April 24, 1962 C. L. PRICE 3,031,026

AIR CLEANER

Original Filed June 20, 1956 2 Sheets-Sheet 1

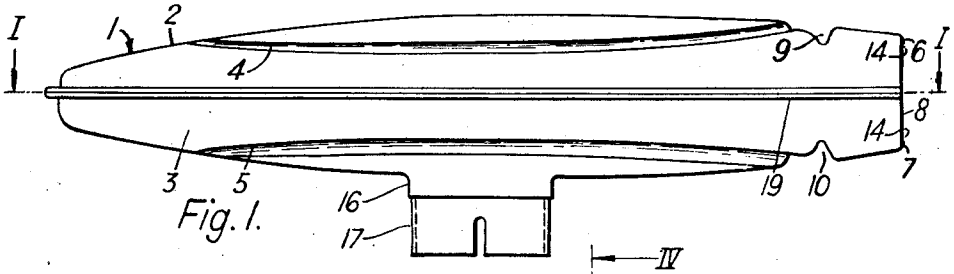



Fig. 1.

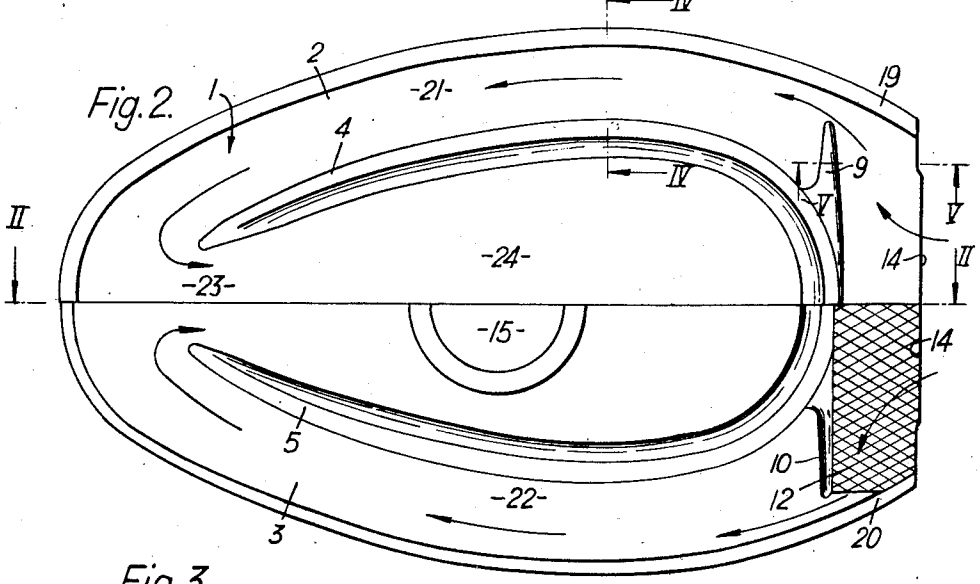



Fig. 2.

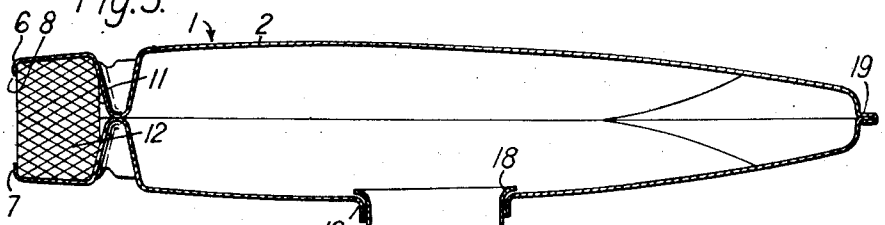



Fig. 3.

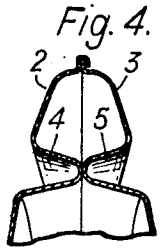



Fig. 4.

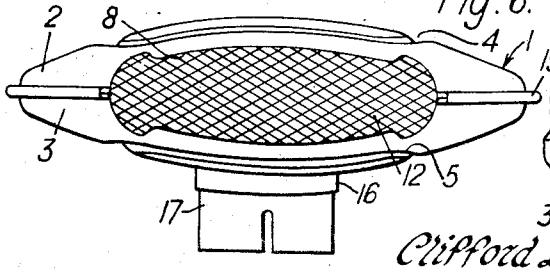



Fig. 6.

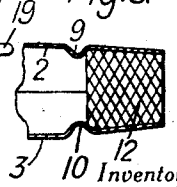



Fig. 5.

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Fig. 7.

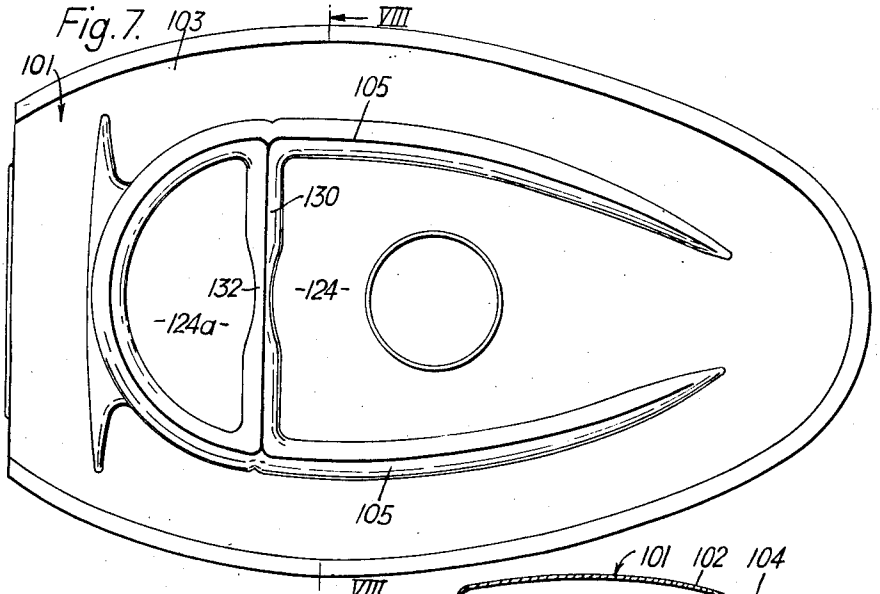



Fig. 8.

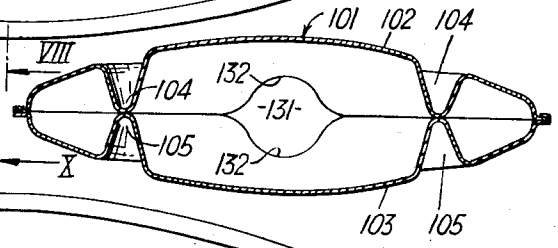



Fig. 9.

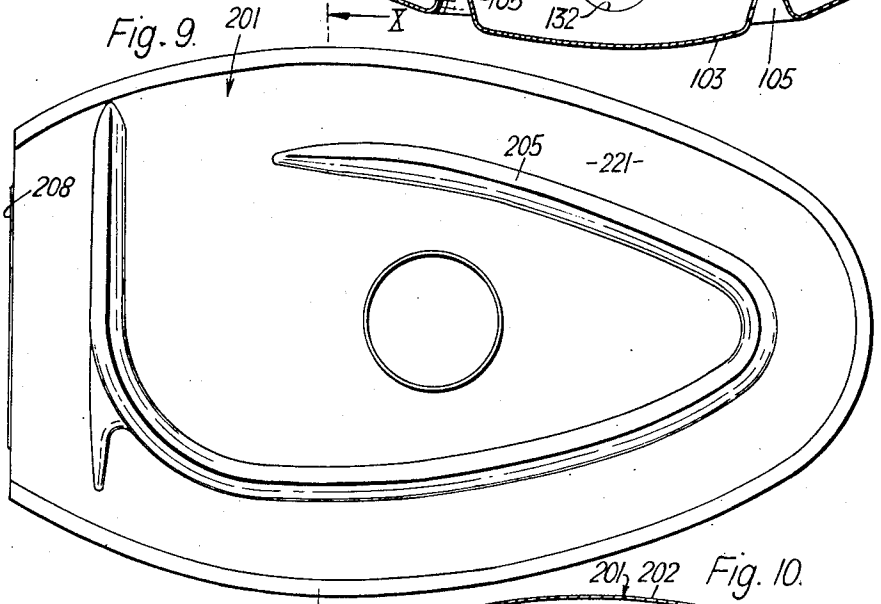
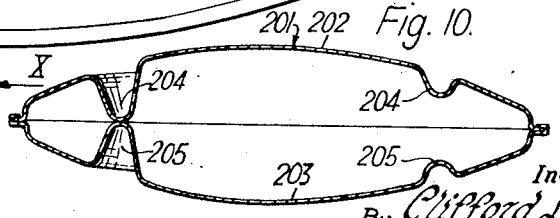



Fig. 10.




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3,031,026

# AIR CLEANER

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Continuation of application Ser. No. 592,661, June 20, 1956. This application May 31, 1960, Ser. No. 33,010
11 Claims. (Cl. 181—54)

This invention relates to an air cleaner for the air intake of a carburetor for an internal combustion engine.

This is a continuation of co-pending application Serial No. 592,661, filed June 20, 1956 (now abandoned).

By virtue of the invention an air cleaner may be made from simple pressings or mouldings of sheet material requiring only a simple assembly operation.

The invention is concerned in particular with an air cleaner which includes one or more chambers having a communication with an air inlet conduit or conduits and designed to resonate at the frequencies of the sound waves which it is desired to suppress.

The scope of the invention is defined by the appended claims; and how it may be performed is hereinafter particularly described, with reference to the accompanying drawings, in which:

FIGURE 1 is an elevation of one embodiment of the air cleaner according to the invention;

FIGURE 2 is a composite plan view, the upper half being a plan of FIGURE 1 and the lower half being a plan on the line II—II of FIGURE 1 with the upper shell of the air cleaner removed;

FIGURE 3 is a longitudinal section on the line III—III of FIGURE 2;

FIGURE 4 is a detail section on the line IV—IV of FIGURE 2;

FIGURE 5 is a detail section on the line V—V of FIGURE 2;

FIGURE 6 is an end elevation of the air cleaner as seen from the right of FIGURE 1;

FIGURE 7 is an inverted plan of a second embodiment of the air cleaner according to the invention;

FIGURE 8 is a section on the line VIII—VIII of FIGURE 7;

FIGURE 9 is an inverted plan of a third embodiment of the air cleaner according to the invention; and

FIGURE 10 is a section on the line X—X of FIGURE 9.

In the embodiment of the invention shown in FIGURES 1–6, the device is made as a relatively shallow casing 1 of general oval shape in plan. The casing is formed from an upper concave shell 2 and a lower concave shell 3 each formed as single sheet metal pressings which have formed therein similar trough-like indentations 4, 5 respectively, the base of each of which lies in the same plane as the periphery of its shell, the indentations being substantially of horseshoe shape in plan. The ends 6, 7 of the shells 2, 3 remote from the spaced ends of the horseshoe indentations are made substantially straight in plan, so that when the two shells 2, 3 are placed face to face, a substantially rectangular inlet opening 8 is formed at one end of the casing 1.

Near the inlet opening 8 each of the shells 2, 3 has a further substantially transverse indentation 9, 10 respectively so as to form a chamber 11 into which a filling of woven wire 12 or like air filtering material is inserted and retained in position by the transverse indentations 9, 10 and by inturned flanges 14 formed about the inlet opening 8.

The lower shell 3 is also formed with a central outlet opening 15 bounded by a short outwardly extending neck 16 integral with the shell. A connector sleeve 17 having a flange 18 at one end is fitted within the neck 16 of the



outlet opening 15 with the flange 18 in abutment with the interior surface of the shell 3 and is secured to the shell as by spot welding or soldering.

The shells 2, 3 are formed with a peripheral flange 19, 20 respectively, that on the shell 2 being of greater width than that on the shell 3, and to assemble the air cleaner casing the two shells 2, 3 are placed face to face and united at their peripheries by folding the larger flange 19 over the other flange 20 and crimping the flanged edges.

When the two shells 2, 3 are thus secured face to face as described, the horseshoe shaped indentations 4, 5 of each abut to form within the casing 1 two conduits 21, 22 which extend from and communicate with the air inlet opening 8 at the one end of the casing and are defined by the abutting surfaces of the indentations 4, 5 and by the peripheral flanges 19, 20 of each shell 2, 3, the conduits 21, 22 thus extending substantially parallel to the periphery of the casing 1 and, at the closed end of the casing, communicating by way of the space 23 formed between the open ends of the horseshoe shaped indentations 4, 5, with a central chamber 24 which is bounded by the horseshoe shaped indentations 4, 5. This chamber 24 constitutes a resonance chamber and its dimensions and shape may be chosen so that it will resonate at the frequency of the sound waves which it is desired to suppress when the device is fitted to the air intake of a carburetor. The length of the two air inlet conduits may also be selected so as to provide the desired degree of acoustic impedance.

In use, the air cleaner is connected to a carburetor air intake by the sleeve 17 and air is drawn into the casing through the air inlet 8 at the one end thereof and is cleaned as it passes through the woven wire filling 12 therein, which is preferably coated with oil. The air then passes in two streams through the two said air conduits 21, 22, which, at the air inlet end of the casing, are separated from the central resonance chamber 24 by the juxtaposed horseshoe shaped indentations 4, 5. At the other end of the casing 1 the two streams of air meet and pass through the opening 23 between the ends of the horseshoe shaped indentations 4, 5 into the central resonance chamber 24 and then out through the outlet opening 15 formed in the lower shell 3.

Thus the air cleaner has two air inlet conduits 21, 22 disposed in parallel and being connected in series with a resonance chamber 24.

In the second embodiment of the invention shown in FIGURES 7 and 8 the two shells 102, 103 forming the casing 101 are constructed in substantially the same way as in the first embodiment, but the central resonance chamber defined by the abutting horseshoe shaped indentations 104, 105 is divided into two communicating chambers 124, 124*a* by further opposed indentations 130 which extend transversely across the closed portion of the horseshoe shaped indentations 104, 105 so as to separate one resonance chamber 124 from the other 124*a* except for an opening 131 defined by opposed shallower portions of the transverse indentations 130. The additional resonance chamber 124*a* formed in this way may be of such a size as to damp sound waves of say, a high frequency, the low frequency waves being damped by the adjoining resonance chamber 124.

In the third embodiment of the invention shown in FIGURES 9 and 10 the general construction of the air cleaner is substantially the same as in the two preceding embodiments but in this case the air cleaner is formed with a single air inlet conduit 221 which is defined by juxtaposed single indentations 204, 205 formed in the upper and lower shells 202, 203 respectively of the casing 201 and extending from the peripheral edge of the shells near the air inlet opening 208, transversely across the casing 201 substantially parallel to the air inlet open-

ing 208 and then parallel to the periphery of the casing to a point near the start of the indentations, the indentations 204, 205 thus having the shape of a letter C with a flat top portion. With this construction the single air conduit 221 is of substantially greater length than in the other two embodiments and accordingly will have a higher acoustic impedance.

The air cleaner may also be formed in a similar manner with two or more resonance chambers and air conduits by appropriate configuration of the indentations made in each shell of the casing.

The constructions described enable an air cleaner to be made from simple metal pressings which can be united by a simple crimping operation, and the device so formed enables a desirable length of air inlet conduit and a suitable size of resonance chamber to be incorporated in a shallow structure which occupies little vertical space, this being a desirable feature in present day motor vehicles in which the tendency is to keep the line of the hood as low as possible.

The air cleaners described may also be made from synthetic plastic material instead of metal, the parts thereof being readily formed as mouldings or pressings from such material and being united at their peripheries by adhesive or, where a thermoplastic material is employed, by the application of heat at the juxtaposed peripheral edges. This method of construction may in some circumstances result in a product which is cheaper to manufacture than a metal structure, since where a limited number of air cleaners of one design are to be produced, the tools, such as vacuum presses, for making the shells of the air cleaner from synthetic plastic material may be less expensive than those for a sheet metal air cleaner.

What is claimed:

1. An air cleaner comprising a hollow casing formed by concave shells secured together at the edges to provide an air chamber, elongated indentation means formed in said shells and extending across said chamber within said edges and dividing said chamber into inlet passage means and chamber means, an inlet formed in said casing and leading to said inlet passage means, an outlet formed in said casing, said shells being spaced across said indentation means and remote from said inlet to provide communication between said inlet passage means and said chamber means and said outlet.

2. An air cleaner comprising a hollow casing formed by concave shells secured together at the edges to provide an air chamber, complementary indentation means formed in said shells and extending across said chamber and meeting within said edges and dividing said chamber into inlet passage means and chamber means, said shells being spaced at one side of said casing and between said edges to provide inlet chamber means leading to said inlet passage means and being spaced to provide communication between said inlet passage means and said chamber means, and an outlet formed in one of said shells and communicating with said chamber means.

3. An air cleaner comprising a hollow casing formed by concave shells secured together at the edges to provide an air chamber, elongated indentation means formed in said shells and extending across said chamber within said edges and dividing said chamber into inlet passage means and chamber means, an inlet formed in said casing and leading to said inlet passage means, an outlet formed in said casing, said shells being spaced across said indentation means and remote from said inlet to provide communication between said inlet passage means and said chamber means and said outlet, said indentation means being spaced from said edges to provide said inlet passage means around said chamber means, said outlet being formed in one of said shells and opening into said chamber means.

4. An air cleaner comprising a hollow casing formed by concave shells secured together at the edges to provide an air chamber, elongated indentation means formed in said shells and extending across said chamber within said edges and dividing said chamber into inlet passage means and chamber means, an inlet formed in said casing and leading to said inlet passage means, an outlet formed in said casing, said shells being spaced across said indentation means and remote from said inlet to provide communication between said inlet passage means and said chamber means and said outlet, said shells being spaced at said inlet to provide filter chamber means between said inlet and said inlet passage means, and a filter element within said filter chamber means.

5. An air cleaner as defined by claim 1 and in which said inlet passage means comprises a pair of parallel branches between said inlet and said chamber means.

6. An air cleaner as defined by claim 1 and in which said inlet passage means comprises a single continuous passage leading from said inlet to said outlet and communicating with said chamber means.

7. An air cleaner as defined by claim 1 and in which said chamber means is formed between said outlet and said inlet passage means and comprises a side branch.

8. An air cleaner for the air intake of an internal combustion engine, comprising two juxtaposed concave shells united at their peripheral edges to form a hollow casing, said shells having complementary peripheral portions which form an inlet opening in the casing and one shell having an outlet opening therein, and said shells having complementary indentations which abut to divide the space within the casing into at least one air conduit and at least one chamber in communication with said inlet and outlet openings.

9. An air cleaner for the air intake of an internal combustion engine comprising two juxtaposed concave shells united at their peripheral edges to form a hollow casing, said shells having complementary peripheral portions which form an inlet opening in the casing and one shell having an outlet opening therein through which extends a connector sleeve secured to said shell, said shells having complementary indentations therein which abut each other upon the juxtaposition of the shells to divide the space within the casing into at least one air conduit and at least one chamber in communication with said inlet and outlet openings, and to form a chamber between said inlet opening and said air conduit to receive a mass of air filter material.

10. An air cleaner for the air intake of an internal combustion engine comprising two juxtaposed concave shells united at their peripheral edges to form a hollow casing, said shells, having complementary peripheral portions which form an inlet opening in the casing and one shell having an outlet opening therein in which is secured a connector sleeve, and said shells having complementary indentations therein brought into mutual abutment by the juxtaposition of the shells to divide the space within the casing into at least one air conduit extending substantially parallel to the periphery of said shells, and at least one chamber, said air conduit communicating at one end with said air inlet and at its other end wtih said chamber, and said chamber also communicating with said outlet.

11. An air cleaner for the air intake of an internal combustion engine comprising two juxtaposed concave shells united at their peripheral edges to form a hollow casing, said shells having complementary peripheral portions which form an inlet opening in the casing and one shell having an outlet opening therein through which extends a connector sleeve secured to said shell; said shells having complementary indentations therein brought into mutual abutment by the juxtaposition of the shells to divide the space within the casing into two air conduits extending substantially parallel to the periphery of the casing and two chambers enclosed by and in communication with said air conduits, and said outlet opening, and a chamber communicating with said inlet opening and said

air conduits and having a filling of air filter material therein.

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