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R. J. PABODIE

BAFFLE FOR CENTRIFUGAL OIL SEPARATORS

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Fig. 1.

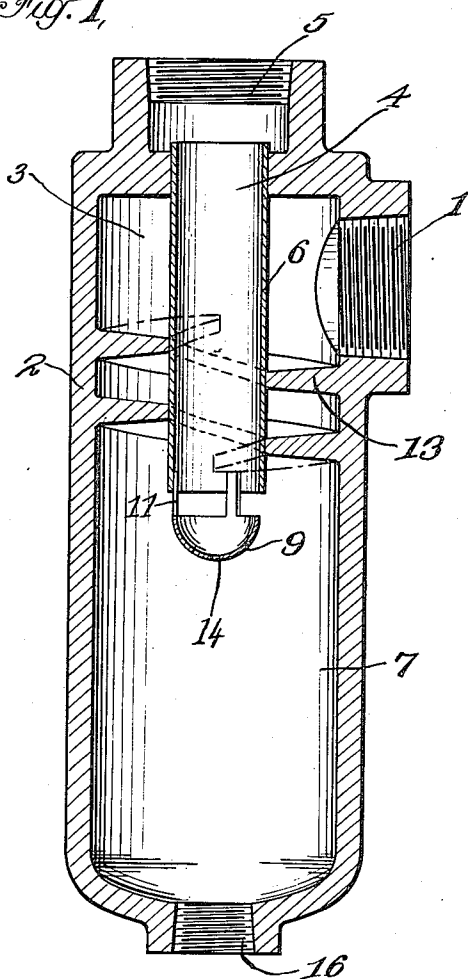


Fig. 3.

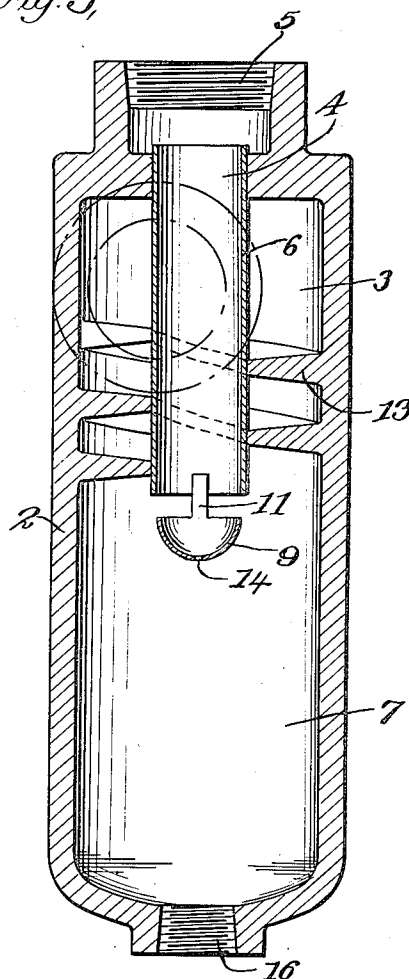
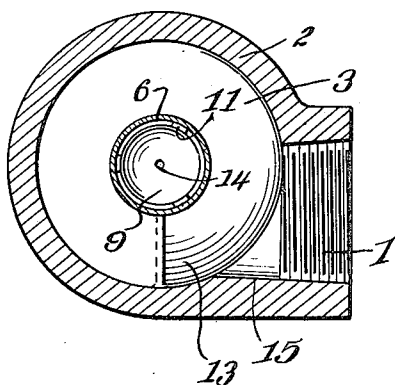


Fig. 2.



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UNITED STATES PATENT OFFICE.

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BAFFLE FOR CENTRIFUGAL OIL SEPARATORS.

Application filed February 16, 1920. Serial No. 359,572.

To all whom it may concern:

Be it known that I, ROBERT J. PABODIE, a citizen of the United States, residing at Maywood, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Baffles for Centrifugal Oil Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to separators for separating oil or other liquid from a current of steam or other gas flowing through a conduit, and has for its object to provide a separator of the centrifugal type in which a thorough and effective separation of the liquid from the gas is attained without any appreciable retardation of the velocity of the gas current and with a negligible pressure difference in the line pressure on each side of the separator.

A further object of the invention is to provide an apparatus of this character which contains no moving parts, is of simple design, and may be readily installed in any gas or vapor line without attachments other than the ordinary pipe connections.

A further object of the invention is to provide an apparatus of this character in which there are no screens or baffles interposed in the path of the gas or vapor current to retard its flow and to become clogged and necessitate cleaning or repairs.

In the accompanying drawings I have illustrated a preferred embodiment of my improved separator, and in said drawings,

Figure 1 is a vertical section through a separator embodying my invention.

Figure 2 is a horizontal sectional view taken thru the upper portion of the apparatus.

Figure 3 is a view similar to Figure 1 but taken at right angles to Figure 1.

Referring to the drawings, particularly to Fig. 1, 1 indicates the entrance port of the separator. The port 1 communicates with an annular passage 3 formed in the body portion 2 of the separator, which passage surrounds a central vertical passage 4 communicating at its top with the discharge opening 5 for the gas or vapor. The annular passage 3 is separated from the central passage 4 by an unbroken wall or par-

tion 6 whose lower edge terminates some distance below the line ports 1 and 5, and at a point within the upper end of an enlarged chamber 7 provided at the bottom of the body portion 2.

Attached to the lower end of the web or partition 6 is a cup 9 which depends from the member 6 and serves to permit entrance of the purified vapors into the member 6 while at the same time constituting a guard at the open end of the member 6 to exclude from the member liquid particles which have already been separated out and are swirling about in the space or chamber 7.

The gas or vapor entering the port 1 is caused to spiral about in the annular passage 3 before entering the cup, by means of a spiral web 13 between the partition 6 and the outer wall of the separator, the web 13 being downwardly inclined and serving to direct the incoming gas or vapor around the partition wall 6 and in a downwardly direction. The bottom of the cup is provided with a hole 14 to permit drainage from the cup of liquid which may condense or accumulate in the cup. The bottom of the enlargement 7 will also be provided with a discharge opening 16, the opening being provided to draw off the oil or other material accumulated in the bottom of the separator. The operation of this form of separator will now be described. The incoming gas or vapor passes into the annular and downwardly inclined passage 3, which not only imparts to the current a rotary or circular motion whereby a centrifugal force will be impressed on the particles of oil or other liquid entrained in the current, but also a downward direction which is so determined that the heavy particles of oil or other liquid in the current will, through their momentum, pass over the lip of the cup *a* into the space between the cup and the outer wall of the apparatus, while the gas or vapor, due to the suction through the discharge port of the separator, will be drawn into the opening at the top of the cup, thence passing up through the vertical passage 4 and out at the discharge port 5.

It will be noted that at all points in the air path through the separator, the passageways are of full cross section and not restricted so as to retard the flow of the gas. The passage of the gas through the

separator is short, so that there is little skin friction and the velocity of the current is not appreciably checked. In pipe lines where the air or vapor is moving with any appreciable velocity, substantially all the entrained moisture will be discharged over the lip of the cup or even with a low velocity fluid the separation is substantially complete, for such small amount of liquid as may enter the cup will be discharged against the inner edge of the cup wall instead of making the turn in the central passage with the vapor current, and the liquid will drain down the wall of the cup and fall through the opening 14 at the bottom into the collecting chamber.

The separator of this application is particularly adapted for separating oil and moisture from compressed air in air-brake apparatus and other air or gas lines having similar operating conditions. The apparatus here shown is formed of a single integral casting arranged in the air line with its axis vertical. The inlet opening 1 is offset from the center line of the cylinder in the manner shown in Fig. 2 to such an extent that the outer wall 15 of the opening is substantially tangential with the inner wall of the cylinder. The baffle 13 consists of a spiral vane formed on the inner wall of the casting 2, the vane beginning on the side wall adjacent the inlet opening 1 and about half way between the transverse middle line of the opening and its lower edge, as shown in Figs. 1 and 2. The vane 13 is of a length to make about two complete turns around the inner wall of the cylinder and is preferably of a depth such as shown in the drawing, its inner edge forming a circular bore concentric with the walls of the casting 2 and projecting into this bore through a hole in the top wall of the casting is the center tube or partition 4 of sheet metal, the tube having a tight fit in the vane whereby the vane and the wall of the tube form a closed spiral conduit leading into the lower portion of the chamber and constituting the sole outlet for the gas or air entering the apparatus, while the bore of the tube forms a vertical passage connecting the lower portion of the chamber with the outlet 5.

The lower end of the tube 6 is closed by the semi-spherical cap 9 which, for convenience of assembling, has its outer diameter equal to the inner diameter of the tube, whereby the cap may be attached to the tube 6 by means of tongues 11 projecting upwardly from the edge of the cap into the bore of the tube and welded or otherwise attached thereto, the edge of the cap being spaced from the end of the tube a sufficient distance to provide free passage of the air from the chamber 7 into the bore of the tube.

The above described apparatus has cer-

tain well defined features of advantage for particular conditions of use. By having the inlet opening tangential to the wall of the cylinder the moisture is deflected away from the wall of the cylinder with less change in direction than required in other tubes of separators. Also, the spiral path separating the two parts of the chamber allows ample time in which the liquid may collect at the outside wall and away from the inlet opening at the center.

The apparatus is of low manufacturing cost and is especially effective in small sizes as it requires but a small diameter of cylinder to impart the necessary centrifugal force to the entrained moisture to separate it from the gas current.

I claim:

1. A centrifugal separator of the class described comprising a body portion, inlet means for the fluid to be acted upon, a chamber within said body portion in which the separation of the lighter and heavier portions of the fluid is effected, a baffle for directing the flow of the incoming fluid formed integrally with said body portion and projecting inwardly into said chamber, a delivery passage for the lighter portions of the separated fluid comprising a hollow member separate from said body portion and extending into said chamber, the inner edges of said baffle constituting an opening of substantially the same conformity and dimensions as the outer surface of said hollow member, whereby said member fits snugly within said opening, means adjacent the inner end of said member of maximum dimension not exceeding the maximum transverse dimension of said member, said means permitting entrance of purified fluid into said member adjacent the lower edges thereof and at the same time serving as a guard for the open end of said member, and separate outlet means for discharging the heavier portions of the separated fluid.

2. A centrifugal separator of the class described, comprising a body portion, inlet means for the incoming fluid, a chamber within said body portion in which the separation of the lighter and heavier portions of the fluid is effected, a baffle for directing the flow of the incoming fluid formed integrally with said body portion and projecting inwardly into said chamber, said baffle constituting a plurality of convolutions along the inner wall of said chamber, a delivery passage for the lighter portions of the separated fluid comprising a hollow member separate from said body portion and extending into said chamber, the inner bore of said baffle constituting an opening of substantially the same conformity and dimensions as the outer surface of said hollow member whereby a substantially closed circuitous path is formed for receiving and conveying

the incoming fluid, means for admitting the purified fluid to said delivery passage, comprising a guard member positioned at the inner end of said hollow member and of
5 maximum dimension not exceeding the maximum transverse dimension of said member whereby said hollow member may be inserted into position within the chamber to constitute the completely assembled apparatus, an opening being provided between 10 said guard and said hollow member, and separate outlet means for discharging the heavier portions of said separated fluid.

In testimony whereof I affix my signature.

ROBERT JENETT PABODIE.