduce said tangential force and said rotary speed of said head.

References Cited in the file of this patent

UNITED STATES PATENTS

540,218	Stanton et al.	May 28, 1895
1,098,389	Lister	June 2, 1914
1,189,593	Lynn	July 4, 1916
1,399,441	Petersen	Dec. 6, 1921
1,650,292	Miscampbell	Nov. 22, 1927
1,977,882	Lassen	Oct. 23, 1934
2,414,528	Hutchinson et al.	Jan. 21, 1947