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SEPARATOR

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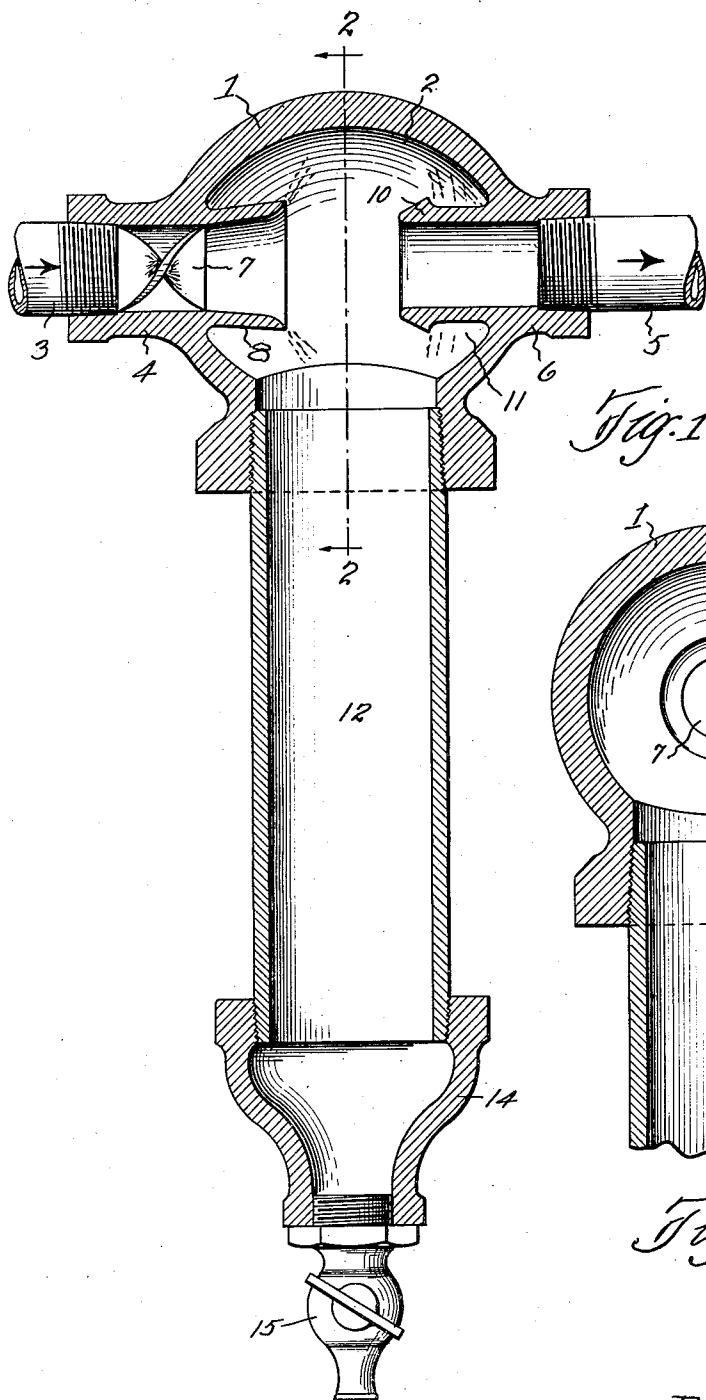


Fig. 1

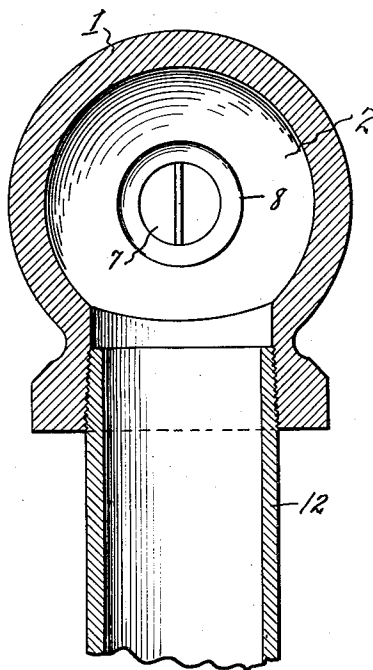


Fig. 2

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UNITED STATES PATENT OFFICE.

HENRY J. MASTENBROOK, OF LAKEWOOD, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO THE SWARTWOUT COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SEPARATOR.

Application filed March 30, 1921. Serial No. 457,039.

To all whom it may concern:

Be it known that I, HENRY J. MASTENBROOK, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to separators of the class which operate on the helico-centrifugal principle, and while my present construction may be used with a high degree of efficiency under practically all circumstances where it is desired to remove a liquid from a gas, it is especially suitable for separating water or moisture from air.

The main object of the invention is to provide a separator which will effectually remove a liquid, such as water or moisture, from a gas, such as air, and which will maintain the separation of the elements beyond the possibility of their reuniting or subsequently intermingling. A further object is to provide a comparatively simple, compact and inexpensive construction designed to expedite and cheapen manufacture, and facilitate assembly and installation.

In the drawing accompanying and forming a part hereof, Fig. 1 is a central vertical section through the separator in a plane coincident with the axis of the pipe line wherein the separator is installed; and Fig. 2 is a section on the line 2—2 of Fig. 1.

The head of the separator is designated 1 and it encloses the separating chamber 2. An ingress pipe 3 has communicative connection with the separating chamber through a tubular extension 4, and an egress pipe 5 has similar connection with the chamber through a tubular boss 6.

The extension 4 is of sufficient length to accommodate a helical vein 7, known ordinarily as a "helix" or "worm" and projecting into the chamber 2 in axial alignment with the extension 4 is a nozzle 8, the inner wall whereof diverges gradually as it approaches the inner end of the nozzle where it flares abruptly and meets the outer wall in a comparatively sharp edge. Opposite the nozzle 8 is a neck 10 which joins the wall of the head in alignment with the boss 6, and this neck is provided with a groove or gutter 11.

The separating chamber 2 opens at its lower side into a drip pot 12, which, in the present instance, is formed of a pipe of suitable length and diameter that is screwed into the head and has a fitting 14 applied to its lower end. This fitting is shown as equipped with a petcock 15, although, in some installations it may be found desirable to connect the fitting to a waste pipe (not shown). This is purely a matter of circumstances and pertains to methods of installation and has no bearing upon the invention.

Considering now the operation of the device, pipes 3 and 5 may be considered an air line within which the separator is installed, the direction of flow being indicated by the arrows in Fig. 1. The moisture laden air from pipe 3 impinges against the helical vein 7 with the result that it is given a rotating or swirling motion; and the water or moisture in the air, by reason of its superior weight over that of the air, is, by centrifugal force, thrown against the gradually diverging wall of the nozzle 8. The water or moisture travels along this wall until it reaches the sharp edge at the inner end of the nozzle from where it is thrown into the separating chamber 2. The air, however, because of its extreme lightness, is practically unaffected by the centrifugal action so that it continues on in an unbroken column to the neck 10 through which it passes to the pipe 5. The fact that the inner end of the nozzle 8 terminates in a comparatively sharp edge precludes the accumulation of moisture thereon, whereas, if the end of the nozzle presented an area whereon the moisture was allowed to gather in beads or drops, it would be likely to fall into the column of air and be carried on through the separator to the egress pipe 5. Should drops of water form to a slight degree about the inner edge of the nozzle, those along its upper portion would be thrown back over the edge of the nozzle onto the tapered outer wall and be deflected thereby away from said edge so that eventually they would drop into the lower portion of the chamber 2 and be carried to the drip pot 12. The direction of movement imparted to the water or moisture as it leaves the end of the nozzle is such as will tend to carry it toward the end of the chamber 2 surrounding the neck 10 and, falling upon the neck,

it will be conducted by the groove or gutter 11 to the lower portion of the chamber and thence to the drip pot. The petcock 15 may be left slightly open at all times if desired so as to permit the water accumulating in the drip pot to drain out; or it may be kept closed normally and opened when necessary for the purpose of discharging the contents of the pot; or, as an alternative, and as hereinbefore stated, a waste pipe may be connected to the lower end of the drip pot should the requirements of the particular installation so dictate.

Having thus described my invention, what I claim is:—

1. In a separator of the class described, a head enclosing a separating chamber having an inlet passageway and an outlet opening, a helix disposed within the inlet passageway and spaced from the inner end thereof, the wall of the passageway inwardly of the helix diverging toward the inner end of the passageway, and a neck communicating with and extending inwardly

from the outlet passageway, and having its inner end disposed opposite the inlet passageway, the outer wall of said neck in the region of its inner end converging toward said end.

2. In a separator of the class described, a head enclosing a separating chamber having an inlet opening and an outlet opening, a helix disposed within the inlet opening, a nozzle registering with and extending inwardly from the inlet opening, the inner wall of the nozzle diverging gradually toward the inner end of the nozzle, the inner end of said wall being flared abruptly to define a comparatively sharp edge, and a neck communicating with and extending inwardly from the outlet opening and having its inner end disposed opposite the inner end of the nozzle, the outer wall of the neck in the region of its inner end converging toward said inner end.

In testimony whereof, I hereunto affix my signature.

HENRY J. MASTENBROOK.