Dec. 5, 1950 R. E. BROWN 2,532,888

CRANKCASE PRESSURE CONTROL

Filed Dec. 9, 1948

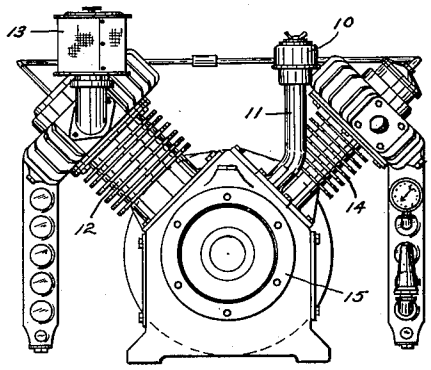


Fig. 1

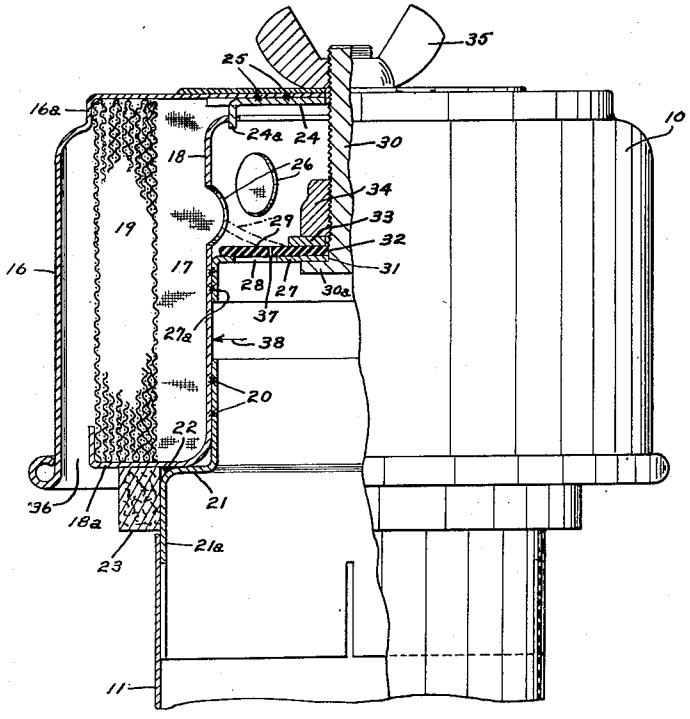


Fig. 2

INVENTOR
RICHARD E. BROWN

BY Hyde, Meyer, Baldwin & Doran
ATTORNEYS

Patented Dec. 5, 1950 2,532,888

UNITED STATES PATENT OFFICE

2,532,888

CRANKCASE PRESSURE CONTROL

Richard E. Brown, Cleveland, Ohio, assignor to Air-Maze Corporation, Cleveland, Ohio, a corporation of Delaware

Application December 9, 1948, Serial No. 64,392

4 Claims. (Cl. 121—194)

1

This invention relates to improvements in crankcase pressure control and more particularly to a crankcase breather with a relief valve.

It is often advantageous and desirable in compressors and internal combustion engines to provide means for maintaining the interior of the crankcase at a slight vacuum so that crankcase vapors will not escape promiscuously. Such an arrangement also conserves the crankcase oil which will be prevented from entering the engine combustion chambers and producing a smoky exhaust. Such arrangements are particularly desirable in confined engine rooms where the atmosphere must be carefully controlled.

One of the objects of the present invention, therefore, is to provide novel means for quickly establishing a slight crankcase vacuum promptly after the engine or compressor is started.

Another object of the present invention is the combination with a crankcase relief valve, of filter means for preventing the passage of oil vapors out of the crankcase and for preventing the passage of dirt particles into the crankcase.

Other objects and advantages of the present invention will be apparent from the accompanying drawings and description, and the essential features thereof will be set forth in the appended claims.

In the drawings,

Fig. 1 is an end elevational view of a gaseous compressor equipped with my invention; while

Fig. 2 is an enlarged view of the combined breather and relief valve of Fig. 1, the right hand portion of the view being in elevation and the left hand portion thereof being cut away on a central sectional view to more clearly show the construction.

It is well understood in the art that it is often desirable to maintain a crankcase under a slight vacuum. My invention comprises a novel means for producing this result comprising a combined breather and relief valve 16 adapted to be slid into position on the breather pipe 11 of a crankcase. In Fig. 1 I have shown my invention as applied to a compressor having a low pressure cylinder 12 into which air flows through a filter 13, and a high pressure cylinder 14, both cylinders being mounted on a crankcase 15 which is equipped with the breather pipe 11. It will be understood by those skilled in this art that my invention may also be applied to the crankcase of an internal combustion engine as will be later described.

My device comprises an outside cap 16 of inverted cup shape within which is provided an

2

annular chamber 17 by mounting a second inverted cup shape member 18 which has a bottom flange 18a extending outwardly radially all around the member 18 to provide a seat for a filter element 19. This filter element is preferably formed of a large number of layers of wire mesh screen. This filter is annular in form and rests against the flange 18a at the bottom and is held in position by a shoulder 16a at the top. The member 18 is mounted by means of spotwelding 20 upon a reducer tube 21 which has a flared lower end 21a which fits slidingly inside of the breather pipe 11. A solder seal 22 is provided between the members 18a and 21 entirely around the circumference. An annular seal 23 of felt or the like is secured by adhesive to the lower face of flange 18a and snugly engages the outer face of the larger diameter of the tube 21 just above the breather pipe. The member 16 is also held in position by a plate 24 which is spotwelded to the top of the cap 16 as indicated at 25. This plate has downwardly turned tongues 24a which engage in suitable openings in the top of the member 16. A suitable number of openings 26 are provided through the upper wall of the cap member 16 so as to allow the flow of air inwardly and outwardly.

Relief valve means is provided in the interior of the cap member 16. For this purpose a plate 27 having an annular downturned flange 27a is secured by spotwelding to the member 18 a little below the openings 26. An annular row of openings 28 is provided through the plate 27 and these openings are normally closed by a flexible disc 29 of rubberlike material which is firmly held at the center portion of plate 27. The means for holding the central portion of the valve 29 comprises a bolt 30 having an enlarged head 30a which underlies the plate 27 when the bolt 30 is pushed upwardly through a hole 31 in plate 27 and a hole 32 in the flexible valve 29. A washer 33 covers the top central portion of the valve 29 from the center outwardly to a point fairly close to the series of openings 28. A nut 34 threaded down on the bolt 30 holds all of the parts assembled against the shoulder 30a. The bolt extends upwardly through suitable openings in plate 24 and the top of cap 16 and is there provided with a wing nut 35. Obviously, removal of the wing nut permits the cap 16 with its attached plate 24 to be lifted upwardly for the servicing, inspection, and cleaning of the filter 19 without displacing any of the other parts.

It results from the use of my invention that the first stroke of the engine or compressor which

moves a piston toward the crankcase causes a slight pressure therein which tends to escape out of the openings 28 causing the valve 29 to assume the dot-dash position indicated in Fig. 2. This air passes outwardly through the openings 26 and on out through the annular filter 19 and through the annular opening 36 at the lower portion of cap 16. This outward flow is generally at a very low velocity and usually will not carry oil out but any oil or oil mist will strike the screens in the filter element 19 so that the same is not carried outside. Upon the next stroke of the engine or compressor which causes a piston to move away from the crankcase space, the crankcase volume will be increased but the valve 29 will have closed over the openings 28 and therefore no air can enter the crankcase and a slight vacuum will be produced. Thus, my invention creates a slight vacuum almost immediately after the engine or compressor starts. After this, there is very little flow inward or outward through my device but the pressure in the crankcase will fluctuate very slightly due to the strokes of the engine or compressor while maintaining a slight vacuum within the crankcase.

If there were no flow inwardly through my relief valve and breather cap, no filter element 19 would be needed. As a matter of fact, this is only desirable in order to take care of the blow-by volume in the crankcase.

It is often desirable to provide a very small bleed hole such as that indicated at 37 through the valve 29 opposite one of the openings 28. Another suitable location for such a bleed hole is shown by the arrow 38. In other words, the bleed hole could be a very small opening through the wall of the member 18. The provision of such a bleed hole is desirable especially in one-cylinder engines or in engines or compressors of the two-cylinder opposed type which, upon the suction stroke, causes a high displacement in the crankcase. If the high vacuum is not relieved in such a case the bearings may be sucked dry.

I have thus provided very simple but novel means wherein the flexible rubberlike valve 29 opens very easily upon the creation of a slight pressure in the crankcase and closes quickly thereafter so as to maintain a slight vacuum in the crankcase.

While I have shown my device as communicating with atmosphere at the zone 36, it should be understood that it is equally applicable in those instances where crankcase gases are drawn away through positive suction applied to the pipe 11. This is particularly true where the positive suction device operates in such a way as to exert alternate suction and pressure. In such a case the device shown in Fig. 2 is placed in the line leading to the source of alternate suction and pressure. When suction is exerted, the valve 29 opens to allow a small amount of the crankcase gases to be sucked out. When the pressure

portion of the cycle occurs on the downstream side of the valve 29, obviously the valve 29 will be pushed to its closed position so as to maintain the slight vacuum in the crankcase.

What I claim is:

1. In combination with a crankcase having a breather pipe, a cap of downwardly opening cup shape adapted to fit over the upper end of said breather pipe, an annular series of openings through said cap, a flexible valve overlying said openings on the upper face of said cap, and means securing the center of said valve to said cap.

2. In combination with a crankcase having a breather pipe, a cap of downwardly opening cup shape adapted to fit over the upper end of said breather pipe, an annular series of openings through said cap, a flexible valve overlying said openings on the upper face of said cap, means securing the center of said valve to said cap, a flange extending radially outwardly from the lower edge of said cap, an annular filter element resting on said flange, and a second cap of cup shape opening downwardly, said second cap secured to said first named cap and engaging the top of said filter element.

3. In combination with a crankcase having an upstanding breather pipe, a cap of downwardly opening cup shape adapted to fit over the upper end of said pipe, a partition extending diametrically across said cap and spaced from the upper end thereof, an annular series of openings through said partition, a flexible valve overlying said openings and having its center only secured to said partition, a flange extending radially outwardly from the lower edge of said cap, an annular filter element resting on said flange, a second cap of downwardly opening cup shape having its central top portion removably secured to said partition wall, and there being openings for air flow between said second cap and said filter element and between said filter element and the interior of said first named cap above said partition.

4. The combination of claim 3 including a passageway for restricted air flow from the interior of said first named cap below said partition outwardly to atmosphere.

RICHARD E. BROWN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,432,187	Jerkins et al.	Oct. 17, 1922
1,943,765	Jones	Jan. 16, 1934
2,375,718	Winkels et al.	May 8, 1945

FOREIGN PATENTS

Number	Country	Date
347,770	Germany	Jan. 24, 1922