

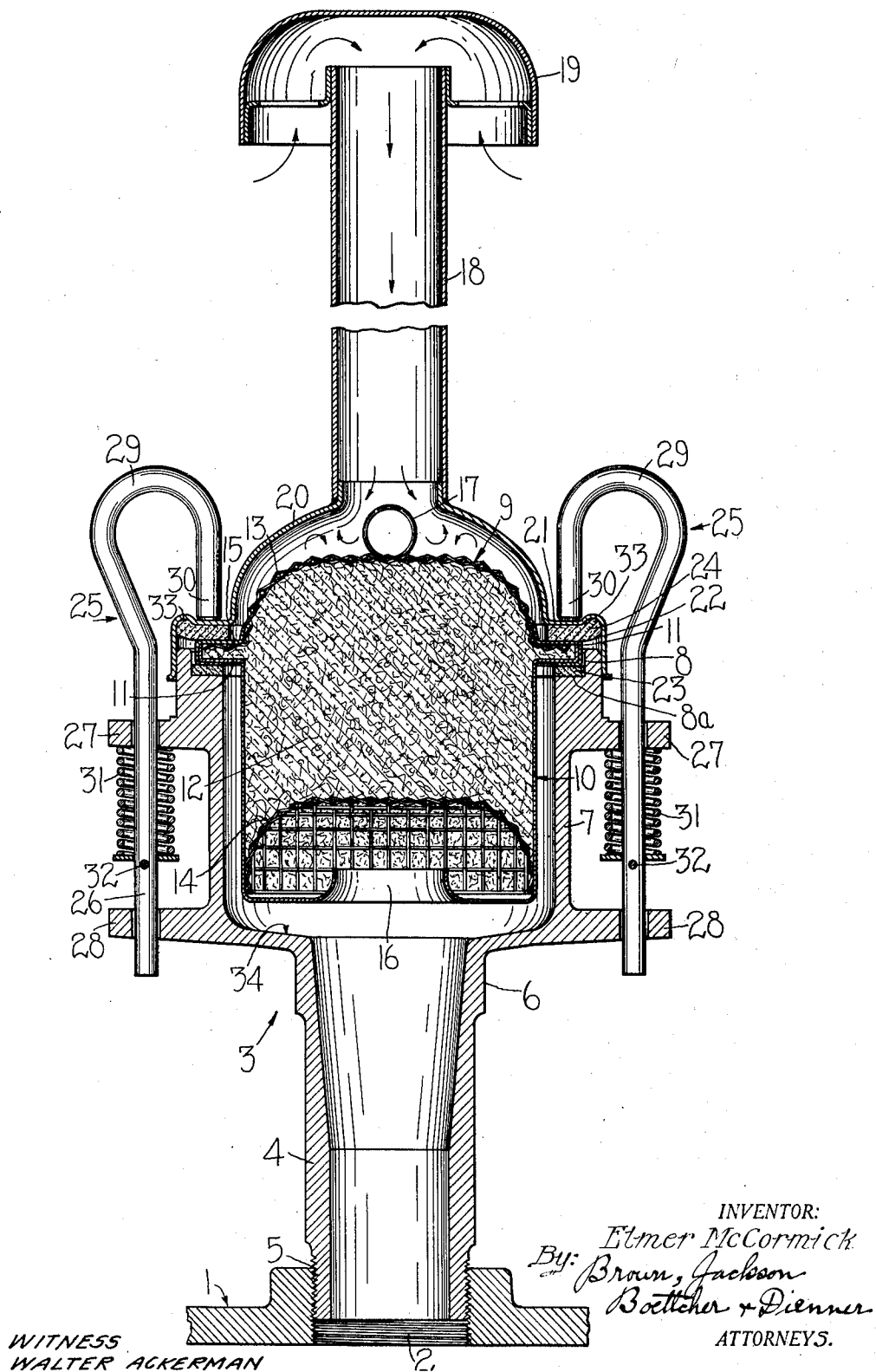
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BREATHER DEVICE

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BREATHER DEVICE

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1 Claim. (Cl. 121—194)

The present invention relates to an improvement in tractors and is more particularly directed to a crank case breather for tractor engines and the like.

5 Although the device of the present invention is particularly adapted for use on a tractor engine, it is applicable to any type of engine to function in the capacity for which it was devised. Obviously, its application to a tractor engine is of
10 considerable importance by reason of the fact that tractor engines are usually employed in places where large quantities of foreign materials fill the air.

Of the various features embodied in the device
15 of the present construction, one of the more important features resides in the disposition of the air filtering means. The device as a whole comprises an oil filler opening to the engine crank case and an air filtering means in the form of
20 an oil filled core is disposed within the filler in such a manner that it must be removed therefrom when adding oil to the engine. The removal of the filtering means serves as a reminder to the operator to clean the filter there-
25 by guarding against neglect in that respect, it being quite important to keep the air filter clean to warrant efficient functioning of the device in the total capacity for which it is designed. Moreover, the breather is so constructed that the
30 element thereof which holds the air filter also acts as a funnel into which the engine oil is poured when the air filter is removed from the breather.

The various other features and advantages of
35 the breather of the present construction will hereinafter be fully discussed in the following detailed description thereof, reference being had to the accompanying drawing which illustrates a preferred embodiment thereof.

40 In the drawing, the breather is illustrated in cross section, the section being taken vertically and substantially along its vertical axis.

Referring now to the drawing, a fragmentary
45 portion of an engine is indicated at 1 which is preferably a wall of the crank case, which portion of the engine or crank case wall is provided with a tapped opening 2 for the reception of the breather unit. The breather unit has been so
50 constructed as to take the place of the usual oil filler pipe through which oil is added to the crank case of the engine. The breather unit is provided with a funnel-shaped base 3 having a
55 tubular stem 4 which is suitably threaded as at 5 for connection with the wall of the crank case and within the tapped opening 2 thereof. The

tubular stem or pipe 4 may be conveniently
screwed into the crank case with the use of a
pipe wrench, or if desirable, the stem may be
provided with suitable flat surfaces as at 6 for
accommodating a wrench or other suitable tool. 60
The upper portion of the base adjacent the
tubular stem or pipe 4 is of a considerably larger
diameter and comprises a funnel 7 into which oil
may be poured when filling the engine crank
case. The upper end of the funnel portion of
65 the base is provided with an annular recess 8
forming a shoulder 8a around the inner peripheral
wall of the funnel for supporting the air
filtering core 9 which is so constructed as to
extend downwardly into the funnel opening of
70 the base member 3. From the foregoing it is seen
that the upper portion of the base 3 not only acts
as a funnel but also constitutes a housing for
the air filtering element or core 9. The base 3
is preferably a casting, although it may be con-
75 structed in any other suitable manner so long as
the materials employed are of sufficient rigidity
to dampen the engine vibrations transmitted to
the breather unit as much as possible to prevent
any foreign particles or oil retained by the air
80 filter from being dislodged or to find their way
through the filter.

The air filtering element of the present con-
struction is in the form of a flanged container
85 10 having a peripheral flange 11 for supporting
the filter upon the shoulder 8a and to center
the same within the funnel. This container is
filled with any suitable air cleaning substance
such as the filtering moss 12 which is confined
90 between an upper screen 13 and a lower screen
14. The upper screen 13 is secured to the con-
tainer 10 by means of a suitably shaped annular
ring 15, while the lower screen is merely sup-
ported upon the bottom of the container. For
95 the most efficient operation of the filtering ele-
ment 12, the filtering moss is saturated with
oil, and in order to prevent any excess or dirty
oil from draining out of the filtering moss and
running into the crank case, the lower screen
is so shaped that any of the oil which does
100 drain through the filtering moss will flow later-
ally outwardly along the screen to the walls
of the container. Obviously, the excess oil
draining out of the filtering moss is laden with
the foreign particles that have been separated
105 out of the air, and in order to prevent this sur-
plus oil from flowing into the crank case, the
bottom of the container 10 is provided with an
upwardly flared opening 16. The walls of this
upwardly flared opening cooperate with the
110

side walls of the container to form a sump wherein the excess grit laden oil is collected and stored until the filter element is removed from the breather and cleaned. The upper
5 screen is substantially of the same shape as the lower screen so as to increase the capacity of the filtering element by confining a greater amount of the filtering moss between the two screens. The upper screen is also provided centrally thereof with a ring 17 for the removal
10 of the filtering element 9 as a whole from within the funnel portion of the base.

A removable air inlet member in the form of a vented stack 18 forms the remainder of the enclosure for the air filtering core element 9.
15 The upper portion of the air inlet member or stack is provided with a deflector 19, while the lower end thereof is provided with an enlarged semi-spherical cap 20 which has a laterally disposed annular shoulder 21 formed thereon having a depending flange 22, the internal diameter of the latter being substantially of the same diameter as the outer periphery of the funnel
20 7 to form a substantially air tight seal therewith. The flanged portion of the filtering element 9 is confined between a pair of suitable gaskets or washers 23 and 24 respectively, the washer 23 being disposed upon the shoulder 8a formed by the recess 8, while the washer 24 is
25 carried by the cap 20. By means of the gaskets 23 and 24 and the depending sealing flange 22 of the cap 20, an air tight closure is provided between the air inlet member 18 and the base 3, and all of the air which is drawn into the crank
30 case must necessarily pass upwardly into the deflector 19 and downwardly through the inlet 18.

Any suitable releasable means may be provided for cooperation with this air tight closure
40 to hold the same tightly upon the funnel portion of the base 3 and a preferred means for accomplishing this purpose as herein provided comprises a plurality of yieldable clamping units 25. Each of these clamping units comprises a pin 26 slidably mounted in a pair of
45 ears 27 and 28 formed integrally with the funnel portion of the base, the pin being provided at its upper end with a finger loop 29 with the downwardly extending portion of the free end of the loop forming the clamp 30. The clamp
50 is at all times urged downwardly by means of a spring 31 which is interposed between the ear 27 and a washer abutting a stop pin 32 secured to and carried by the pin 26 of the clamping unit. When these clamping units are in operative position as illustrated in the drawing, they function through the action of their respective springs to urge the cap 20 and its associated parts firmly downwardly upon the upper edge
55 of the funnel portion of the base, the cap being held in vertical spaced relation to said edge by virtue of the superimposed arrangement of the gaskets 23 and 24 and the peripheral flange of the filtering element, the flange 22 of the cap, however, overlapping a portion of the outer peripheral surface of the base.

In order to maintain the clamps 30 in operative engagement with the cap, that portion of the cap extending between the horizontal flange 21 and the depending ring 22 is formed into an upwardly extending bead 33 which acts to positively maintain the clamp ends 30 of the clamping units upon the horizontal shouldered portion 21 of the cap. This bead is also provided
75 for the purpose of retaining the gasket 24 within

the cap. This is accomplished by making the external diameter of the gasket somewhat larger than the internal diameter of the depending ring 22 and by forcing the excess portion of the gasket into the beaded portion of the cap whereby the gasket will be frictionally held against loosening.

As hereinbefore explained, the filtering element must be removed when adding oil to the engine, the purpose being to remind the operator to clean the filtering element. To clean the filtering element is a simple operation and merely requires a small quantity of fresh and clean oil in which the element may be agitated back and forth to wash the accumulated grit and dirt out of the filtering moss. This operation will at the same time moisten the filtering moss whereby the most efficient operation of the breather is obtained when the filtering element is replaced.

Because of the numerous times that the filtering element is removed during the life of the engine, it is possible that either one or both of the gaskets 23 and 24 may be omitted or misplaced. For this reason, the dimensions of the filtering element and the cap are so proportioned that the breather unit can still be used effectively for the purpose for which it was devised until one or two new gaskets may be procured to replace either or both of the lost gaskets. This feature greatly enhances the utility of the device and is embodied in the breather in the following manner. The gasket 23 is ordinarily frictionally retained within the recess 8, but in the event that it is lost through continual usage of the device, the depth of the container 10 is such that it will still be maintained in spaced relation to the bottom 34 of the funnel portion of the base whereby the flanged portion of a filtering element will still be capable of properly seating upon the shoulder 8a. Also, the thickness of the flange 11 of the filtering element is such that the horizontal flange or shoulder 21 of the cap will properly bear against the top side of the flange 11 to provide an effective seal to prevent by-passing of air around the filtering element even though the gasket 23 is omitted. This seal, of course, is at all times aided by the peripheral contact of the depending sealing flange 22 of the cap 20 with the laterally outer peripheral surface of the funnel. In the event that the gasket 24 is misplaced or lost, the cap will still be capable of bearing against the top side of the flange 11 of the filtering element because of the predetermined thickness of said flange regardless of the presence or absence of the lower gasket 23. In this connection, it is to be noted that the depending flange portion of the cap 20 is of such length that normally, with both gaskets in place, the flange will overlap the outer peripheral surface of the funnel sufficiently to effectively prevent infiltration of air into the breather at this point. Now, if the gasket 23 is omitted, the depending sealing flange 22 of the cap will overlap the outer peripheral surface of the funnel to a greater extent, thereby increasing the effectiveness of the sealing flange, and in cooperation therewith the gasket 24 will not only be seated against the flange of the filtering element but will also be seated upon the upper periphery of the upstanding edge of the funnel. And in the event that the gasket 24 is omitted along with the gasket 23, the depending sealing flange

of the cap will overlap the outer peripheral surface of the funnel the maximum amount possible, as limited by the proportions of the cap and the funnel elements of the breather and thereby produce a still more effective seal against the infiltration of air at this point. In other words, the sealing flange 22 has its effectiveness increased inversely proportional to the effectiveness of the inner seal between the cap and funnel as determined by the presence or absence of the gaskets 23 and 24. It is obvious that the yieldable clamping members will at all times serve the purpose for which they have been devised regardless of the omission of either or both of the gaskets 23 and 24, and in resiliently urging the cap 20 against the flange 11 the springs aid in establishing the inverse ratio mentioned.

The ventilating air is drawn into the crank case in any conventional manner, for example, by the suction caused by the reciprocating of the pistons, or by the reduction of the pressure in the crank case by means of any known suction method. Of the foregoing two methods, the latter is preferable, since the air is then only drawn downwardly through the breather as contrasted with the former method wherein the air is reciprocated through the breather. The manner in which a breather of the present construction acts upon the grit laden air that is drawn into the crank case is as follows:

The air is drawn upwardly into the deflector 19 and its direction is abruptly reversed to flow downwardly through the filter stack 18. During this initial reversal of the air, some of the heavier particles of the foreign materials in the air will be separated by inertia, these particles striking the top wall of the deflector and dropping downwardly out of the same. The deflector also serves as a protection to prevent other objects from entering the intake pipe of the filter which might impair the operation thereof. As the air passes down the stack or intake pipe 18 it then enters the enlarged opening defined by the interior of the cap where the air velocity is suddenly diminished due to the difference in the transverse areas between the intake pipe and the cap. This sudden change in the velocity of the air causes a turbulence above the filtering element whereby more of the foreign particles are separated from the air in the chamber defined by the cap and the upper screen of the filtering element, and the particles that are here separated may be thrown to the lateral extremities of this chamber, most of the particles falling directly upon the filtering element. From this point the air passes directly through the moss of the filtering element whereby the major portion of the foreign particles, principally the smaller ones, are finally separated from the air which then passes into the crank case.

Whatever foreign particles, if any, which may still remain in the air after passing from the moss are negligible. However, if the operation of the breather should be impaired somewhat for any reason, such as may occur if the oil in the filtering moss had dried up, another partial separation of the foreign particles from the air is brought about in the chamber defined by the lower screen and the bottom of the container 10. As hereinbefore explained, the bottom of the container forms a sump for excess oil that drains out of the filtering element. Obviously, some excess oil will generally be present in this sump, and by reason of the fact that the diameter

of the flared opening in the container is much smaller than the internal diameter of the container 10, another turbulence of the air will occur before it passes down into the tubular stem or pipe of the base and into the crank case. During this turbulence, a large percentage of any fine foreign particles that may pass the moss will under certain adverse conditions be caught and retained by the sump oil that encircles the flared opening 16. The foreign particles are stated as being fine since it is highly improbable that anything else than the finer particles would escape through the moss of the filtering element if and when the occasion should arise that the breather is not functioning properly.

The device of the present invention requires no attention aside of an occasional cleaning of the air filter when it is removed from the breather, the removal of the filter, being necessary whenever oil is being added to the engine, and serves as a constant reminder to clean the air filter core. To remove the air intake member 18 and the filter, each of the clamping members must be raised against the action of the spring connected therewith and then turned. When released in inoperative position each clamping member will move downwardly until the stop pin 32 engages the upper face of the ear 28 and will be held in this position by the action of the spring. After the air intake member and filter are removed, oil can be conveniently poured into the wide mouth of the base funnel without spilling. Spilled oil about an engine is always objectionable since it causes dirt and grit to collect, and when such deposits occur near an engine opening, such as the breather or oil filler pipe, they are apt to find their way into the engine particularly when adding oil thereto or they may get into the engine when repair work is being done.

Although the drawing by way of example discloses a preferred embodiment of the present invention and the foregoing description is specifically directed to this disclosure, it is to be understood that many changes may be made in the structure shown without departing from the essence and scope of the invention. Therefore, I do not intend to be limited to the specific details shown and described but only insofar as the appended claim is so limited.

What I claim is:

In air filtering apparatus, oil filler means for an engine comprising a breather pipe having one end thereof connected with the crankcase of said engine and having its other end formed into an enlarged housing serving as a funnel for said pipe when oil is being supplied to the engine, a removable air inlet member including a stack having an enlarged portion at its lower end arranged to be mounted over the enlarged housing portion of said breather pipe, and air cleaning means of substantially the same size as and disposed within said enlarged housing, serving to substantially fill the same and adapted for cleaning the air entering said crankcase, said air cleaning means being removable from said enlarged housing to permit the use of the latter as a funnel when supplying oil to the crankcase of the engine.

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