

G. McKERAHAN.
OXYGEN CONCENTRATOR.
APPLICATION FILED JAN. 27, 1920.

1,339,211.

Patented May 4, 1920.

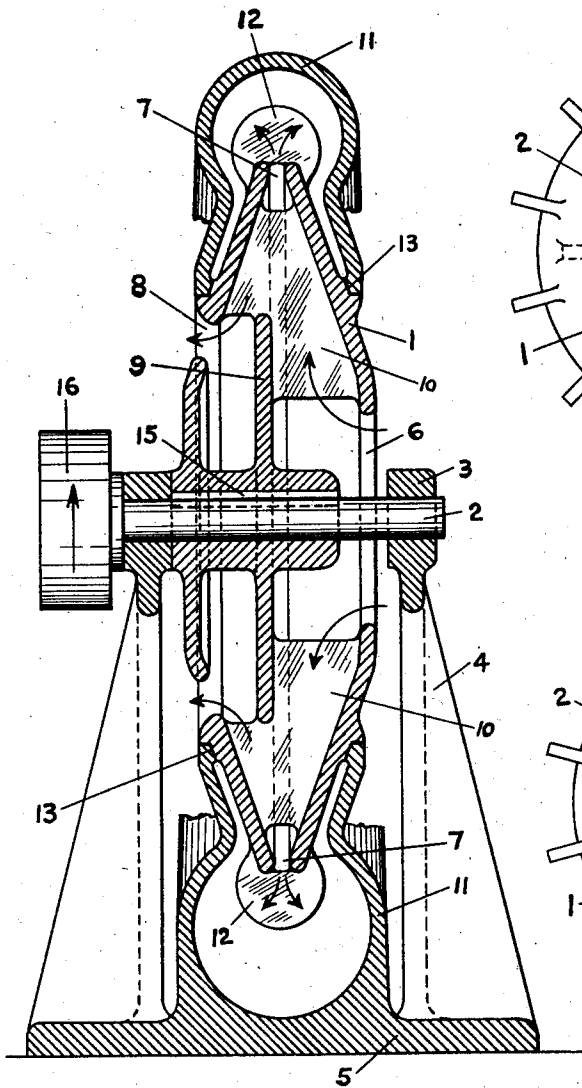


FIG. 1

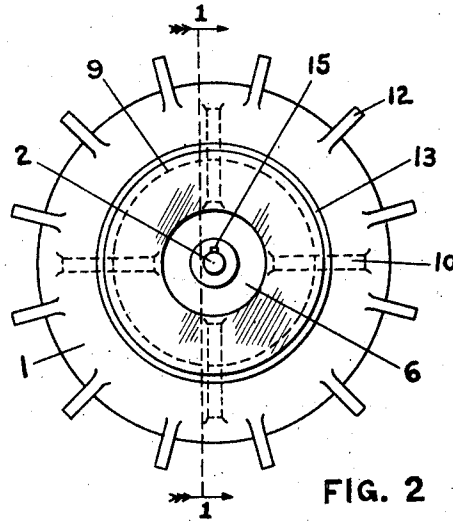


FIG. 2

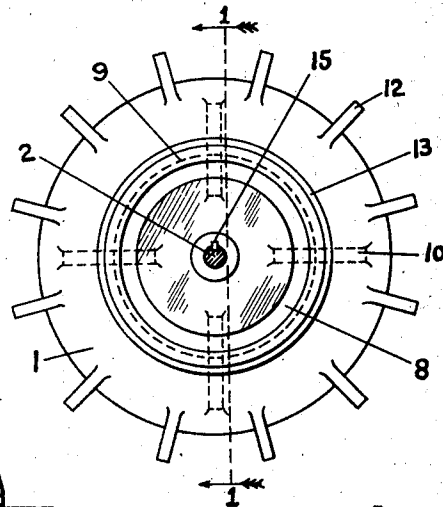


FIG. 3

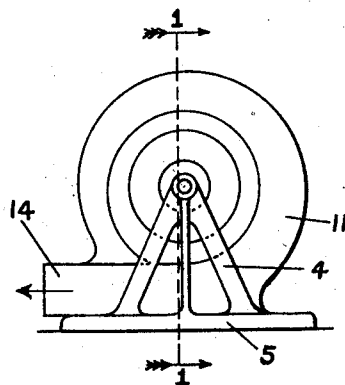


FIG. 4

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OXYGEN-CONCENTRATOR.

1,339,211.

Specification of Letters Patent.

Patented May 4, 1920.

Application filed January 27, 1920. Serial No. 354,509.

To all whom it may concern:

Be it known that I, GEORGE MCKERAHAN, a citizen of the United States, residing at Avonmore, in the county of Westmoreland and State of Pennsylvania, have invented new and useful Improvements in Means for Separating and Concentrating Atmospheric Oxygen, of which the following is a specification.

In many of its uses this invention relates to blowers for supplying air to smelting furnaces, blacksmith fires, steam boilers and the like and the object is to provide simple means for concentrating large volumes of atmospheric oxygen thereby supplying for the support of combustion air having a larger proportion of oxygen than is normally present in the atmosphere. By this means more complete combustion and a saving of fuel will be obtained. This invention will be especially useful where a very high temperature is desired and it may also be useful for supplying air for combustion in gas engines and for other purposes.

To accomplish this separation and concentration advantage is taken of the higher specific gravity of oxygen as compared with the nitrogen of the atmosphere. The air is rotated at high speed in a circular vessel the diameter of which is large in proportion to the dimension in the direction of its axis of rotation, the vessel being provided with suitably located openings for admitting the air and discharging the separated constituents. The concentrator would preferably have its axis of rotation in the horizontal plane.

Figure 1 of the drawings shows a vertical section through the concentrator and the collecting casing which envelops the peripheral discharge opening of the vessel, the parts of the casing in the background being broken away. The section is taken on the lines 1—1 of the side views Figs. 2, 3 and 4. Fig. 2 is a view, with the annular collecting casing and frame removed, of the side of the concentrator on which is placed the opening 6 for air admission, and Fig. 3 is a view, collecting casing and frame removed, of the opposite side of the vessel on which is placed the outlet 8 for the de-oxygenated air. Fig. 4 is an outline side view of the assembled machine.

Referring to the drawings, 1 is the cir-

cular vessel which forms the concentrator and which is supported by shaft 2 on which it rotates in journal bearings 3, the latter being supported by frame 4 and base plate 5. Opening 6 on the side of concentrator 1 and immediately around shaft 2 admits the air which travels in the direction indicated by the arrows. Outlet 7 around the periphery delivers the heavier air in which the oxygen has been concentrated while the de-oxygenated air escapes through outlet opening 8 on the opposite side from inlet 6.

Outlet openings 7 and 8 are preferably made continuous or nearly so and are placed concentric with the vessel. A circular deflecting plate 9 extends from the center of the concentrator in the direction of the periphery nearly or quite as far as the outer edge of outlet 8, or slightly beyond this edge as may be found most advantageous. This deflecting plate is placed farther away from inlet 6 than its distance from outlet 8 so as to afford free passage for the larger volume of incoming air. This deflector guides the entering air toward the periphery of the concentrator and prevents the air from passing directly across from inlet 6 through outlet 8 before centrifugal action has had opportunity to take effect upon the contained oxygen. Radial blades 10 force the entering air to travel with the vessel's rotation. An annular collecting casing 11 incloses the periphery of vessel 1 and receives the oxygenated air delivered through outlet 7. In construction this casing would be made in separable halves to permit vessel 1 being placed within the casing the halves being then bolted together. Blades 12, attached externally to the periphery of the concentrator as shown, facilitate the delivery of the oxygenated air through discharge pipe 14 in which casing 11 terminates exactly the same as in the ordinary fan blower; Fig. 4. Casing 11, which is here shown integral with base plate 5, joins the rotating concentrator at circular joints 13 which have no bearing contact but are fitted closely to prevent passage of air through them. Concentrator 1 is fixed to shaft 2 by a key 15. A pulley 16 for belt drive is secured to the shaft when the latter is not directly connected to an electric or other motor.

When this concentrator is rotated at high speed centrifugal action will cause a cir-

culuation of air through it as indicated by the arrows.

Air entering at opening 6 is given rotary motion by blades 10, the heavier oxygen is thrown toward the periphery and is discharged through outlet 7 into casing 11 where blades 12 drive it toward delivery pipe 14, the latter shown at Fig. 4. The lighter de-oxygenated air will escape through side outlet 8.

Air inlet 6 would have an area greater than the combined areas of outlets 7 and 8 so as to admit the air freely and the concentrating vessel 1 would be of large capacity compared with outlets 7 and 8 so that a large volume of air would be subject to the separating effect of centrifugal action for some length of time instead of passing rapidly through the concentrator.

By suitably proportioning the size and number of delivery blades 12 the machine will be made an oxygen concentrator and blower combined, but where blast is required this machine will likely prove more useful as a feeder for supplying oxygenated air to the pressure blowers or air compressors now in use.

The proportion of oxygen in the delivered air may be increased by reducing the size of discharge opening 7; and by using two or more of these concentrators in series, the oxygenated air from the first being used as air supply for the second and so on, it is possible that a high degree of oxygen concentration may be effected.

I claim:

1. An atmospheric oxygen separator and concentrator consisting of a rotating circular vessel of large diameter in proportion to its thickness in the direction of its rotating axis; an air inlet on one side of the vessel immediately around said axis; an air outlet on the opposite side from said inlet and located between said axis and the periphery of said vessel and concentric with the latter; a second air outlet around the extreme pe-

riphery of the rotating vessel; substantially as specified.

2. In an atmospheric oxygen separator and concentrator, a rotating circular vessel of large diameter in proportion to its thickness in the direction of its rotating axis; an air inlet on one side of the vessel immediately around said axis; a de-oxygenated air outlet on the opposite side from said air inlet and located some distance away from said axis and concentric therewith; a circular deflecting plate within the rotating vessel extending opposite these two openings, said deflecting plate extending outward from the center of the rotating vessel and at right angles to its axis of rotation; and an oxygenated air outlet around the periphery of the rotating vessel, all substantially as specified.

3. In an oxygen separator and concentrator the combination of a rotating vessel of large diameter in proportion to its thickness in the direction of its rotating axis; an air inlet on one side of said vessel immediately around said axis; a de-oxygenated air outlet on the opposite side from said air inlet and located between the axis of the rotating vessel and its periphery and concentric with said vessel; a circular deflecting plate within the vessel extending from its center outward between the aforesaid air inlet and de-oxygenated air outlet and at right angles to the rotating axis of said vessel; air rotating blades extending from side to side within the vessel and parallel with its axis of rotation; an oxygenated air outlet around the periphery of the rotating vessel; an annular collecting casing inclosing the latter air-outlet; air delivery blades projecting externally from the periphery of the rotating vessel and parallel with its rotating axis, said delivery blades being adapted to revolve within the aforementioned annular casing.

GEORGE McKERAHAN.