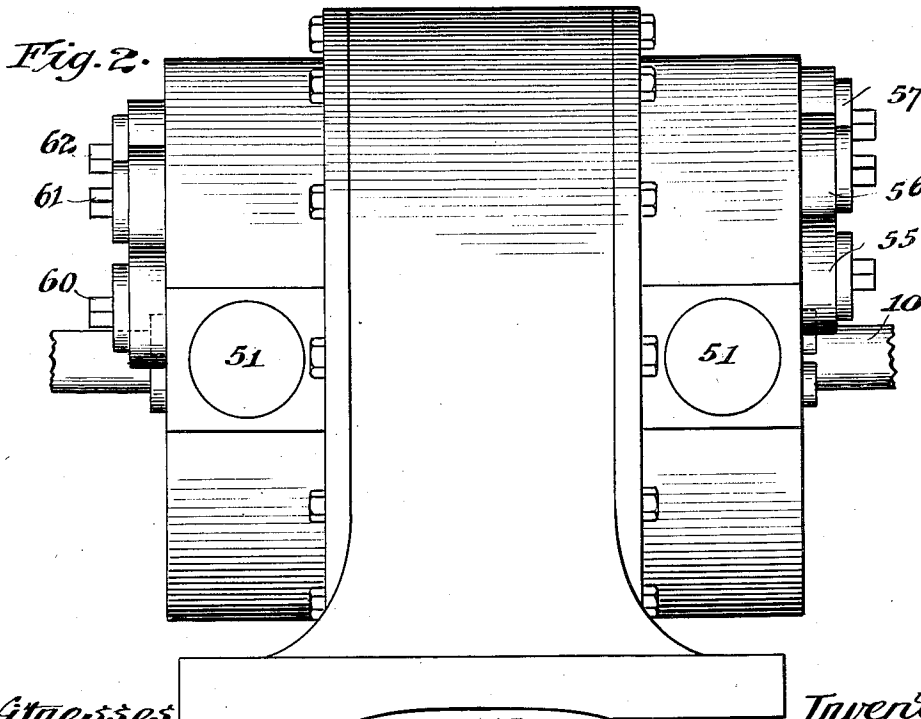
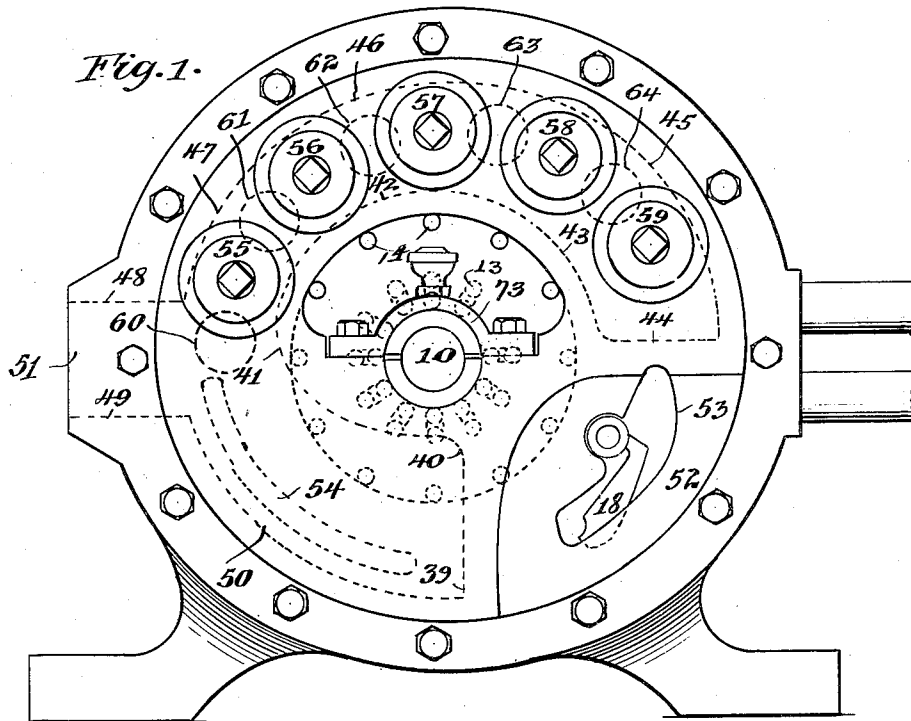


No. 887,955.

PATENTED MAY 19, 1908.

R. J. McCARTY.
COMPRESSOR OR BLOWER.
APPLICATION FILED NOV. 23, 1906.

2 SHEETS—SHEET 1.



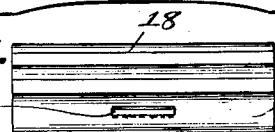
Witnesses,

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Fig. 3.

20



Inventor,

Richard J. McCarty

By *Offield Towle & Little*
Attys.

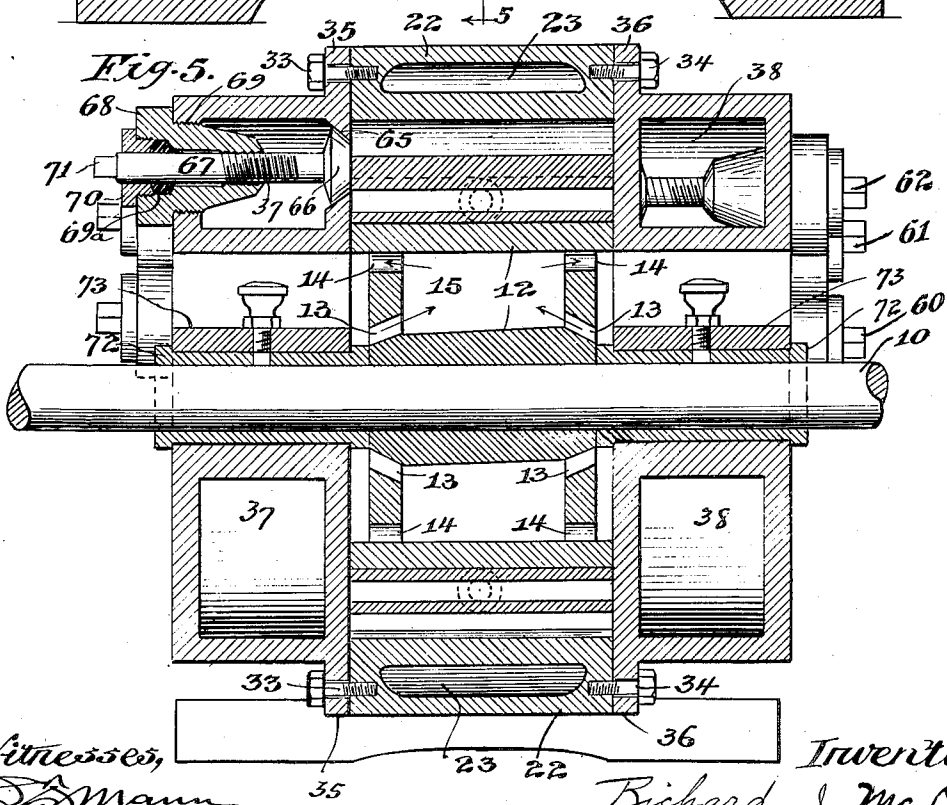
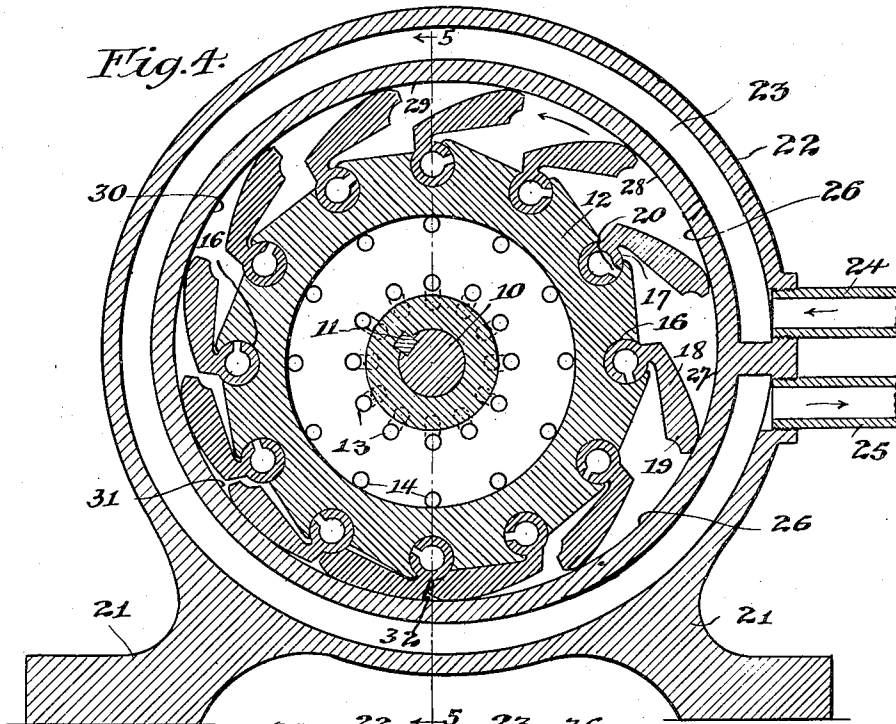
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

RICHARD JUSTIN McCARTY, OF KANSAS CITY, MISSOURI.

COMPRESSOR OR BLOWER.

No. 287,955.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed November 23, 1906. Serial No. 344,772.

To all whom it may concern:

Be it known that I, RICHARD JUSTIN McCARTY, a citizen of the United States, residing at Kansas City, county of Jackson, and State of Missouri, have invented certain new and useful Improvements in Compressors or Blowers, of which the following is a specification.

My invention pertains to air compressors, blowers, pumps, or the like, and aims to produce a device of this character which shall be rotary in operation and simple in construction.

Another object of the improvement is to provide effective means for cooling the machine, means for lubricating its parts, and devices for easily and readily varying and controlling the pressure of the delivered air or other fluid.

One of the important features of my invention is the centrifugally actuated blades or wings which operate to maintain tight a plurality of compartments whose volumes are caused to gradually diminish and thereby compress the contained fluid, because of the inward forcing of the blades or wings as they revolve by means of a spiral or eccentric internal surface of a surrounding or inclosing casing.

On the accompanying drawing, I have illustrated a desirable embodiment of my invention and on all the views like reference characters refer to the same parts.

Figure 1 is a side elevation of one embodiment of my invention in compressors or pumps; Fig. 2 is an end elevation of the same structure; Fig. 3 is a rear view of one of the centrifugally actuated blades or wings; Fig. 4 is a central vertical section of the compressor or blower; and Fig. 5 is a central cross-section of the same on line 5—5.

The device includes a substantially centrally disposed rotatable shaft 10 to which is keyed at 11 a hollow substantially round wing or blade support or hub 12, the two outwardly extended side walls of which each have two series of holes or perforations 13 and 14 forming means for communication between the interior space 15 and the external air. The purpose of these apertures is to create currents of air through the support or hub as indicated by the arrows on Fig. 5, during the rotation of the hub to maintain it cool. Centrifugal force thrusts the air in the chamber 15 out through aper-

tures 14 and at the same time causes an entrance of cooler air through holes 13, whereby the change of air helps to prevent the device from becoming unduly hot.

Across its outer face support or member 12 has a number of cylindrical undercut grooves 16, in the present instance, 12 in number. Within each is adapted to fit and turn the hollow cylindrical hub 17 of a wing or blade 18 bent backward somewhat from its hub and recessed or curved at its end at 19 to neatly fit over the hub of the adjacent wing when in its innermost or collapsed condition. Grooves 16 extend completely across the face of member 12 permitting the hubs and blades to be withdrawn from or inserted into the grooves by sliding them lengthwise thereof. These blades are adapted to be forced outwardly by centrifugal force and in moving under the influence of this force their hubs turn in the grooves which form their bearings. It is, therefore, desirable to provide some means for lubricating or oiling these hinge or pivotal connections and to meet this need each hub is provided with a longitudinal slot 20 through which lubricant of the proper consistency placed within the hollow interior of the hub may find its way to the bearing, being aided by the centrifugal force occasioned by the rapid revolution of the parts.

Mounted on supporting legs or feet 21 integral therewith and surrounding the winged member 12 is a round casing or rim 22 having the annular water chamber or compartment 23 to which cooling water is admitted through pipe 24 and from which the water flows through pipe 25. The internal surface of casing 22 is spaced from member 12 a varying amount being eccentric to the axis of shaft 10 and forming with respect to the blades and member 12 over the surface 27, 28, 29, 30, 31 and 32 a flat spiral, as distinguished from a helical spiral, which gradually approaches the center or member 12 or axis of shaft 10 in the direction of rotation of the shaft and blades, this direction being counter-clockwise as viewed in Fig. 4 and indicated by the arrow. From 32 to 27 the shape of the surface is immaterial so long as it affords proper easement for the motion of the blades from their innermost or collapsed position at 32 to their extreme outer or extended position at 27. As will be observed from the drawings, the front faces of the blades are curved or rounded to provide a

smooth and effective bearing of the blade on its cooperating spiral surface 26 in all positions of the blade.

Casing 22, member 12, and blades 18 are of the same width or length, as is clearly shown in Fig. 5, and to the two sides of casing 22 are bolted at 33 and 34 sides 35 and 36 each equipped with a curved air chamber 37 and 38, respectively, lying at the sides of the compartments formed by the blades between casing 22 and member 12. Casing 22 and the sides 35 and 36 form in effect an inclosing or surrounding casing for the hub and blades. Since the blades are of the same length as the distance between the sides, they form partitions which have a substantially airtight joint with the sides. The outline of the air chambers may be traced by reference characters 39—50, inclusive, on Fig. 1, the outlets being characterized 51, and it will be noted that the chambers extend around approximately three-quarters of a circle. As will be observed the casing 22, sides 35 and 36 and member 12 form a substantially annular chamber of varying thickness or depth divided into compartments or sections by the blades which are pushed out by centrifugal force into contact with the casing during their rotation about the axis of shaft 10. In one or both flat plate portions 52 of the two sides 35 and 36 there is provided an air inlet or entrance port 53 of such shape, size and location that any one of the blades or wings 18 may be withdrawn therethrough when the machine is not in operation, but during the rotation of the shaft and blades the latter by the centrifugal force are thrust outwardly into the position shown in Fig. 1 so that their removal, either intentional or accidental, cannot be effected since they overlap a part of the side.

Each air chamber has an elongated curved port 54 communicating with the compartments between the blades, but since it may be desirable or necessary to vary the pressure of the air delivered to the air chambers, each is equipped with a plurality of valves 55 to 64, inclusive, any one or more of which may be opened to establish an earlier delivery of the air to the chambers with a consequent reduction of pressure. The valves 55, 56, 57, 58 and 59 on one side of the machine and in connection with one of the air chambers are disposed opposite the middle points between the valves 60, 61, 62, 63 and 64 of the other side to secure a more minute adjustment or regulation of the pressure created. Each valve includes a conical port opening 65 leading from the air chamber to the compartments formed by the blades, a conical closure or valve 66 to close and open the port, a threaded valve stem 67 engaging the internal threads of guide 68 screw-threaded at 69 into the wall of the air chamber, the outer end of stem 67 being grasped by the packing

69^a of a stuffing-box, including a gland 70. By means of a wrench or handle, the squared outer end 71 of the stem may be turned to open or close the valve port, as will be readily understood.

A desirable way of rotatably mounting shaft 10 is to support it by means of bushings 72 in journal boxes or bearings 73 near the centers of the sides 35 and 36, as is most clearly shown in Figs. 1 and 5.

The operation of the compressor or blower is as follows: When the hub 12 and the blades 18 are revolving at a high rate of speed, the latter are forced by centrifugal force against the spiral surface of casing 22 so as to form a plurality or succession of closed compartments, the ends of the blades rubbing on, or in extremely close relation to the inner faces of the sides. As each compartment advances in its rotation, owing to the approach of surface 26 toward the hub and to the inward turning of the wings or blades 18 forming its front and rear walls, its volume gradually decreases until at the point 32 its volume is almost nothing. The external air enters each compartment through the admission port or ports 53 when its volume is a maximum and, as the compartment rotates, its volume is forcibly diminished by the blades riding on and contacting with the spiral surface 26. Provided all the air chamber valves are closed, this compression of the air continues until the compartment registers with or comes opposite the exhaust ports 54 when the air under pressure is delivered to the air chambers. When the compartment has reached the point 32, its volume is practically nil, its entire contents having left the air chambers. The speed of rotation and weight of the blades must be such that the pressure in one compartment does not exceed that of the following compartment, plus the pressure of the blade against the spiral surface 26 produced by the centrifugal force, otherwise the blade would be pushed back or down by the air in the front or advance compartment, thereby destroying the effectiveness of the operation of the machine. Provided a less pressure is required in the air chamber, one or more of the valves 55—64, inclusive, may be opened. Under such circumstances, the compression of the air is not so great as in the previous instance before it is delivered to or discharged into the air chambers. In passing from the point 32 to 27, the blades gradually become extended or moved outwardly, being compelled to do so under the influence of the centrifugal force and permitted to do so because of the shape of the surrounding casing's surface. As will be readily understood, the flow of cold water in casing 23 and the currents of air in the hub 12 prevent the temperature of the compressor from becoming excessive.

Although I have described this device as

operating to compress and deliver air under pressure, it will be readily understood by those skilled in the art that it may be used for the same purpose with other fluids, suitable conduits being provided for conducting the fluid to the entrance ports if necessary. Various minor mechanical changes may be made in the structure shown and described without departing from the substance of my invention or sacrificing any of its advantages. For example, instead of having the blades or wings perform part of the compressing operation, the compression of the fluid or gas by diminution of the volume of the compartment may be effected solely by the approach of the spiral surface of the casing toward the winged hub, the blades under such circumstances acting exclusively as partitions between the compartments. In such a modification the blades might be mounted to slide radially in the hub, being pressed outwardly by centrifugal force and slid inwardly by the cam or spiral surface of the casing, the blades in no wise partaking of or performing the compression of the fluid. Instead of having a number of discharge ports or passages leading to the air chambers, the same result may be secured by having a single one or a pair of discharge ports and a plurality of admission ports with valves to open or close them whereby the amount of compression effected between the time of admission and discharge may be regulated by opening or closing more or less of the admission ports.

I claim:

1. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior surface approaching the axis of said hub or support in the direction of rotation of the latter, and a plurality of trailing wings or blades mounted on said hub or support, extended across the full width of the interior of said casing, and held in rubbing contact with said interior surface under the action of centrifugal force in opposition to the pressures generated and acting on the front faces of the wings or blades, said wings or blades dividing the space between the hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, substantially as described.

2. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, said casing having admission and discharge ports, and a plurality of trailing wings or blades mounted on said hub or support, extended across the full

width of the interior of said casing, and held in rubbing contact with said spiral surface under the action of centrifugal force in opposition to the pressures generated and acting on the front faces of said wings or blades, said wings or blades dividing the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and wings or blades to effect compression of their contents, substantially as described.

3. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, and a plurality of trailing wings or blades mounted on said hub or support, extended across the full width of the interior of said casing, and held in rubbing contact with said spiral surface under the action of centrifugal force in opposition to the pressures generated and acting on the forward faces of the wings or blades, said wings or blades dividing the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, said casing having an admission port communicating with said compartments when their volumes are at a maximum and a discharge port communicating with said compartments after their volumes have decreased and their contents have been compressed, substantially as described.

4. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, and a plurality of trailing wings or blades hinged to said hub or support, extended across the full width of the interior of said casing, and held in rubbing contact with said interior surface under the action of centrifugal force in opposition to the pressures generated and acting on the front faces of the wings or blades, said wings or blades dividing the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, substantially as described.

5. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, and a plurality of trailing wings or blades hinged to said hub or support, extended across the full width of the interior of said

casing and held in rubbing contact with said interior surface under the action of centrifugal force in opposition to the pressures generated and acting on the front faces of the wings or blades, said wings or blades dividing the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, said casing having an admission port communicating with said compartments when their volumes are at their maximum, and a discharge port communicating with said compartments after their volumes have decreased and their contents have been compressed, substantially as described.

6. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of rotation of the latter, said casing having an admission port, a plurality of wings or blades mounted on said hub or support, extended across the full width of the interior of said casing, and free to move outwardly under the action of centrifugal force into rubbing contact with said spiral surface to divide the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, a chamber to receive the compressed fluid and having means of communication with said compartments at a plurality of points in the path of travel of said compartments, and means for opening and closing said means of communication to control the pressure of the fluid delivered to said chamber, substantially as described.

7. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of rotation of the latter, said casing having an admission port, a plurality of wings or blades hinged to said hub or support, extended across the full width of the interior of said casing, and free to move outwardly under the action of centrifugal force into rubbing contact with said spiral surface to divide the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, a chamber to receive the compressed fluid and having means of communication with said compartments at a plurality of points in the path of travel of said compartments, and means for opening and closing said means of communication to control the

pressure of the fluid delivered to said chamber, substantially as described.

8. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, said casing having an admission port, a plurality of wings or blades mounted on said hub or support, extended across the full width of the interior of said casing, and free to move outwardly under the action of centrifugal force into rubbing contact with said spiral surface to divide the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, a chamber to receive the compressed fluid having two series of means of communication with said compartments at a plurality of points in the path of travel of said compartments, one series being in advance of the other an amount approximately equal to one-half the distance between the means of the other series, and a valve to control each of said means of communication, substantially as described.

9. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, said casing having an admission port, a plurality of wings or blades hinged to said hub or support, extended across the full width of the interior of said casing, and free to move outwardly under the action of centrifugal force into rubbing contact with said spiral surface to divide the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their contents, a chamber to receive the compressed fluid having two series of means of communication with said compartments at a plurality of points in the path of travel of said compartments, one series being in advance of the other an amount approximately equal to one-half the distance between the means of the other series, and a valve to control each of said means of communication, substantially as described.

10. In a compressor, the combination of a rotary hub or support, a casing inclosing said hub or support and having an interior spiral surface gradually approaching the axis of said hub or support in the direction of rotation of the latter, and a plurality of wings or blades hinged to said hub or support and removable therefrom by sliding the same relative to said support, said wings or blades

extending across the full width of the interior of said casing, and free to move outwardly under the action of centrifugal force into rubbing contact with said spiral surface to
5 divide the space between said hub or support and said casing into a number of tight compartments whose volumes decrease during the rotation of said hub or support and said wings or blades to effect compression of their
10 contents, said casing having an admission port and an exhaust port, the former being of such size, shape, and location as to allow a blade or wing to be removed therethrough
15 but not during normal working conditions of the compressor, substantially as described.

11. In a compressor, the combination of a

rotary shaft, a hollow member or hub fixed to said shaft, and a centrifugal-controlled member mounted on and adapted to revolve with said hollow member, the latter having
20 through its walls a series of openings or holes forming means of communication from said hollow interior to the exterior air, said holes or openings being at different distances from the axis of the shaft, whereby currents of air
25 are created in said hollow body by centrifugal force, substantially as described.

RICHARD JUSTIN McCARTY

Witnesses:

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