I. H. SPENCER.

CLEANING APPARATUS.

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1,134,022.

Patented Mar. 30, 1915.

2 SHEETS—SHEET 1.

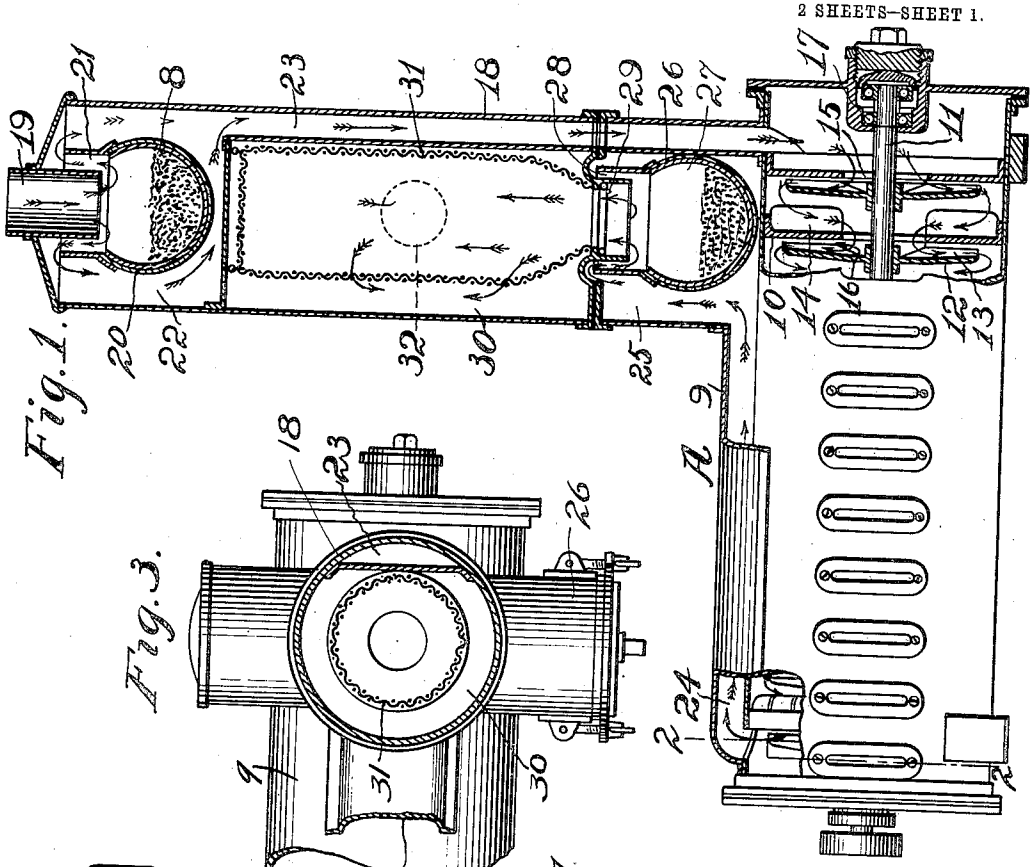


Fig. 1.



Fig. 3.

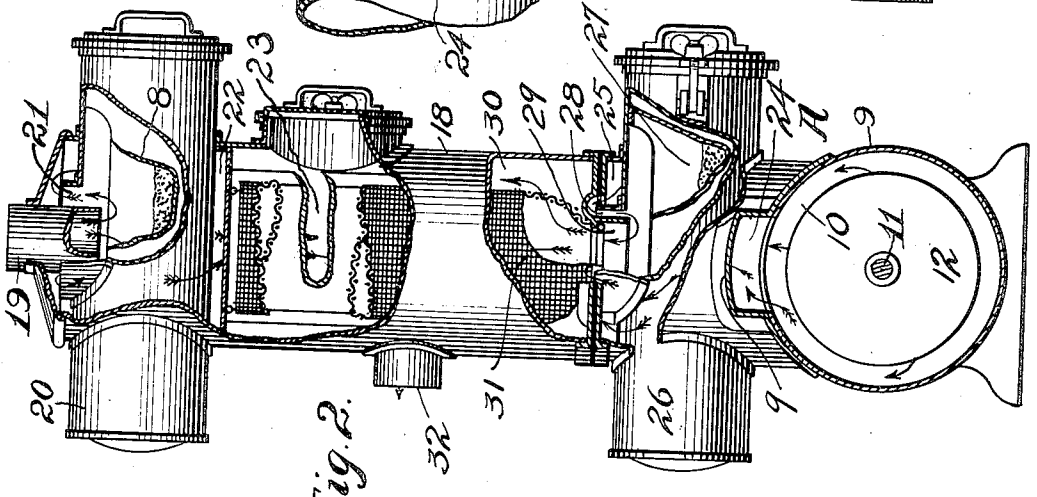


Fig. 2.

Witnesses.
L. E. Berkowitch.
Wm. T. Bates.

Inventor.
Ira H. Spencer
per
Arthur B. Jenkins.
Attorney.

I. H. SPENCER.

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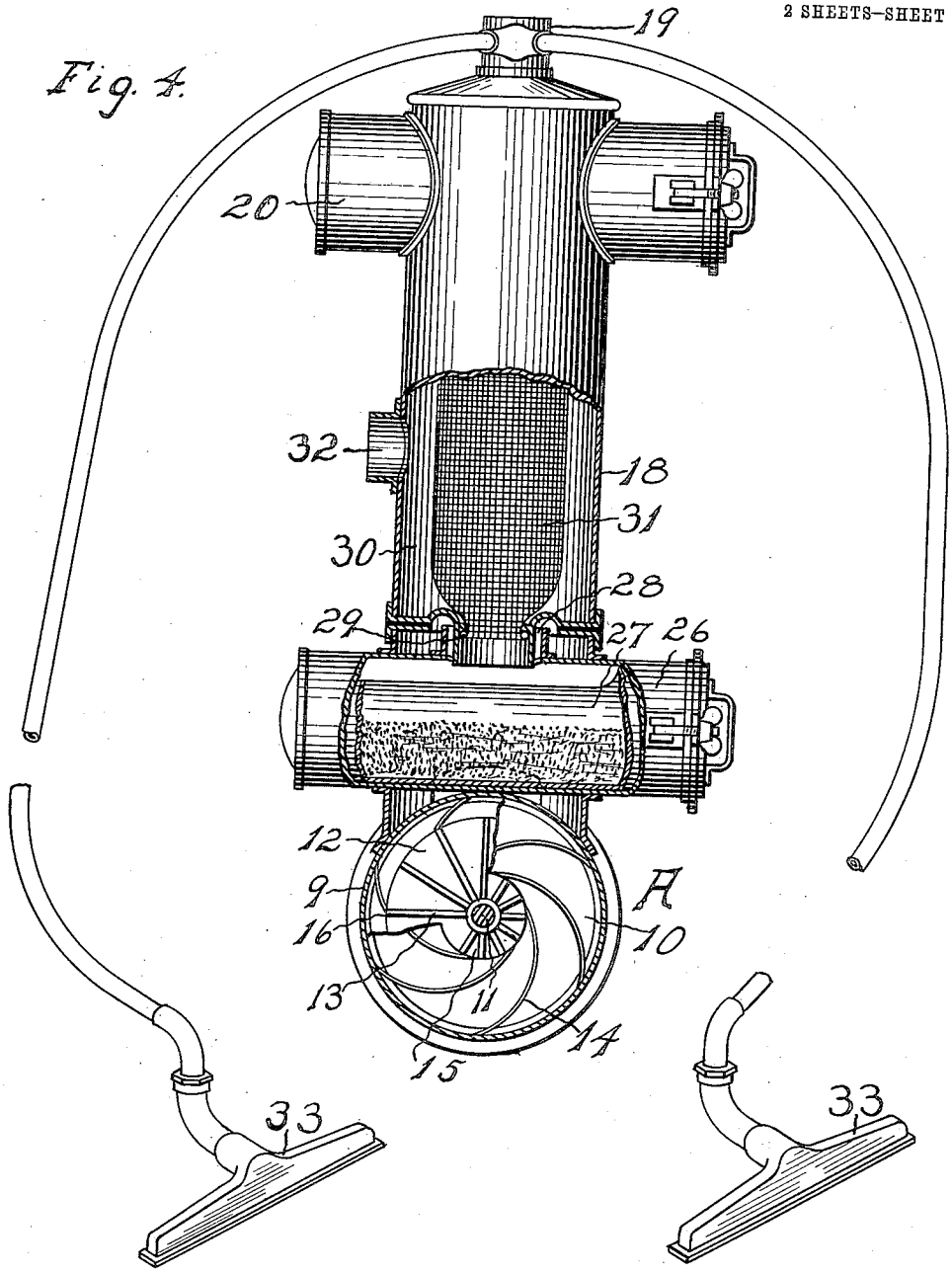
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2 SHEETS—SHEET 2.

Fig. 4.




Witnesses.

L. E. Beckwith.

Wm. F. Bath.

Inventor.

Ira H. Spencer

per

Arthur B. Jenkins.

Attorney.

# UNITED STATES PATENT OFFICE.

IRA H. SPENCER, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SPENCER TURBINE CLEANER COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## CLEANING APPARATUS.

1,134,022. Specification of Letters Patent. Patented Mar. 30, 1915.

Application filed May 31, 1907. Serial No. 376,608.

*To all whom it may concern:*

Be it known that I, IRA H. SPENCER, a citizen of the United States, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented a new and Improved Cleaning Apparatus, of which the following is a specification.

My invention relates to the construction of cleaning apparatus designed to remove dust, trash, litter and the like by means of a confined stream of air that is drawn inwardly through a cleaning tool which is adapted to be applied to the surface of the object to be cleaned, the dust and trash transported by the stream being collected by suitable arresters and the air being permitted to pass to the atmosphere.

More especially, my invention relates to that type of suction cleaning apparatus wherein a multi-stage fan is employed for inducing the desired operating conditions in the confined stream of air.

The principal object of the invention, generally stated, is to produce a simple, efficient and durable device of this character which is compact in form and which may be operated with an economical expenditure of power. This object is accomplished by certain relative arrangements of the parts of the apparatus and by the employment of dust and trash collecting receptacles that are designed with special reference to their use in conjunction with suction creating apparatus of the fan type, as will hereinafter appear.

In the drawings illustrating my invention, the scope whereof is pointed out in the claims, Figure 1 is a view, partly in side elevation and partly in vertical central section, showing a cleaning apparatus embodying my invention; Fig. 2 is a sectional view taken in the plane of the line 2—2, Fig. 1, portions of the cupola and the dust and trash receptacles being broken away to show the construction of these parts; Fig. 3 is a detail horizontal section through the cupola; and Fig. 4 is a detail view, partly in elevation and partly in vertical central section through the cupola, illustrating the manner of using the apparatus.

Like symbols refer to like parts wherever they occur.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

The suction creating device in the type of apparatus to which my invention relates is a multi-stage fan by means of which a partial vacuum is constantly maintained at the inlet orifices of the cleaning tools when the apparatus is in operation. The suction creating device A of this type illustrated in the drawings embodies a generally cylindrical fan casing 9 which is divided into a series of communicating compartments by transversely extending partitions 10 each of which is preferably provided with a plurality of curved vanes 14 that project outwardly from those faces of the partitions 10 which are nearer the intake end of the casing. Journaled on the casing 9, as, for example, in bearings 17, is a shaft 11 which extends lengthwise of the casing, passing through the centrally disposed circular orifices 15 in the transversely extending partitions 10. Upon this shaft is rigidly mounted a plurality of fans each of which may be conveniently formed as a disk 12 having a plurality of projecting blades 13. Each of the several interior chambers of the casing 9 contains one of these fans, the front edges of the blades 13 thereof being arranged to rotate in proximity to the plane face of the adjacent casing partition 10. The cylindrical area between each fan disk 12 and its adjacent partition 10 on a circle located at 16, at what I term the throat, is preferably approximately equal to the area of the opening 15 in the adjacent partition.

Mounted upon the fan casing 9 and rising vertically therefrom is a cupola 18 within which are housed a plurality of receptacles for arresting and collecting the dust, trash and litter transported by the confined stream of air. For the sake of brevity these receptacles will be hereinafter referred to merely as dust arresters or receptacles.

At its upper end the cupola 18 is provided with an air inlet pipe 19 which, by means of couplings 6, communicates with cleaning tools 33 through flexible tubing or hose 7. The air inlet pipe 19 opens into a receiving receptacle which is preferably in the form of a trap, such trap comprising a casing 20 which extends transversely through the cupola near the top and which is provided with a removable drawer 8 having an open-

ing that communicates with the opening in the casing 20 through which the inlet pipe 19 projects. The inlet pipe 19 which, as shown in Figs. 1 and 2, extends downwardly into the opening through the casing 20 of the dust receiving receptacle, is of somewhat less cross sectional area than the cross sectional area of the opening in the receptacle, thus providing an outlet 21 which permits the air to pass from the dust arrester into a chamber 22 in the upper part of the cupola. A duct or passage 23 extends from the chamber 22 downwardly through the cupola and communicates with the interior of the fan casing 9 at one end thereof. The opposite or outlet end of the fan casing communicates with an outlet conduit or passage 24 which opens into a chamber 25 in the lower part of the cupola 18, the chamber 25 being in communication with a dust arrester or receiving receptacle which, like the dust arrester heretofore described, preferably consists of a casing 26 which is open at the top and within which is movably mounted a drawer 27 having an opening which communicates with the opening in the casing 26. Above this dust arrester and within the cupola is a transversely extending partition having a downwardly extending tubular portion that projects through the opening in the top of the casing 26 of the dust trap or arrester, such tubular portion being of less cross sectional area than that of the opening in the casing 26 to thus form a passage 28 connecting the chamber 25 with the dust arrester and to also form an outlet 29 through which the air may pass from the receiving receptacle to an outlet chamber 30 within the cupola. If desired, a screen 31, as shown, may be arranged within the outlet chamber 30 so as to be interposed between the outlet 29 of the dust arrester and the outlet pipe 32 leading from the outlet chamber 30. The outlet pipe 32 may be connected to a chimney or may discharge directly into the atmosphere. The cleaning tools 33 may be of any desired form. Each of them, as shown in Fig. 4, is connected to the inlet pipe 19 of the apparatus by means of flexible tubing or hose 7. These tools 33, as is well known, are formed with inlet orifices through which the moving air draws dust, trash and litter from the surface or object to be cleaned.

I claim:

1. A cleaning apparatus comprising a casing, said casing being provided with a chamber which is adjacent to and in communication with the air inlet pipe of the apparatus and being also provided with a second chamber which is located below said chamber first named, a suction creating device movably mounted in said casing, a dust arrester arranged vertically above the portion of said casing within which said suction creating device is mounted, said dust arrester being located in that said chamber of the casing which is adjacent to the air inlet pipe of the apparatus and being provided with a dust receiving receptacle into which the air inlet pipe of the apparatus projects, an air inlet pipe opening into said arrester, means for permitting the passage of air from the chamber in which said arrester is located to the interior of the portion of said casing within which said suction creating device is located, and a second dust arrester in communication with the air outlet end of said casing and arranged below the dust arrester first mentioned.

2. A cleaning apparatus comprising a casing, suction inducing centrifugal means revolubly mounted in said casing and involving a plurality of devices successively delivering the same volume of air from one to another and operating to successively increase the density of said air within said casing, a dust receiving receptacle having an imperforate bottom and having an outlet opening in its upper portion, an air inlet pipe opening into said receptacle, the cross-sectional area of the inlet pipe being less than that of the said receptacle to thereby permit a portion of the dirt and trash to settle in said receptacle, and means for permitting the air and finer dust to issue from the outlet opening of the said receptacle and to enter the interior of said casing at one end thereof.

3. A cleaning apparatus comprising a casing, suction inducing centrifugal means revolubly mounted in said casing and involving a plurality of devices successively delivering the same volume of air from one to another and operating to successively increase the density of said air within said casing, a dust receiving receptacle having an opening therein, a drawer movably mounted in said receptacle and having an opening which communicates with the opening in said receptacle, an air inlet pipe projecting into the opening in said receptacle, the cross-sectional area of the inlet pipe being less than that of the opening in said receptacle to thus form an outlet permitting the air and a portion of the dust transported thereby to pass from said receptacle, means for permitting the air issuing from said receptacle to enter the interior of said casing at one end thereof, and an outlet connecting the interior of the casing with the atmosphere.

4. A cleaning apparatus comprising a casing, suction inducing means revolubly mounted in said casing and involving a plurality of devices operating centrifugally to successively displace the air entering said casing and to successively increase its density, an arrester of the settling type adapted to collect a portion of the dirt and trash and

to permit the escape of air and fine dust, means for directing the current of dust-laden air downwardly within said arrester, means for permitting the air and dust issuing from said arrester to pass in a continuous stream to said suction inducing means, and a dust arrester of the dry type communicating with said casing and to which the dust-laden air delivered by the suction inducing means passes after leaving said casing.

5. A cleaning apparatus involving a casing having an inlet opening and an outlet opening, successively acting revoluble means mounted in said casing and operating centrifugally to progressively increase the density of the dust-laden air passing through said casing, and an arrester involving a chamber for collecting a portion of the dirt and trash by deposition due to gravity and adapted to permit the air and the remainder of the dust particles to escape therefrom and enter said casing without substantial resistance.

IRA H. SPENCER.

Witnesses:
ARTHUR P. DAY,
MAY C. CARROLL.