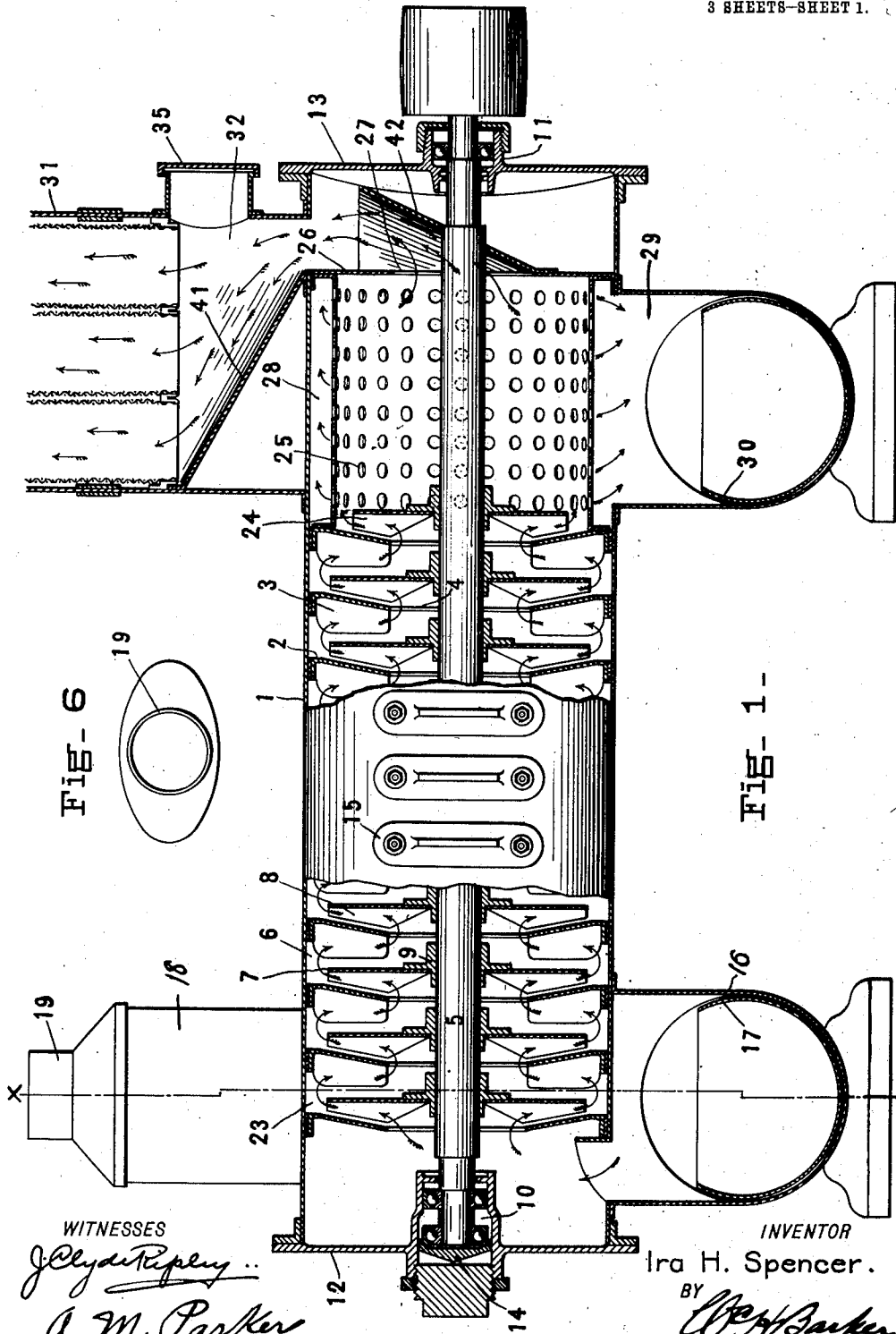


I. H. SPENCER.  
CLEANING APPARATUS AND DUST SEPARATOR.  
APPLICATION FILED NOV. 22, 1907.

1,114,058.

Patented Oct. 20, 1914.  
3 SHEETS-SHEET 1.



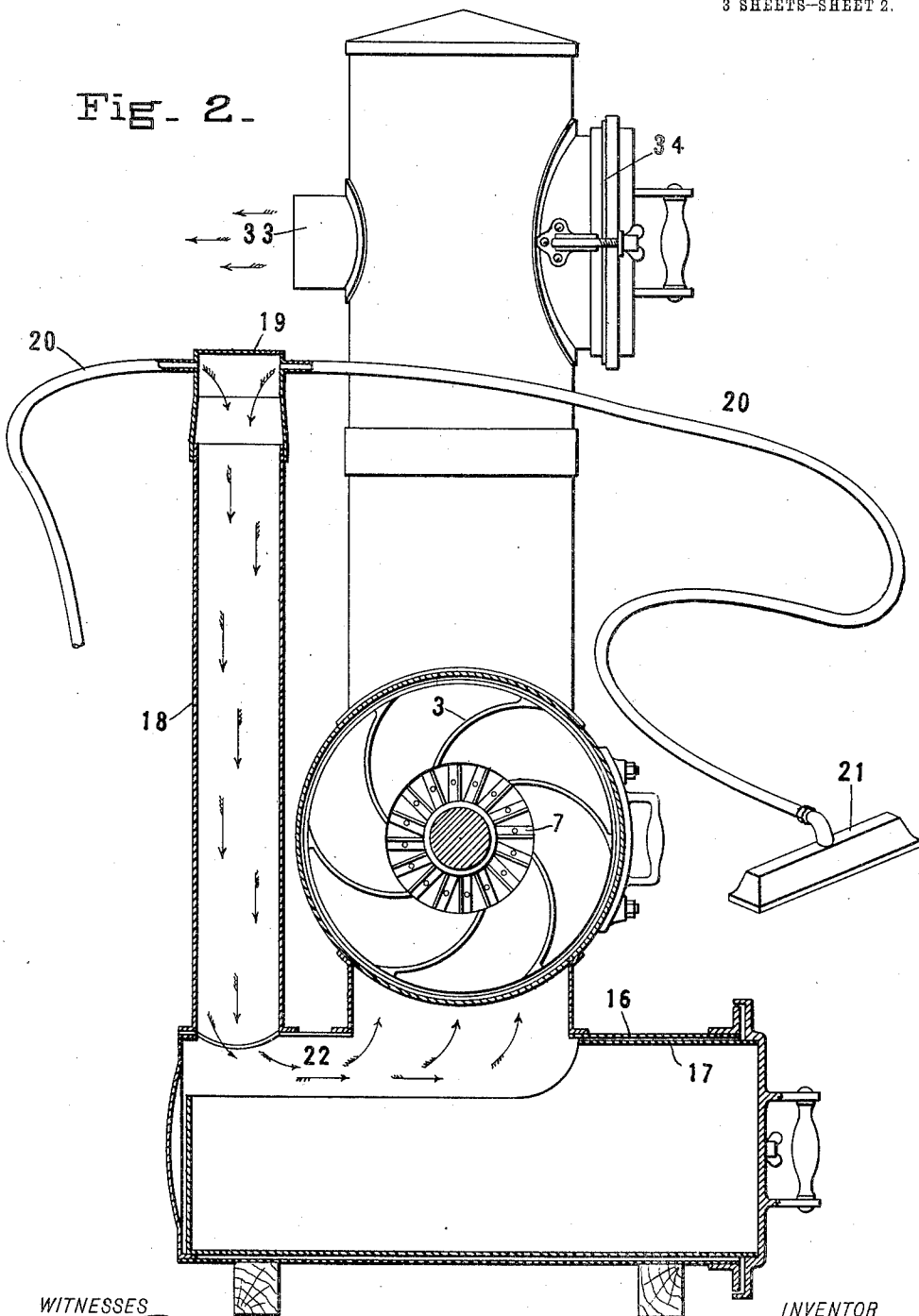
I. H. SPENCER.  
CLEANING APPARATUS AND DUST SEPARATOR.  
APPLICATION FILED NOV. 22, 1907.

1,114,058.

Patented Oct. 20, 1914.

3 SHEETS-SHEET 2.

FIG. 2.



WITNESSES

*J. A. R. R. R.*  
*A. M. Parker*

INVENTOR

Ira H. Spencer.

BY

*C. A. Barker*  
ATTORNEY

I. H. SPENCER.  
CLEANING APPARATUS AND DUST SEPARATOR.  
APPLICATION FILED NOV. 22, 1907.

1,114,058.

Patented Oct. 20, 1914.

3 SHEETS-SHEET 3.

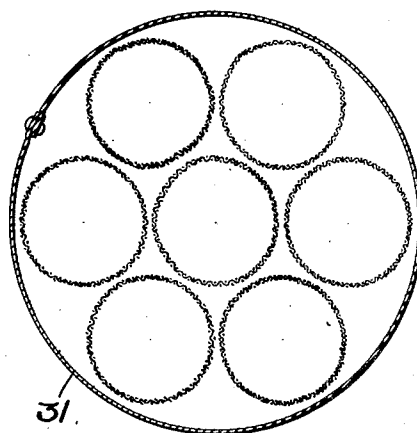
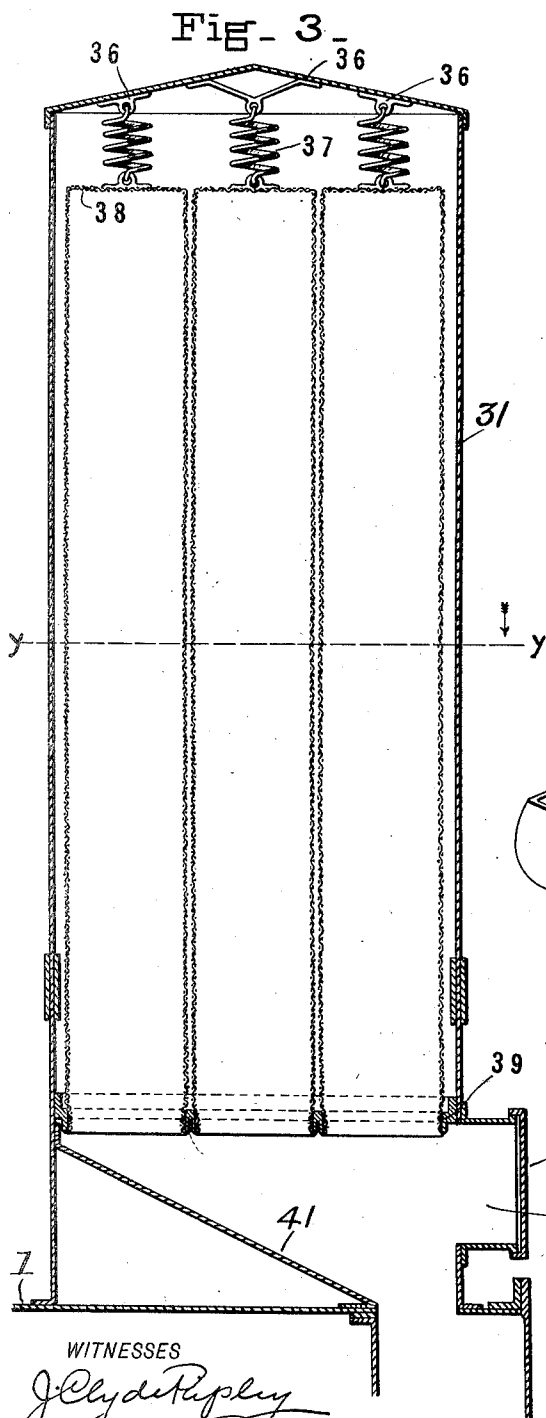


Fig- 4-

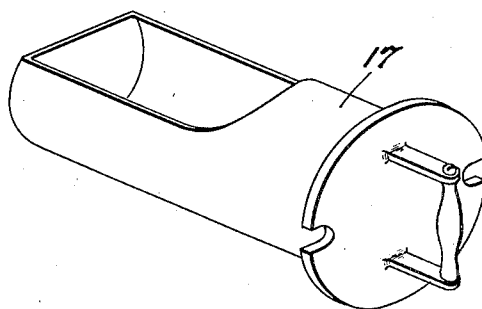


Fig- 5-

WITNESSES

*J. Clyde Ripley*  
*A. M. Parker*

INVENTOR

Ira H. Spencer.

BY

*W. H. Parker*  
ATTORNEY

# UNITED STATES PATENT OFFICE.

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

## CLEANING APPARATUS AND DUST-SEPARATOR.

1,114,058.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed November 22, 1907. Serial No. 403,317.

*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, (whose post-office address is Hartford, Connecticut,) have invented certain new and useful Improvements in Cleaning Apparatus and Dust-Separators, of which the following is a full, clear, and exact description, whereby any one skilled in the art may make and use the same.

The invention relates to cleaning apparatus and dust separators, and more particularly to a device in which the cleaning is effected by a suction and the separation of the particles carried by the moving fluid from said fluid is effected by the centrifugal action of the suction apparatus.

The objects of the invention are to provide a simple and extremely efficient suction inducing apparatus, having inherent features of centrifugally separating all extraneous matter from a given fluid which is drawn in by the suction.

A further object is to provide positive means for maintaining the desired separation of the extraneous material.

A still further object is to provide a suction apparatus which will give free passage of all material drawn into it with positive retarding devices for absolutely purifying the fluid at the exhaust side of the device.

Referring to the drawings: Figure 1 is a partial central sectional view of the apparatus. Fig. 2 is a cross sectional view on the line "X X" of Fig. 1 showing attached cleaning tools. Fig. 3 is a central sectional view of the exhaust chamber and appurtenant retarding screens. Fig. 4 is a cross sectional view through Fig. 3 on the line "Y Y" of said figure. Fig. 5 is a detail perspective view of one of the collecting receptacles. Fig. 6 is a detail plan view of the inlet tube or casing.

One of the particular objects of the present invention lies in the method of separating all matter picked up by the cleaning tools from the fluid passed through the apparatus, and further, to provide efficient cleansing devices appurtenant to the exhaust side of the mechanism.

Referring to the drawings, numeral 1 denotes a casing, within which there is arranged a series of disks or plates 2, pro-

vided with deflector wings 3, and having central openings 4 about a main shaft 5. These plates or disks 2 divide the casing 1 into a series of impeller compartments 6, within which are arranged impeller disks 7 having extended therefrom impeller blades 8. The plates 7 are secured to hubs 9 mounted upon and rotatable with the main shaft 5. This main shaft 5 is mounted in anti-friction bearings 10—11 arranged in headers 12—13 which form the ends of the casing 1. A thrust bearing 14 is provided at one end of the shaft 5 to maintain the impellers in predetermined and proper running alignment with reference to the deflector plates.

For convenience the casing 1 is provided with a series of covers 15 which overlie openings in said casing and give access to each of the impeller chambers. This provides a ready means of ingress to either of the chambers. Adjacent to the inlet side of the casing 1 is a transversely disposed receiving casing 16, provided with a removable tray or box of tubular form 17. The tubular casing 16 arranged transversely of the main casing 1 extends beyond it and has rising from one end a tubular inlet pipe 18 which is preferably of elliptical form, giving an area many times greater than the inlet tube or dome 19. To this inlet tube 19 may be attached any desired number of cleaning tubes 20, which may be attached to any desired form of cleaning tool, one form of which is illustrated at 21.

By having the inlet tube or pipe 18 of larger area than the inlet pipe 20, the fluid will move more slowly down through said tube when the suction is induced by the impellers. This slow movement of the air at the entering side of the suction apparatus will permit all heavier particles of material carried by the incoming fluid to drop into the receptacle 17.

The inlet tube or pipe 18 is preferably located at one side of the impeller casing 1, and owing to the transverse intersection of the casing 16 with the casing 1 the fluid must take a short turn when passing from the inlet tube 18 to the interior of the impeller casing. Thus the fluid is sucked about a sharp turn 22 and will deposit in the receptacle 17 all of the heavier matter carried in suspension. The fluid after passing the sharp turn 22 passes into the first impeller chamber 23 and from there is suc-

60

65

70

75

80

85

90

95

100

105

110

cessively carried through the various impeller chambers to an impeller 24. This impeller 24 is not backed up by a deflector plate and deflector wings, but is somewhat smaller in diameter than the other impellers and rotates within a perforated tubular chamber 25. This chamber 25 is provided with a header 26 having a central opening 27 and being smaller in diameter than casing 1 provides an annular chamber 28. At one side of said chamber 28 and connecting therewith is a chamber 29, within which is located a receiver 30 similar in form and arrangement to the receiver 17, heretofore described.

Appurtenant to the casing 1 is an exhaust casing 31 which communicates with the interior of the impeller casing 1 through a passage 32 and the central opening 27 of the plate or header 26. The exhaust casing 31 is provided with an outlet 33 and hand-holes 34-35 to give access for the purposes of inspection, cleaning and adjustment. The hand-hold 34, is arranged adjacent to the upper portion of the exhaust casing and gives access above the tubular screens while the hand-hold 35, is arranged adjacent to the bottom of the exhaust casing and gives access below the tubular screens hereinafter described. These hand-holds are of course covered with suitable removable caps or doors which may be locked in any desired manner.

Arranged at the top or dome of the exhaust casing are a number of supports 36, to which are secured resilient supporting members 37, which at their opposite ends are connected to tubular screens 38. These tubular screens at their lower end are secured in a base plate 39 secured at the bottom of the exhaust casing and open into the chamber or air passage 32 communicating with the interior of the impeller casing. The tubular screens may be arranged in any desired number or juxtaposition, and it will be noted that by using a plurality of tubes within the exhaust chamber, the screening area is very materially increased.

The impregnated fluid entering the inlet tube or pipe, first deposits its heavier particles of material in the receptacle 17 as it passes the sharp turn 22, then as it is drawn into the various impeller chambers, it is finally thrown out to the impeller 24 which is located in the perforated cylindrical chamber 25. Its movement through the impeller casing toward the outlet chamber is very slow, while its rotary or swirling movement induced by the last impeller 24 is very rapid. In fact, the fluid will be caused to revolve many thousand times inside the perforated cylindrical chamber before it finally reaches the outlet opening 27. During this high rotary movement practically all of the impregnating material will be thrown off

from the fluid and find its way through the perforations of the chamber into the annular chamber 28, and from there to a receptacle 30 located below it. As the center of the vortex of the whirling fluid is at the opening 27 and said fluid must pass there-through, it is apparent that only the most insignificant and finest particles carried in suspension will be borne through said opening and up into the tubular screens 38. These tubular screens or retarders 38 are of such a texture as to prevent the passage of even the finest particles to the exhaust chamber and exhaust outlet 33. Whatever accumulation of fine dust there may be in the tubes 38 may be shaken down over deflector plates 41 and 42 through the perforated cylindrical chamber into the receptacle 30. Obviously, the exact details and arrangements possible might be varied to suit the exigencies of any particular case without departing from the spirit or intent of the invention.

Attention is particularly called to the advantages in providing, first for the removal of heavy particles borne by the fluid, the free passage of said fluid through the suction inducing apparatus, the separation by centrifugal action of all of the appreciable impregnating material by a rapid swirling action, and the perfect cleansing provided by a positive separator having an extremely large area.

My improved separating apparatus is such that no matter what the character of the fluid or how completely it may be impregnated with extraneous matter, there will be no clogging of the positive separator or retarding screens, such as will make the apparatus inefficient in its work. In fact, the cleaning tools may be of a proper design for scrubbing and may be used in connection with water. Owing to the large volume of air taken in through said tool the muddy or dirty water may be instantly picked up and the surface being scrubbed, will be almost instantly dried. This muddy water will be thrown off before it has clogged the final collecting screen or retarder.

The device herein shown and described, while similar to a device shown in co-pending application for "suction cleaner and dust separator" Serial No. 403,318, filed Nov. 22nd, 1907, and an application for "method and apparatus for collecting and separating dust" Serial No. 403,319, filed Nov. 22nd, 1907, claims only the invention herein shown and described and forms no part of the inventions of the co-pending applications.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a dust separating apparatus, a casing having an inlet and an outlet, means within said casing for creating a suction or vacuum and for imparting a rotary movement to a volume of air, and a tubular perforated

member constituting a vacant chamber located between the suction apparatus and the exhaust for flow of air out at the end of said tubular member, and through which said volume of air is forced.

2. In a dust separating apparatus, a casing having an inlet and exhaust, a rotating member within the casing for creating a suction, a tubular perforated member constituting a vacant chamber located between the rotating member and exhaust and of a size in diameter greater than that of said rotating member and out at the end of which a volume of air is forced to the exhaust.

3. In a dust separating apparatus, a casing having an inlet and an exhaust, a rotary means within said casing for creating a suction, a tubular perforated member constituting a vacant chamber located beyond the rotary means and through and out at the end of which a volume of air passes to the exhaust, and a receiver located under said perforated member.

4. In a dust separating apparatus, a casing having an inlet and an exhaust, rotary means located within the casing for creating a suc-

tion, a tubular perforated member constituting a vacant chamber located between the rotary member and exhaust for flow of air out at the end of said tubular member, said casing having a passage leading from the end of said tubular perforated member to the exhaust, and a receptacle located opposite the tubular perforated member.

5. In a dust separating apparatus, a tubular case having an inlet opening at one end and an exhaust opening at the opposite end, a tubular perforated member smaller in diameter than the case and located at the exhaust opening through which tubular member from end to end air passes to the exhaust opening, a rotary member located at one end of said tubular member to impart rotary movement to the air passing through said tubular member, and a receptacle located underneath and opposite the side of said tubular member to receive matter passing through the perforation therein.

IRA H. SPENCER.

Witnesses:

WILBUR V. PAINE,  
ARTHUR P. DAY.