

March 7, 1944.

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2,343,682

HELICAL CENTRIFUGAL SEPARATOR

Original Filed Nov. 14, 1936

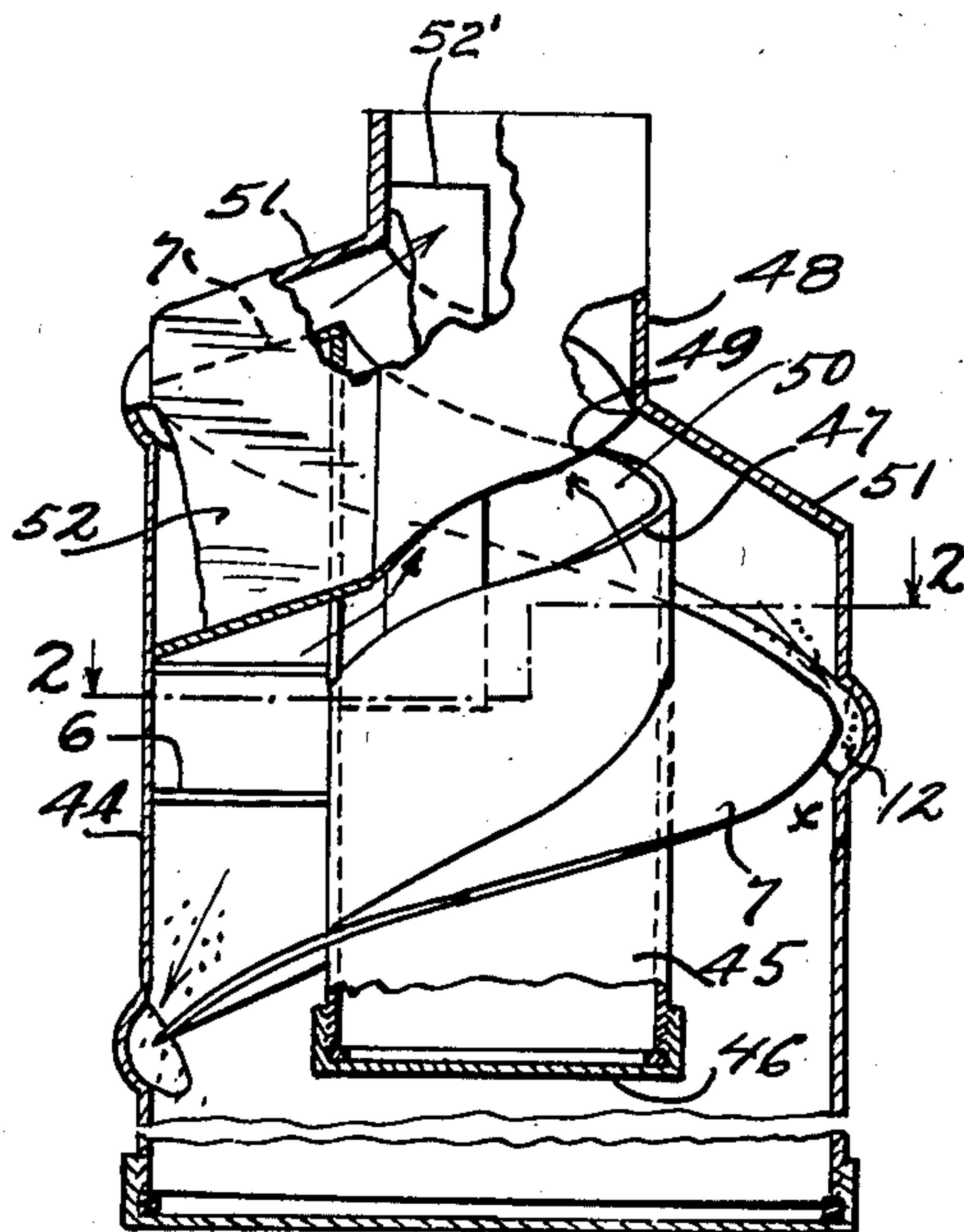
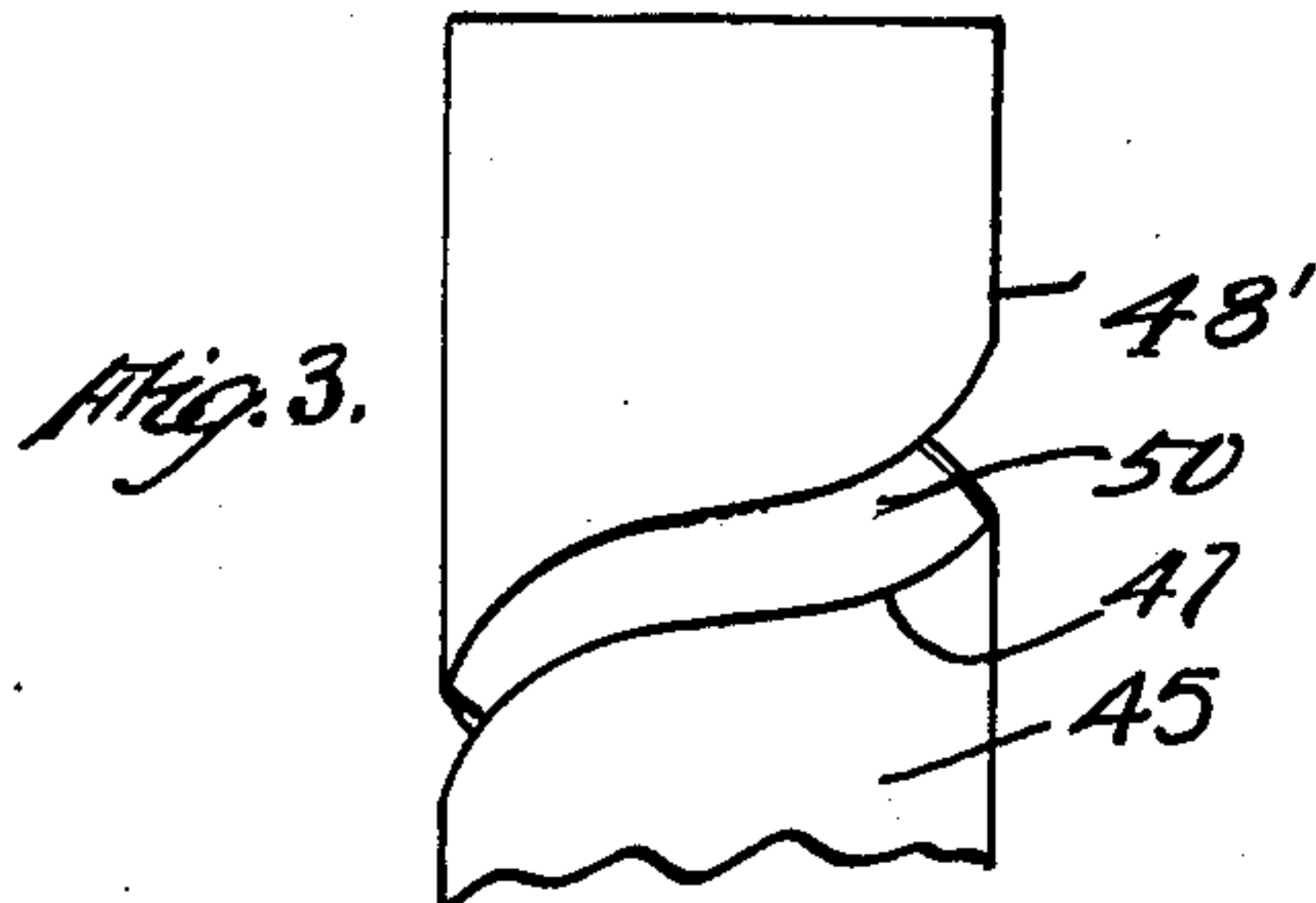
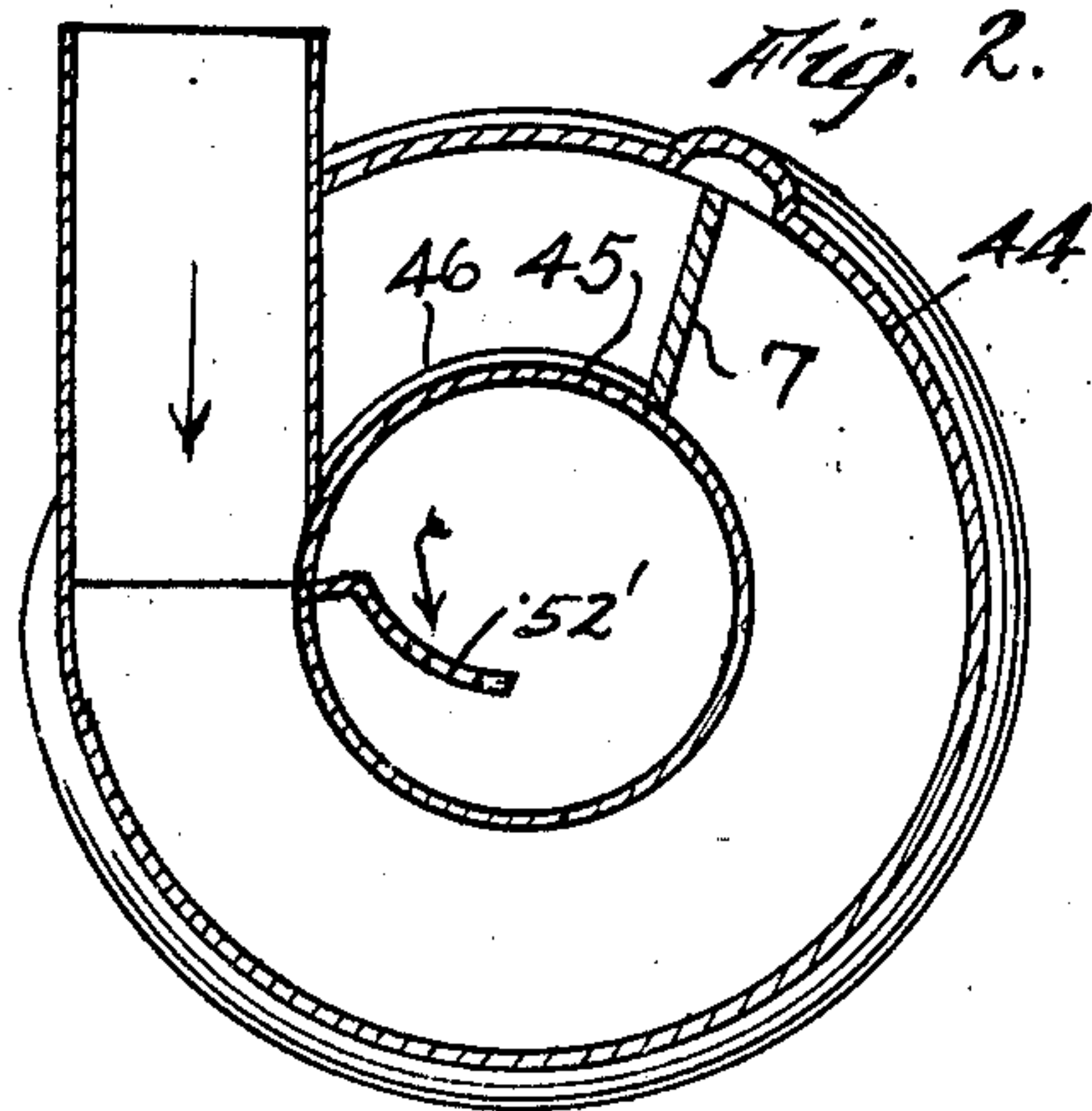


Fig. 1.



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UNITED STATES PATENT OFFICE

2,343,682

HELICAL CENTRIFUGAL SEPARATOR

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Original application November 14, 1938, Serial No. 240,357. Divided and this application December 18, 1940, Serial No. 370,735

3 Claims. (Cl. 183—88)

This invention is a centrifugal separator for the separation of various material; that is, gaseous and liquid media, either for the separation of solids from the fluids, or gas from liquids, or to separate different gravities of fluids, or to classify granular solids.

It is an object of the invention to provide an extremely simple, practical, substantial, effective and efficient device wherein to obtain the aid of centrifugal force by causing a circular motion in a given stream of flowing material, which may be under either vacuum induction or forced draft effect, or otherwise caused to flow.

A purpose of the invention is to provide means to impart a helical movement to the medium being treated so that a full circle of movement may be effected between the inlet and the outlet of apparatus embodying the invention.

The present invention has for a further purpose the provision of a helical ramp feature forming a helical chamber in a shell and the provision of a complementary-direction helical dome or ceiling, and further includes the provision of an inner coaxial, up-flow stack-like device and bottom trap therefor for increased efficiency in operation on a gaseous fluid.

The invention consists of certain advancements in this art as will be set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed and whose construction, combinations, and details of means and the manner of operation will be made manifest in the description of the herewith illustrative apparatus; it being understood that modifications, variations and adaptations may be resorted to within the scope, principle and spirit of the invention as it is more particularly claimed presently.

Fig. 1 is a vertical, axial section of an axially converging passage-type of the separator.

Figure 2 is a horizontal section thereof on line 2—2, Fig. 1.

Figure 3 is an elevation showing a slight modification of the inner cylinder feature.

The instant apparatus is a variation of the helical separator shown in my Patent No. 2,229,860 issued Jan. 28, 1941, in which a helical ramp is shown about the axis of a suitable shell; the ramp having a marginal edge suitably spaced from the shell wall to provide a lateral discharge space for the heavier matter to fall to a bottom under the ramp.

The present disclosure has to do with the upper end and light-matter discharge feature of the

shell and its chambers. In this embodiment an annular shell 44 has a helical ramp 7 of one complete turn about a coaxial cylinder 45 having a basin 46 and a top, vertical venting edge 47 of helical form forming the lower boundary of a helical slot 50 of one pitch length. The ramp 7 is sloped downwardly toward a perimetral discharge channel 12 provided between the shell and the rim of the ramp for the gravitation of cast-off media toward a still-fluid basin under the ramp.

The material to be treated is supplied to the space above the first coil of the helical ramp by means of a tangential inlet tube 6, Fig. 2, whose outlet opens into the passageway on a radial plane, preferably, as set out in the above mentioned patent.

At the top of the shell 44 there is provided a second, coaxial cylinder 48 Fig. 1, with a helical, bottom edge 49 upward and inward from the orifice edge 47. This cylinder 48 forms a central up-stack for the cleaned fluid above the ramp.

The stack edge 49 is a full turn helix complementary to the orifice edge 47. The ramp 7 as shown is of regular pitch and above this is a helical ceiling 51 of equal outward and downward slope to ramp 7 but of less and uniform axial pitch so that the top end of the ceiling 51 is closest to the ramp 7. The ceiling 51 stops at a vertical, dead-wall 52 which extends upward from the lower end of the ceiling, and is radial.

It will be seen that while the diameter of the shell 44 is generally constant from top to bottom, the helical passageway above the ramp 7 is gradually reduced to maintain the same centrifugal effect on the heavy media of the stream. Also, the heavy media are discharged centrifugally to the channel 12 but the lighter media, such as gases, move vortically, centripetally to the helical outlet 50, between the edges 47 and 49, of one pitch length.

The sharp turn of the stream into the stack 48 at the outlet 50 involves a centrifugal effect on light dust particles which might be moving up with the gas or air and this dust is thrown down the inner cylinder 45.

The radial wall 52 is shown in Fig. 2 as being continued inwardly to form a barrier 52' to interrupt the central swirl for the axial length of the slot 50 so that the up-flowing stream passing in over the lip or edge 47 will not be intermingled with light dust that may be showering from along the upper extent of the same edge.

The ceiling 51 may be of varied pitch if so desired from the one shown.

In Fig. 3 the upper tube 48' is shown as of the same diameter as the lower tube 45 so that their adjacent, orifice edges are in the same cylindric surface.

It is understood that the helical passageway may extend to any suitable length from the inlet tube 6.

This application is a division of application Ser. No. 240,357, now U. S. Patent No. 2,229,860, to which reference is made as to matter here disclosed but not claimed.

What is claimed is:

1. A separator of the centrifugal class including a vertical, cylindrical shell and an inner, coaxial cylinder having a helical top edge, a helical ramp between the shell and the cylinder, a sec-

ond and smaller, inner cylinder coaxial with the shell and having a lower, helical edge complementary to and higher than the helical edge of the first cylinder, and a helical ceiling between the shell and the second cylinder and similar in direction to the helical ramp.

2. The separator of claim 1, in which said ceiling gradually converges toward the said ramp.

3. A separator of the centrifugal class including a closed top vertical shell of cylindric form, and an inner coaxial cylinder having a helical top edge, a helical ramp between the shell and the cylinder and spaced from the shell to form a perimetral discharge channel, and a second, smaller cylindrical stack coaxial with the shell and having a bottom helical edge complementary to the helical top edge of the first cylinder.

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