

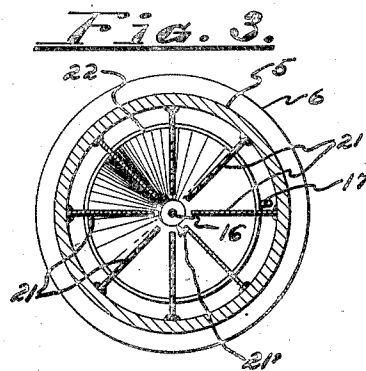
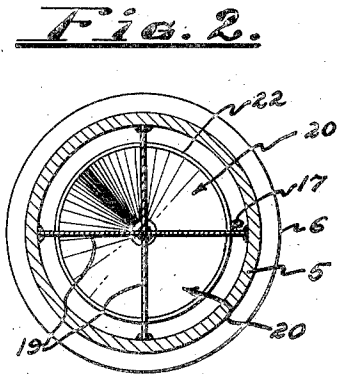
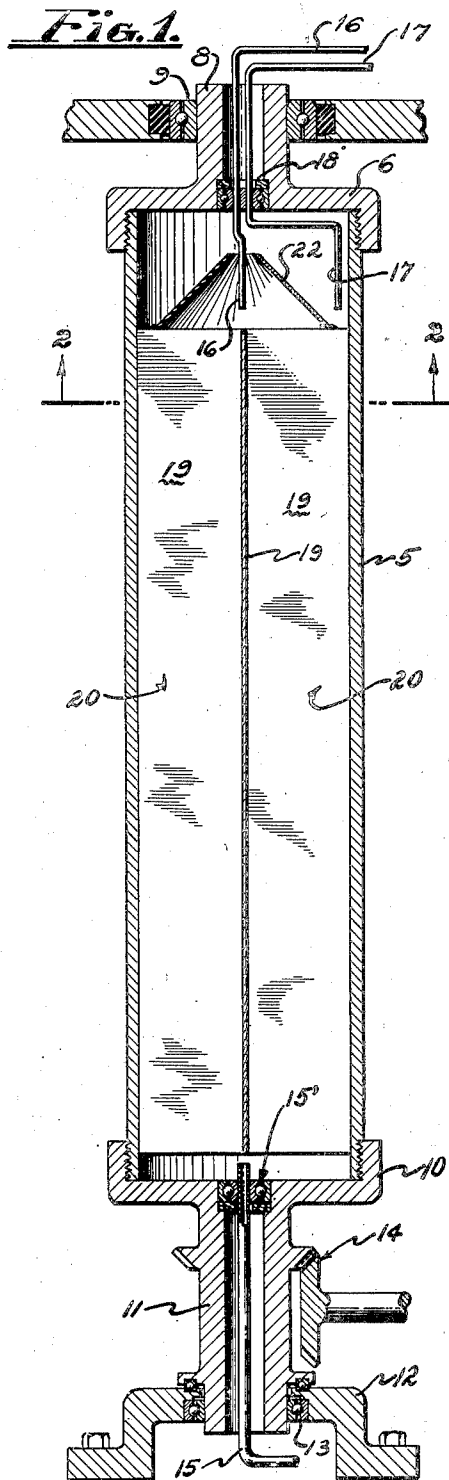
Aug. 7, 1951

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2,563,550

GASEOUS FLUID CENTRIFUGE

Filed Jan. 2, 1947



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2,563,550

GASEOUS FLUID CENTRIFUGE

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Application January 2, 1947, Serial No. 719,674

1 Claim. (Cl. 233—21)

1

This invention has for its primary object the provision of a simply constructed and comparatively inexpensive centrifuge for separating and making available for immediate use or storage as the occasion may require, one or more of the component elements of various gaseous fluids, for example atmospheric air and wherein it may be desired to make available for immediate use or storage only the oxygen component of such air or where it may be desirable to separately use or separately store the oxygen and nitrogen components.

Another object of this invention is to provide a centrifugal separator of the character described which is constructed, arranged and operated in such manner that as a relatively small and compact unit it is capable of many different advantageous applications and uses at the points of consumption or storage of its products.

A further object of this invention is to provide a centrifuge such as described wherein an effective separation of components of the gaseous fluid under treatment is achieved through the instrumentality of a novel rotary cylinder in which are disposed partitions, vanes or baffles and take-off conduits of a particular construction and relative arrangement also making for marked simplicity as to construction of the machine as a whole and assuring optimum separation and production of one or more desired components of the particular gaseous fluid at a minimum of equipment, installation and operating costs.

This invention also resides in the provision of a new method of centrifugally separating components of gaseous fluids in a particularly efficacious manner, which method generally consists in passing a body of gaseous fluid into a confined zone wherein such body in entirety is subjected to centrifugal force throughout said zone and centrifuged components are directed through said zone in separate streams and separately taken off at the top of said zone for immediate use or storage.

With the foregoing object in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a vertical sectional view of a centrifuge embodying the present invention,

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

2

Fig. 3 is a sectional view of a modified form of centrifuge unit.

In carrying out the present invention I provide an upright rotary cylinder 5, the interior of which serves as a centrifuge chamber while the ends thereof are constructed and suitably supported so that the cylinder may be rotated at appropriate speeds while a gaseous fluid to be centrifuged is being passed therethrough.

As here shown the upper end of the cylinder 5 is closed by means of a centrally apertured cap 6 having a tubular extension 8 rotatably supported in suitable bearing means 9. At its lower end the cylinder is closed by means of a screw cap 10 which has a tubular extension 11 supported on a base 12 within suitable bearing means 13.

Drive means 14 operatively connected with the extension 11 and operated from a suitable source of power not shown provides for rotation of the cylinder at appropriate speeds. Gaseous fluid from a source (not shown) under just sufficient pressure to flow into the cylinder is directed into the cylinder by means of a pipe 15 extending through the extension 11 and a bearing 15' carried by the cap 10 and forming a seal around said pipe.

Centrifuged components of the fluid are taken off at the top of the cylinder by means of separate take-off pipes or conduits 16 and 17 located within the upper end of the cylinder adjacent the center of the cylinder and adjacent the inner surface of the wall of the cylinder respectively. The heavier components pass out through the conduit 17 and the lighter components through the conduit 16. These take-off conduits lead out through and are fixed to the center of a bearing 18' carried by the cap 6 and forming a partial seal around the conduits. One or more of the separated components are discharged from these conduits for immediate use or storage or undesired components may be dissipated to the atmosphere.

Means are provided within the cylinder 5 for dividing the body of gaseous fluid therein into separate streams which means has the function of confining centrifuged components to said streams in such manner that no centrifugal action, that is, no vortex of each stream will be created apart from or in addition to the centrifugal action of the entire body of fluid in the cylinder, thereby assuring that the heavier components will be maintained alike adjacent the cylindrical wall in each separate stream and may thus be taken off by the conduit 17. This means

3

as shown in Figs. 1 and 2 may consist of radial partitions or baffles 19 which extend for the major portion of the length of the cylinder but terminate well spaced from said ends and define four conduits or passages 20 therein, or it may as shown in Fig. 3 comprise four baffle plates 21 extending radially from the cylindrical wall to a point short of the center of the cylinder thereby leaving a center passage 21'.

I may also use a frusto-conical baffle member 22 between the upper ends of the partitions 19 and the take-off conduits and fastened to the partition 19. The center conduit 16 will extend freely through the center of this conical baffle whereas the outer periphery of the baffle will be spaced circumferentially from the cylinder wall whereby the heavier components will pass between the baffle and said wall into the outer take-off conduit 17 while the other components will pass out through the conduit 16.

It will now be seen that when a gaseous fluid to be centrifuged is introduced through the pipe 15 into cylinder 5 under just sufficient pressure to flow slowly therethrough while the cylinder is rotated at high speeds for example of the order of approximately 12,000 R. P. M. and upwards, the body of fluid will be divided by means of the partitions or baffles into a plurality of separate streams and the components of each stream will be centrifuged alike without forming a vortex in each stream. Thus the heavier components of each stream will remain alike at the outer limits of the cylinder adjacent and against the cylinder wall and will pass out through the conduit 17 while the other components guided by the conical baffle will pass out through the conduit 16.

If the example atmospheric air is treated with the machine it will be centrifuged so that the oxygen containing component, being the heavier, will be centrifuged alike in each stream and taken off through the conduit 17 while the nitrogen bearing components being lighter will be taken off through the conduit 16. This same separation according to weight of the components will take place with other gaseous fluids and in all cases the desired separated components may be immediately used or stored and other components dissipated to atmosphere or stored for use or used as the occasion may demand.

It will now be seen that this invention provides a new method of centrifugally separating component elements of gaseous fluid, which method consists in directing a body of gaseous fluid into a centrifuging zone, subjecting such body of fluid to like centrifugal action throughout said zone, dividing the body into separate streams in such manner that the centrifugal action is alike in each stream without creating a vortex of any one of the streams and then taking off from said streams centrifuged and separated components of the fluid.

4

I claim:

A centrifuge for gaseous fluid comprising a rotary hollow cylinder mounted to rotate about a vertical axis, caps closing the upper and lower ends of the said cylinder, a plurality of vertically and radially extending vanes fixed in said cylinder terminating at their upper ends on a plane adjacent to but spaced from the cap on the upper end of the cylinder, forming a series of spaces for the passage of a plurality of streams of fluid through said cylinder, a frusto-conical baffle mounted on the upper ends of said vanes with its base periphery adjacent to but spaced from the cylinder forming a continuous annular space between the base of said baffle and the cylinder immediately above the upper ends of said vanes, said baffle being formed with an opening in the apex portion thereof, a conduit leading through the cap on the lower end of said cylinder for introducing a gaseous fluid to be centrifuged into the lower ends of the spaces formed by said vanes, and a pair of conduits leading through the cap on the upper end of said cylinder one of which extends through the opening in the apex of said baffle and opens axially of the cylinder between the upper ends of said vanes and the apex of said baffle, and the other of which conduits leads above said baffle and opens downwardly toward and adjacent to the annular space extending between the base of baffle and the cylinder.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
521,104	Davis	June 5, 1894
699,217	McCornack	May 6, 1902
702,795	Holmes	June 17, 1902
1,101,548	Hoffman	June 30, 1914
1,625,613	Jones	Apr. 19, 1927
2,082,608	Ayres	June 1, 1937
2,536,423	Cohen et al.	Jan. 2, 1951

FOREIGN PATENTS

Number	Country	Date
730,441	France	Aug. 12, 1932

OTHER REFERENCES

"The Concentration of Isotopes by the Evaporative Centrifuge Method," Beams et al., Physical Review, Aug. 1, 1939. Pages 266 to 272.

Beams, "The Ultracentrifuge," Science In Progress, published 1940 by the Yale University Press, copy in Library of Congress, pages 244-248.