July 26, 1927. 1,636,949

E. M. BASSLER

SPRAYING APPARATUS

Filed April 17, 1924 2 Sheets-Sheet 1

Fig. 1.

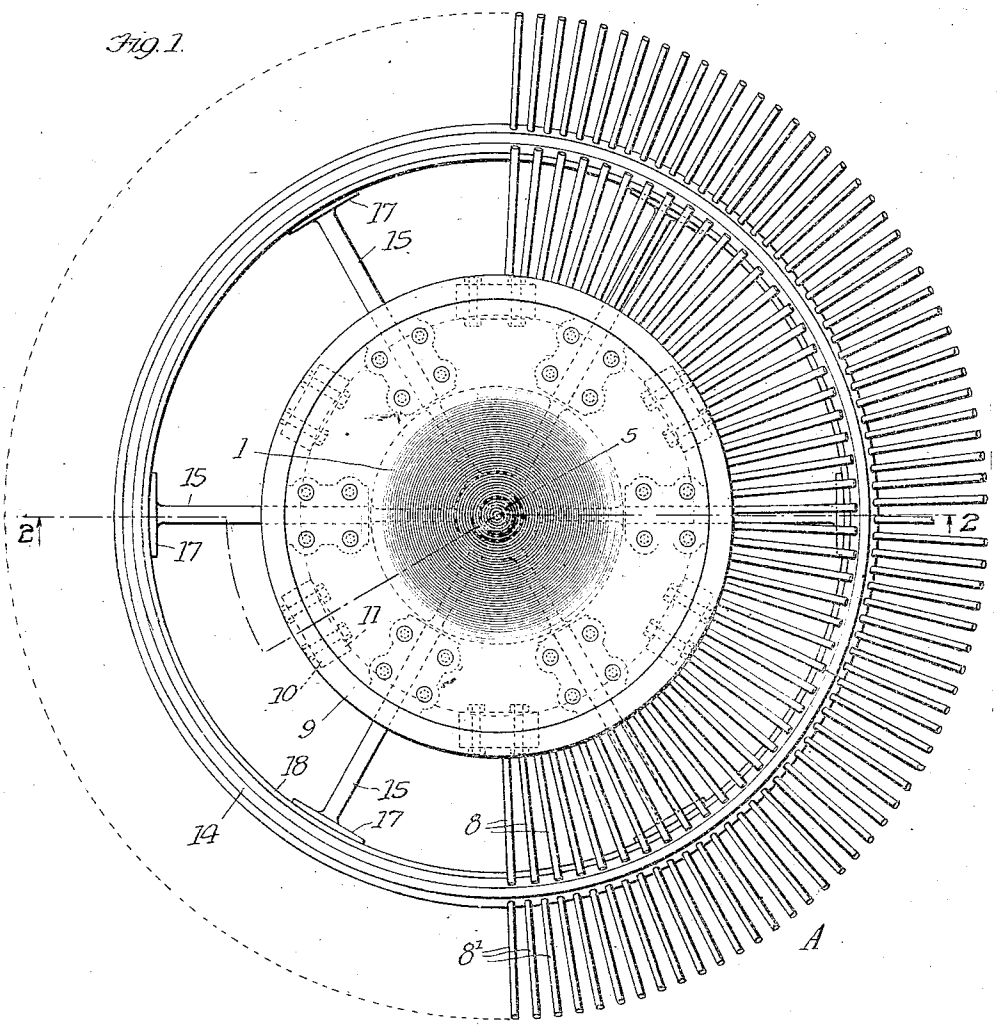
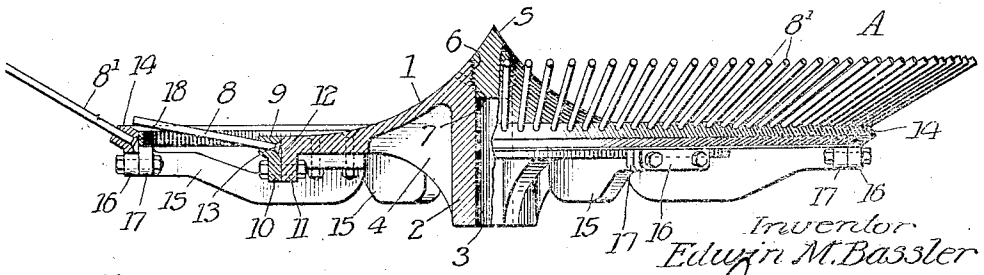


Fig. 2.



Witness
Martin H. Olsen.

Inventor
Edwin M. Bassler
By Wm. T. Waldo
Atty.

July 26, 1927. 1,636,949

E. M. BASSLER

SPRAYING APPARATUS

Filed April 17, 1924 2 Sheets-Sheet 2

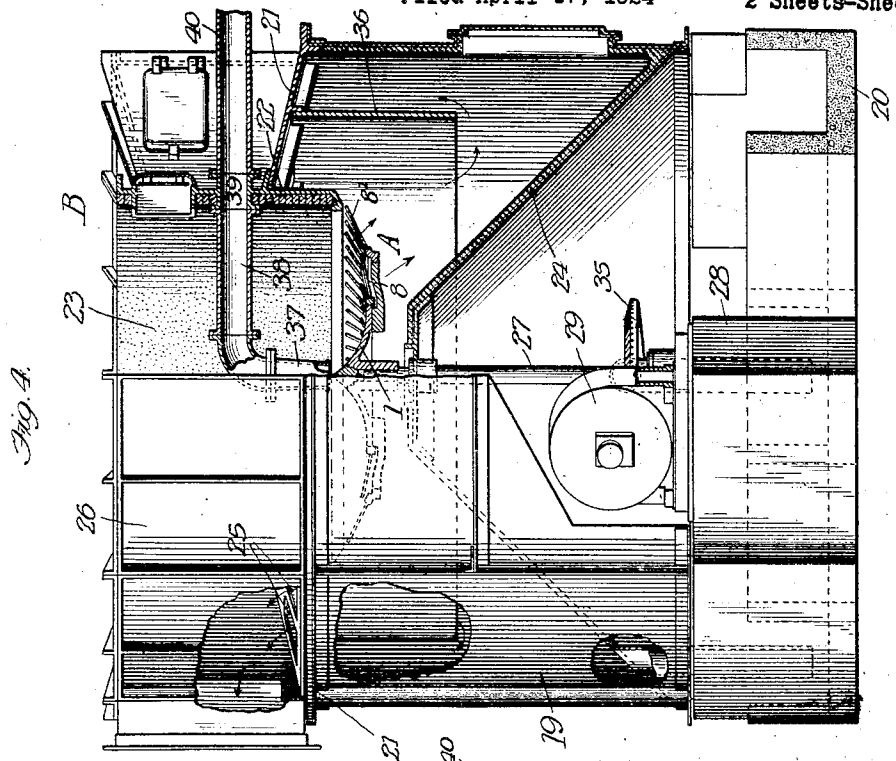


Fig. 4.

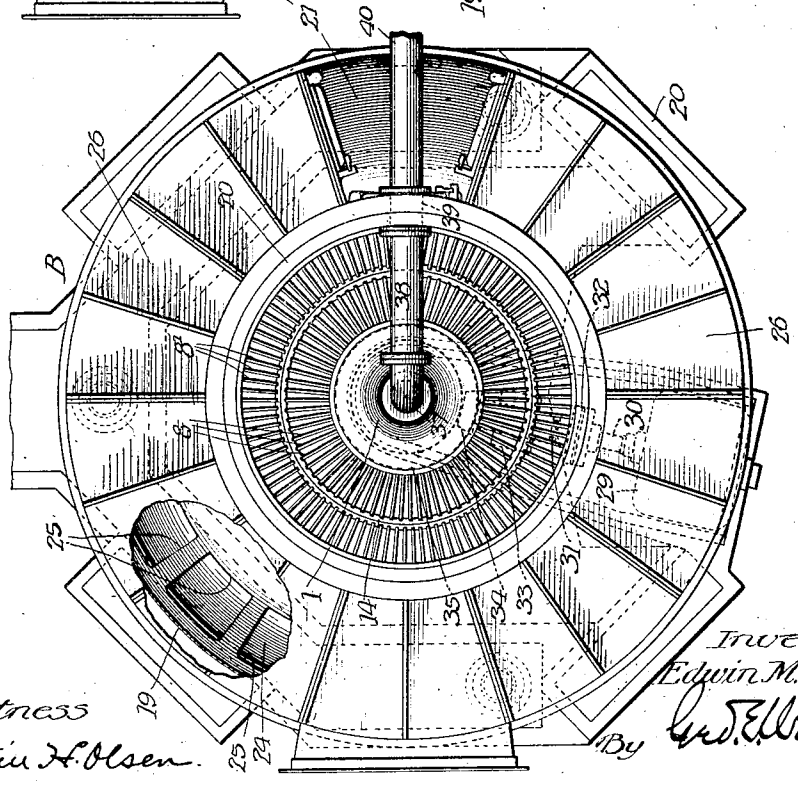


Fig. 3.

Witness
Martin H. Olsen.

Inventor
Edwin M. Bassler
By Geo. E. Wald
Atty

Patented July 26, 1927. 1,636,949

UNITED STATES PATENT OFFICE.

EDWIN M. BASSLER, OF MILWAUKEE, WISCONSIN.

SPRAYING APPARATUS.

Application filed April 17, 1924. Serial No. 707,080.

This invention relates to spraying apparatus of the general type which forms the subject-matter of U. S. Letters Patent No. 1,560,527, dated November 10, 1925, issued to me for improvements in spraying apparatus, and relates particularly to spraying runners therefor.

Spraying apparatus of the type specified is particularly well adapted for clarifying air and gas by removing therefrom dust and other solid particles of dirt contained therein.

In the use of spraying apparatus of this general type, the runner forming part of the apparatus is mounted within a trunk, conduit or housing through which a current of air or gas to be clarified or scrubbed is adapted to pass, a common arrangement being one in which the runner is mounted just beyond the inner end of the air or gas intake of a housing forming part of the apparatus, in position to define a space between the periphery of the disk portion of the runner and the inner end of the air or gas intake, across which the pins of said runner will extend, their outer or free ends terminating in close proximity to the wall of said intake, so that all of the air or gas to be treated will pass between said pins and will be subjected to a beating action thereby coincidentally with the conversion of the water or other liquid used into spray, and will become thoroughly mixed and intermingled with such spray so that the solid particles will become wet. Said spraying runner is preferably surrounded by a baffle against which the mixed spray and wet solid particles will be projected at high velocity, the impact of said mixture against said baffle and material previously deposited thereon, operating to hold the mixture upon the surface of said baffle for a short interval of time, sufficient, however, to thoroughly wet the solid particles contained therein and to cause them to adhere to the baffle, from which they will be washed down into a suitable receptacle provided for the purpose, with the water formed by the accumulation of spray particles on said baffle. Said baffle will operate, in an obvious manner, to prevent entrainment of spray particles with the air or gas.

Described generally, spraying apparatus of the type to which my invention relates comprises a runner consisting of a central disk portion which forms the body of the runner and pins secured in said disk at a distance from its axis of rotation, said pins being preferably arranged in a circular series concentric with the axis of rotation of said disk.

One object of the present invention is to provide a runner for spraying apparatus of this general type, in which the disk portion of said runner will be relatively very small as compared with the overall dimension thereof and also of the air intake of the apparatus or other trunk or conduit to which my improved spraying apparatus is applied, whereby said runner will obstruct or throttle said intake, trunk or conduit to a relatively small extent while, at the same time, maintaining full efficiency of said runner.

A further object of the invention is to increase the efficiency of runners of the general type specified, whereby, for a given duty, the size of the runner may be very much reduced as compared with runners of the particular type shown and described in my said prior Patent No. 1,560,527, having a single set of pins, thereby effecting a corresponding saving in the cost of the runners, both in material and labor, while, at the same time, rendering it much easier to handle runners designed for treating large volumes of air or gas.

In accordance with my invention, I attain the objects thereof by the use of a runner comprising a plurality of sets or series of spraying pins arranged concentric with the axis of rotation of said runner and at different distances therefrom, the free ends of the inner set or series terminating adjacent to the attached ends of the outer series and in such relation thereto that spray from the inner set or series of pins will be discharged across the path of movement of the outer set or series. It is found in practice that a spraying runner constructed as described has a much higher efficiency than the runner of my said prior Patent No. 1,560,527, of the same size, and that under the same conditions, it has a capacity for treating at least twice the volume of air or gas as the runner of my said prior application.

The invention also comprises the various other features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which

spraying apparatus embodying my invention and improvements is fully illustrated,

Figure 1 is a face view of a runner embodying my invention and improvements.

Figure 2 is a side view thereof, partly in elevation and partly in section on the line 2—2 of Fig. 1.

Figure 3 is a top plan view of an air or gas washing and scrubbing apparatus comprising a runner of my invention, parts thereof being broken away; and

Figure 4 is a side view, partly in elevation and partly in vertical central section.

Describing the runner of my improved spraying apparatus, to which the present invention particularly relates and which is designated as a whole A, 1 is a disk forming part of the frame or body portion of said runner, preferably made of cast iron or other suitable cast metal, the front face thereof being substantially conical in shape, the apex of the cone being concentric with the axis of rotation of the runner, and the sides of said cone being slightly concave.

Formed on the rear side of the disk 1 is a hub 2 provided with a hole or opening 3 adapted to receive the shaft for mounting said disk. Said hub is preferably connected to the body portion of said disk 1 by ribs 4 which render the entire structure relatively light and at the same time very strong and rigid.

The apex of the conical front side of the disk 1 comprises a separate section 5, preferably made of bronze removably secured in the end of the hole or opening 3 in the hub 2, which extends entirely through the hub 2 and disk 1, said apex portion 5 having screw threaded engagement with an enlargement of said hole or opening, as shown at 6, and comprising a reduced inner portion 7 closely fitted to the hole or opening 3. When the apex portion 5 is removed, the screw threaded hole 6 provides convenient means for making lifting connections to said runner.

My improved runner also comprises two sets of spraying pins designated, respectively, 8, 8′.

The pins 8 are secured in the perimeter of the disk 1 and are flared frontwards relative to the face thereof at a wide angle to its axis of rotation.

In the preferable construction shown, the pins 8 are secured directly in a ring 9, which forms a detachable portion of the disk 1, being fitted to the perimeter thereof and secured thereto by lugs 10 thereon which are bolted or otherwise secured to corresponding lugs 11 on the disk 1. Said ring will desirably be made of bronze. Convenient means for thus securing the pins 8 in the ring 9 consist in forming holes in said ring at proper angles, to which the pins 8 are fitted and through which they are inserted before said ring is secured in position on the disk 1, the inner ends of said holes being countersunk as shown at 12, and the pins having correspondingly-tapered heads 13, the relation being such that when the pins are inserted through the holes in said ring and said ring is adjusted and secured to the disk 1, the heads of said pins will bear against the perimeter of said disk.

The pins 8′ of the outer set or series, are secured in a ring 14 supported at the outer ends of arms 15 bolted or otherwise rigidly secured to the disk 1. As shown, lugs 16 formed on the ring 14 are bolted to corresponding lugs 17 formed on the ends of the arms 15.

The pins 8′ are secured in the ring 14 in substantially the same manner that the pins 8 are secured in the ring 9, being retained therein by a ring 18 secured to the inner side of said ring 14 so as to extend over the countersunk inner ends of the holes in which the tapered heads of said pins 8′ are secured.

The pins 8 and the arms 15 are made of such relative lengths that the outer ends of the pins 8 will terminate at or adjacent to the attached ends of the pins 8′ of the outer set or series.

The inner set or series of pins 8 are frontwardly and outwardly flared, the relation being such that spray formed thereby will be discharged across the path of movement of the outer set or series of pins 8′, preferably in such manner that the larger volume thereof will be discharged upon said outer set or series of pins adjacent to their attached ends.

I have found in practice, that the best results are obtained with the use of pins which flare at a wide angle relative to the axis of rotation of said runner, the inner set or series of pins preferably flaring at a greater angle than the outer set or series of pins.

What I now consider a preferable and desirable relation is one in which the pins 8 flare at an angle of approximately 80 degrees and the pins 8′ at an angle of approximately 60 degrees to the axis of rotation of said runner.

This relation, however, admits of variation within considerable limits.

In practice, the pins of both sets or series are spaced relatively short distances apart, the distance between said pins increasing outwardly, owing to the flare of the pins. In practice, I have found a desirable relation to be one in which the distance between said pins—both of the inner and outer series, at their attached ends, is substantially equal to the diameter of the pins, a desirable size of pins for most purposes being about ¼ of an inch in diameter.

In Figs. 3 and 4, I have for purposes of clear and definite illustration shown my im-

proved runner embodied in an apparatus adapted for washing or scrubbing air or gas, said apparatus comprising a main housing, which may be made of sheet metal or other suitable material, designated as a whole B. Said housing comprises cylindrical side walls 19, the lower ends of which rest upon suitable supports or piers 20, preferably made of concrete, and the upper end of which is closed by a top wall 21 preferably made of cast iron provided with a central opening secured in which is a short, hollow open ended cylinder or thimble 22, the opening 23 through which forms the air or gas intake of the apparatus. Where the apparatus is designed for washing or scrubbing gas, other than air, a suitable supply pipe or flue is adapted to be connected to the outer end of said cylinder 22.

The lower end of the housing B is closed by means of a sheet metal bottom 24 which is made in the shape of a truncated cone, the lower end thereof being secured to the lower end of the side walls 19 of the housing B.

The housing B is also provided with discharge openings for the washed or scrubbed air or gas consisting, as shown, of holes or openings 25 formed in the top wall 21 of the housing adjacent to its outer edge. Said discharge openings communicate with a bustle pipe 26 adapted to connect said housing with a fan or blower of any usual type or design, not shown, adapted to create a current of air or gas to be treated through the housing of the apparatus.

My improved runner A is mounted directly below the inner end of the cylinder 22 which defines the intake 23 of the housing B. As shown, said runner is mounted at the upper end of an upright shaft 27, having bearings in the flat upper end of the bottom 24 and on a concrete base or foundation 28. Rotation is adapted to be imparted to the shaft 27 and runner A secured thereto by a motor, indicated at 29, mounted on the foundation 28, the rotor shaft 30 of which is connected to a pinion shaft 31 by means of a flexible coupling 32. The pinion shaft 31 is mounted in a bearing 33 on the foundation 28 and secured thereto is a bevel pinion 34 which meshes with a bevel gear 35 secured to the shaft 27.

The disk 1 of the runner A is relatively much smaller than the intake 23 of the housing B and is preferably positioned beyond the inner end of the intake cylinder or thimble 22, the relation being preferably such that the free area of the space between the periphery of said disk and the inner end of said cylinder or thimble will be substantially equal to the transverse area of said intake. Also, the pins 8, 8′ and the arms 15 are proportioned so that the outer ends of the outer set or series of pins 8′ will extend into close proximity to the inner end of the cylinder 22 forming the intake 23, so that all air or gas entering the housing B through said intake will pass between the pins 8, 8′ of the apparatus.

Surrounding the spraying runner A at a distance therefrom and between said runner and the discharge openings 25 through which the washed air or gas passes from the housing B into the bustle pipe 26 is a baffle 36.

Water is adapted to be projected axially against the apex of the conical front face of the disk 1 of the spraying appartus from a nozzle 37 supported at the end of a pipe section 38 which is connected to a flanged connection 39 on the cylinder 22, the outer end of which is adapted to be connected with a source of supply of water or other liquid under pressure by a pipe 40.

Suitable drainage connections for the housing B are provided at its lower end, but said connections form no part of the present invention and for that reason are not shown.

In operating the apparatus, the motor 29 is first started and when the spraying runner A is rotating at desired speed, the water is admitted to the pipe 30 from which it is discharged against the conical face of the disk 1 through the nozzle 37 and, as soon as a suitable spray curtain is produced across the space traversed by the air or gas to be washed, the blower applied to the bustle pipe 26 is started, thus putting the entire apparatus into operation.

The water or other liquid projected against the conical face of the disk 1 will be spread out over the face of said disk in the form of a thin sheet, in which form it will pass off from said disk and into the path described by the inner set or series of the pins 8 by which it will be subjected to a combined beating and centrifugal action which, as previously explained, will convert the water into spray and will project the spray particles outwardly into the path of movement of the outer set or series of pins 8′ which, owing to their greater peripheral speed, will in turn, subject the spray particles to a further beating and centrifugal action, which will reduce them to a spray of desired fineness.

The runner A will operate to throw the spray particles formed thereby, together with the air or gas entering the housing B through the intake 23, outwardly at high velocity and will produce a thorough mixing or intermingling of the air or gas, particularly the solid particles contained therein, with the spray particles, thus wetting said solid particles and causing them to be thrown against the baffle 36, where they will be held for a short interval of time, sufficient, however, so that said solid particles will become thoroughly wet and will ultimately be washed down from the baffle into

the lower end of the housing B by the water formed by the accumulation of spray thereon.

The baffle 36 will also prevent entrainment of spray particles by the current of air or gas into the air and gas discharge connections of the apparatus.

Extended comparative tests and experiments in actual use have demonstrated that with the use of my improved spraying runner—having two sets or series of pins—substantially the same efficiency and results may be obtained with a runner having an over-all diameter of approximately six feet (6'), as can be obtained with a runner comprising only one set or series of pins, having an over-all diameter of from ten (10) to twelve (12) feet, under substantially similar operating conditions.

The air and gas washing apparatus shown in Figs. 3 and 4 of the drawings and described in the specification is not herein claimed, for the reason that it forms the subject-matter of and is fully shown, described and claimed in an application for U. S. Letters Patent therefor heretofore filed by me on or about August 20, 1923, and numbered serially 658,360, to which reference is here made in accordance with the provisions of rule 43 of the Patent Office Rules of Practice.

I claim—

1. A runner for spraying apparatus of the type specified, comprising a body portion, a plurality of outwardly-flared sets of spaced pins which project from said body portion at different distances from its center, said body portion comprising a central disk in which the innermost set of pins is secured and against which liquid is adapted to be discharged in operation, the free ends of the pins of an inner set being positioned in such relation to the pins of an adjacent outer set that spray from the inner set of pins will be discharged across the path traversed by the pins of said adjacent outer set.

2. A runner for spraying apparatus of the type specified, comprising a body portion, a plurality of outwardly-flared sets of spaced pins which project from said body portion at different distances from its center, said body portion comprising a central disk in which the innermost set of pins is secured and against which liquid is adapted to be discharged in operation, the free ends of the pins of an inner set terminating adjacent to the attached ends of the pins of an adjacent outer set, the relation being such that, in operation, spray from the inner set of pins will be discharged across the path traversed by the pins of the adjacent outer set.

3. A runner for spraying apparatus as specified in claim 1, which comprises only two sets of pins.

4. A runner for spraying apparatus as specified in claim 1, in which the different sets of pins are arranged in circular series.

5. A runner for spraying apparatus as specified in claim 1, in which the different sets of pins are flared at different angles to the axis of the runner, the inner set being flared at a greater angle than the adjacent outer set.

6. A runner for spraying apparatus as specified in claim 1, in which the diameter of the central disk is relatively much less than the overall diameter of the runner.

7. A runner for spraying apparatus as specified in claim 1, in which the number of pins in each set increases successively from the innermost set outwards.

8. A runner for spraying apparatus as specified in claim 1, in which the pins of different sets are spaced substantially equal distances apart.

9. A runner for spraying apparatus as specified in claim 1, in which the pins of different sets are of substantially equal length.

10. A runner for spraying apparatus of the type specified, comprising a body portion, a plurality of outwardly-flared sets of spaced pins which project from said body portion at different distances from its center, said body portion comprising a central disk in which the innermost set of pins is secured and against which liquid is adapted to be discharged in operation, the free ends of the pins of an inner set being positioned in such relation to the pins of an adjacent outer set that, in operation, spray from the inner set of pins will be discharged across the path traversed by the pins of said adjacent outer set, arms secured to said disk and a ring secured to said arms in which an outer set of pins is secured.

11. A runner for spraying apparatus as specified in claim 10, in which the means for securing said pins in said body portion comprises a circular seat formed on said body portion, and a ring secured to said seat, said ring being provided with holes through which said pins are inserted, the inner ends of said holes being countersunk and the pins having correspondingly tapered heads, contact of the heads of said pins with the seat on the body portion of the runner when said ring is adjusted thereto operating to secure said pins in said holes.

In witness that I claim the foregoing as my invention, I affix my signature this 28th day of March, A. D. 1924.

EDWIN M. BASSLER.