G. W. CHRISTOPH.

FAN BLOWER.

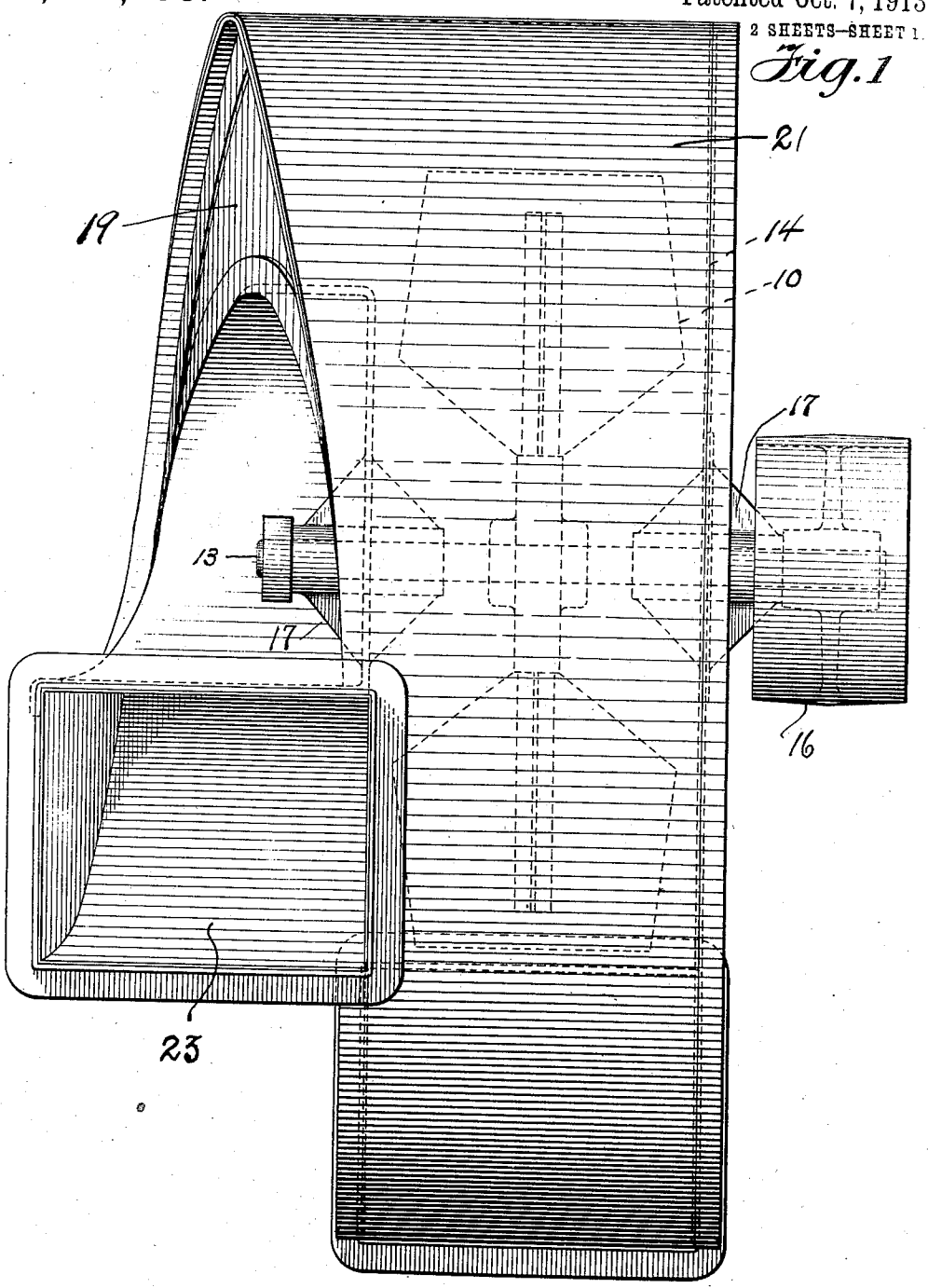
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1,074,606.

Patented Oct. 7, 1913.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses;

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2 SHEETS—SHEET 2.

Fig. 3

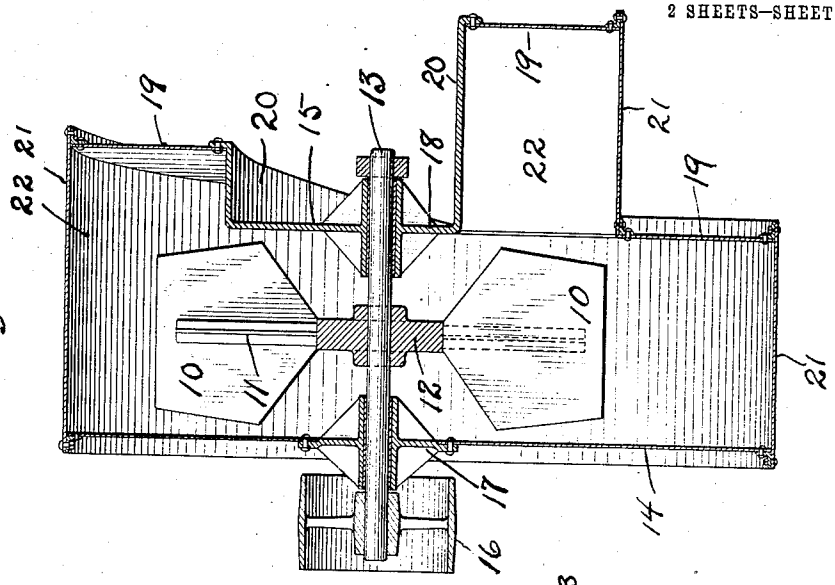
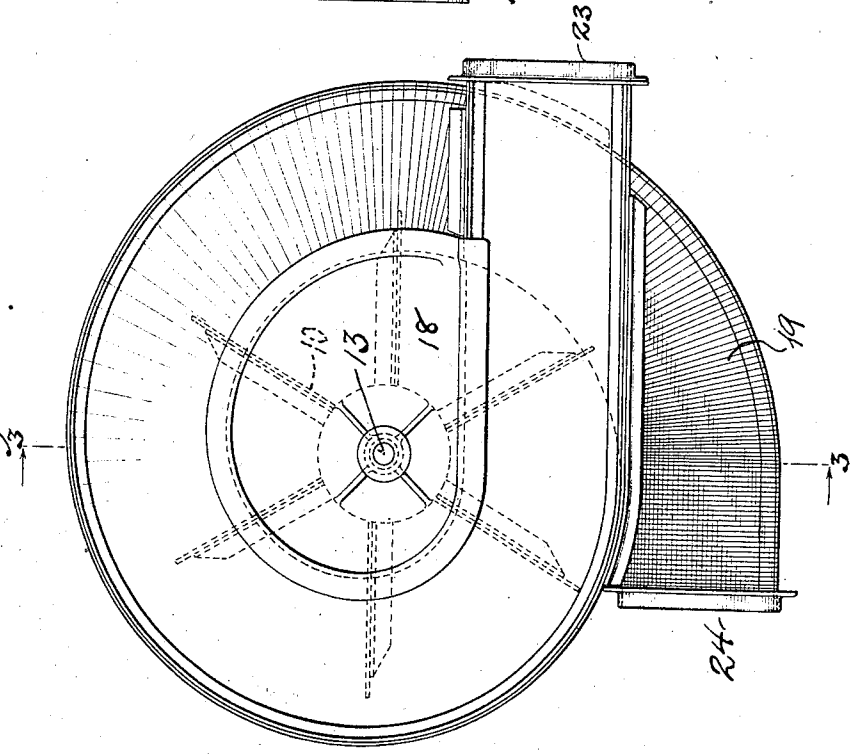


Fig. 2



Witnesses;

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UNITED STATES PATENT OFFICE.

GEORGE W. CHRISTOPH, OF HARTFORD, CONNECTICUT, ASSIGNOR TO STERLING BLOWER COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

FAN-BLOWER.

1,074,606. Specification of Letters Patent. Patented Oct. 7, 1913.

Application filed September 12, 1912. Serial No. 719,928.

To all whom it may concern:

Be it known that I, GEORGE W. CHRISTOPH, a citizen of the United States, residing in Hartford, Connecticut, have invented the following-described new and useful Improvements in Fan-Blowers.

This invention relates broadly to centrifugal air and gas pumps and more particularly to a type commonly known as fan blowers and employed for compressing, exhausting or transferring air or other gases.

My improved blower is especially adapted for transferring gases laden with small particles of solid matter, such, for instance, as the coal dust in producer gas, emery dust from polishing machines, sawdust from wood-working machinery, or the like. By my invention I seek to avoid the direct contact of the solid matter with the blades and bearings of the rotor, and thus avoid the injuries and objectionable abrasive action which these dusts often have upon the rotor. In carrying out my invention, I take advantage of the fact that these particles are heavier than the gaseous medium which carries them, and are more directly influenced by centrifugal force and gravity.

My invention relates particularly to the construction of the casing encircling the fan or other rotor and contemplates the provision of a fair-way through which the gases and solids may pass and be directly acted upon by the rotor, but in which the solid matters may travel along a path out of the range of the blades, so as to avoid, or to a large extent reduce, the direct contact or impingement of the solid particles on the blades or other parts of the rotor. This passage in the preferred construction of the casing extends along a curved path around the rotor from an approximately tangentially-directed inlet at one side of the rotor outwardly in a radial direction and laterally in the direction of the axis of rotation to a tangentially-directed outlet. The gases are first acted upon while at the side of the rotor, the action being due in part to the frictional contact with the gases between the blades of the rotor. As the passage begins to curve around the axis, the solid particles while tending to continue moving in a straight line, come to the outer or peripheral portion of the passage, and as the passage curves in the direction of the axis, the solid particles tend to stay at the side farthest away from the rotor. The passage constitutes a fair-way which is largely or entirely at one side of the rotor at the inlet and is largely or entirely beyond the periphery of the rotor at the outlet. At all points along the fair-way there is sufficient free space out of the path of the blades and along which the solid particles may travel without being in direct contact with the blades, and this passage is so formed that the solid particles naturally tend to follow walls farthest from the rotor. At no point along the passage do the gases make any sharp angle turn as the tangential inlet and outlet passages are connected by a curved loop which merges into both passages. Preferably, the passage along which the gases and solid bodies travel upon entering, is substantially horizontal and below the axis of rotation and curves up and back over the rotor, so that the wall which constitutes the bottom or floor of the inlet passage becomes the outer or peripheral wall of the passage as it encircles the rotor. Thus, I take advantage of the action of gravity, which tends to keep the solid particles in the lower portion of the entrance passage and facilitates maintaining them in the outer or peripheral portion of the passage beyond the fan blades. The passage preferably constitutes a single complete helical loop, although it need not necessarily extend all of the way around. It also constitutes a spiral loop as successive points along its peripheral wall are at increasing distances from the axis of rotation.

One embodiment of my invention is illustrated in the accompanying drawings forming a part of this invention and to which reference is to be had. Inasmuch as various changes may be made in details of construction, I wish these drawings considered in an illustrative rather than in a limiting sense.

In the drawings Figure 1 is an edge view of a fan blower constructed in accordance with my invention, the view being taken in the direction of the inlet passage; Fig. 2 is a side elevation on a somewhat smaller scale and showing the left-hand side of the fan blower shown in Fig. 1, and Fig. 3 is a longitudinal section on the line 3—3 of Fig. 2.

My invention resides primarily in the construction and arrangement of the casing and the relationship of this casing to the

rotor. The rotor may be of any desired character, inasmuch as I do not claim any improvement therein. As shown, a plurality of blades 10 are carried by radially-disposed spokes or arms 11. These arms are carried by a hub 12 mounted on a shaft 13 journaled in the end walls 14 and 15 of the casing. The rotor may be driven in any suitable manner, one simple means includes a drive pulley 16 on one projecting end of the shaft 13 and adjacent to the end wall 14. The casing itself may be made of wood, cast metal or any other suitable material, but is preferably formed of sheet metal and includes a plurality of sections properly secured together. The end wall 14 is substantially flat and in a plane at right angles to the axis of rotation of the rotor, and may carry a suitable casting 17 forming one journal box for the shaft. The opposite end wall includes a central portion 18 and a second or outer peripheral portion 19. The former may be of cast metal and may include a second bearing for the shaft. This central portion is preferably substantially parallel to the opposite end wall 14 and is spaced therefrom a distance slightly greater than the width of the blades of the rotor. The second or outer section 19 lies substantially in the same plane as the central section 18 at one point, for instance, below the axis, and curves helically, that is, in the direction of the length of the axis until after encircling the axis it is spaced from the plane of the central section 18 a distance substantially equal to the width of the inlet or to the distance between the end wall 14 and the central section 18. At the same time that this end wall section 19 curves around the axis, its distance from the axis varies so that the portion which is nearest the axis is farthest from the plane of the central wall portion 18 and the portion which is in, or substantially in, the plane of said central portion is at a greater distance from the axis than the tips of the blades. The central portion 18 is provided with an outwardly-extending peripheral flange 20 disposed at an angle thereto and extending to the adjacent inner edge of the outer wall section 19. This flange is of varying height and distance from the axis of the rotor according to the position of the wall section 19. In other words, the flange is of gradually increasing height from one end to the other and approaches the center as it increases in height.

The fan casing has an outer peripheral wall 21 uniting the end wall 14 and the outer edge of the wall section 19, said peripheral wall being of varying width as the end wall 14 and the opposite outer wall 17 approach each other. These wall sections inclose the rotor and form the fan casing within which the rotor may freely turn. They also define a fair-way or passage 22, leading from an inlet 23 to an outlet 24. The fair-way not only encircles the axis of the rotor in the form of a continuous unbroken loop, but also provides a continuous passage from the inlet to the outlet out of the path of the blades of the rotor. This free passage is, in the preferred embodiment, of substantially uniform cross-sectional area. The inlet passage begins in a run disposed in a plane at right angles to the axis of rotation at one side of the rotor and enters the casing with its lower side substantially tangential with the lowermost tips of the rotor blades so that the passageway is nearer the center of rotation than the tips of the blades. After once encircling the rotor, and, at the same time, traveling axially a distance equal to its own width, its inner side at the outlet is substantially tangential to the lowermost tips of the rotor blades and it is entirely in the plane of and out beyond the rotor. At a point midway between, for instance, that shown at the upper side of Fig. 1, the fair-way will be approximately one-half at the side of the rotor and approximately one-half beyond the periphery of the rotor, but the cross-sectional area will remain substantially the same. The inlet is preferably disposed substantially horizontally and enters at a point directly below the axis of rotation. Thus the heavy or solid particles carried along with the gas will tend to follow the bottom wall of the inlet passage, and this bottom wall becomes the outer or peripheral wall as the passage leads upwardly over the rotor. The tendency of the solid particles moving in a straight line will also tend to keep them near the wall portion 19, as the latter approaches the plane of the rotor. Thus, the resultant tendency will be for the solid particles to tend to follow the angle of intersection of the walls 19 and 21, and be blown out of the fan outlet without having come in contact with the rotor. The advantage gained by thus avoiding the impact or contact of the solid matter with the rotor, and the provision of a continuous unbroken passage without the sharp angles or bends, more than makes up for any slight loss of efficiency by the presence of a continuous passage out of the path of the rotor blades.

Although my improved fan casing is especially adapted for handling dust-laden gases, yet at the same time, it will operate very efficiently as an ordinary blower upon air or other ordinary gases.

I claim:

1. A fan blower comprising a rotor and a casing having an inlet, an outlet, and a passage which connects the inlet and outlet, a portion of such passage from inlet to outlet being out of the path of the rotor and of substantially uniform cross-section.

2. A fan blower including a rotor and a casing having a passageway entering sub-

stantially tangentially at one side of said rotor and leaving tangentially thereof at the periphery, said passageway at all points along its length having a portion out of the path of the rotor.

3. A fan blower, including a rotor and a casing having an inlet and an outlet, said casing being of gradually increasing radius from said inlet to said outlet and of gradually decreasing width to form a fair-way from said inlet to said outlet through which solid particles may pass without contact with the rotor.

4. A fan casing having one substantially flat end wall and the opposite end wall inclined thereto to provide gradually decreasing width of casing from the inlet to the outlet, and a rotor within the casing having its axis intersecting the said end walls.

5. A fan casing having one substantially flat end wall and the opposite end wall inclined thereto to provide gradually decreasing width of casing from the inlet to the outlet, and having a spirally-disposed peripheral wall, and a rotor mounted between said walls.

6. A fan blower including a rotor and a casing inclosing said rotor and having a passage for the fluid acted upon, said passage encircling the axis of the rotor at gradually increasing distances therefrom from the inlet to the outlet and said passage gradually extending helically from one side of the rotor to the plane of the rotor.

7. A fan blower including a rotor and a casing inclosing said rotor and having a passage for the fluid acted upon, said passage encircling the axis of the rotor at gradually increasing distances therefrom from the inlet to the outlet and said passage gradually extending helically a distance substantially equal to the width of the passage.

8. A fan blower including a rotor and a casing inclosing said rotor and having an inlet passage disposed substantially horizontally beneath the axis of said rotor and extending substantially tangentially to said rotor at one side of and substantially above the lowermost portion of the rotor.

9. A fan blower including a rotor and a casing inclosing said rotor and having an inlet passage disposed substantially horizontally beneath the axis of said rotor and extending substantially tangentially to said rotor at one side of and substantially above the lowermost portion of the rotor, and having an outlet passage substantially tangential to said rotor below the same and at one side of said inlet passage.

10. A fan blower including a rotor and a casing having an inlet passage disposed substantially horizontally beneath the axis of rotation, the lowermost side of said inlet passage merging into and constituting a part of the peripheral wall of said casing.

11. A fan casing having inlet and outlet passages disposed substantially parallel at different distances from the axis of said rotor and in different radial planes.

In testimony whereof, I have signed this specification in the presence of two witnesses.

GEORGE W. CHRISTOPH.

Witnesses:

ANDREW A. KEENAN,

GEORGE A. GRAFF.