

May 6, 1930.

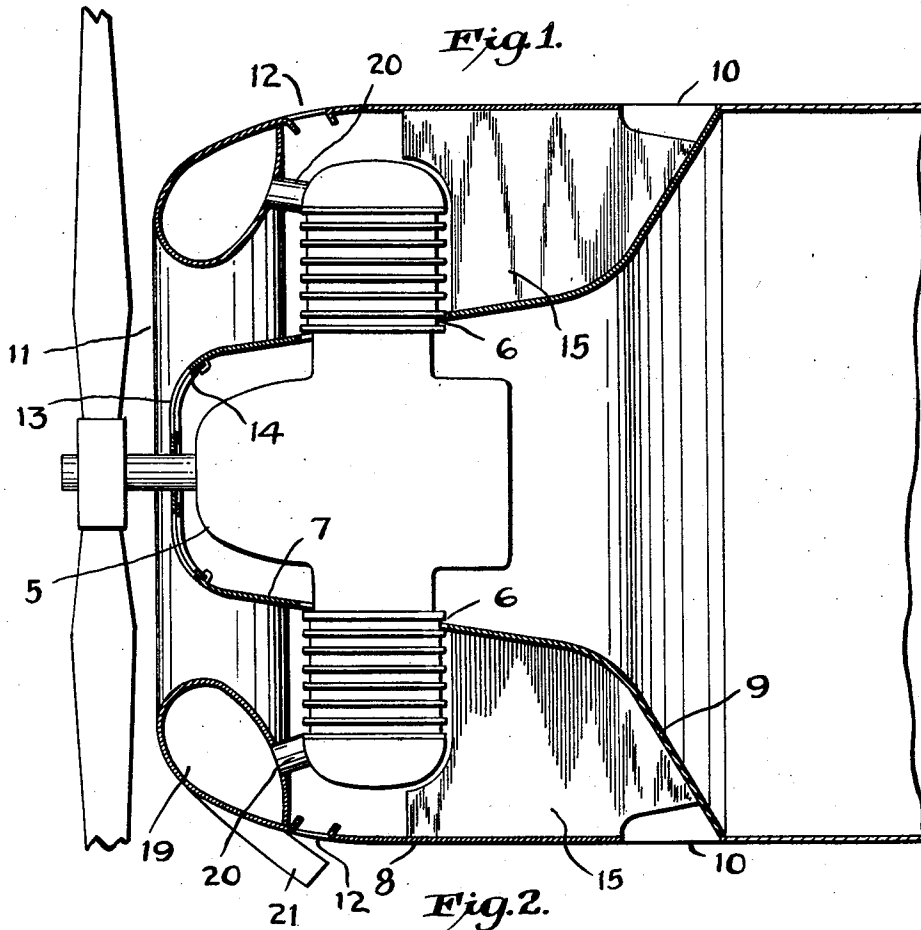
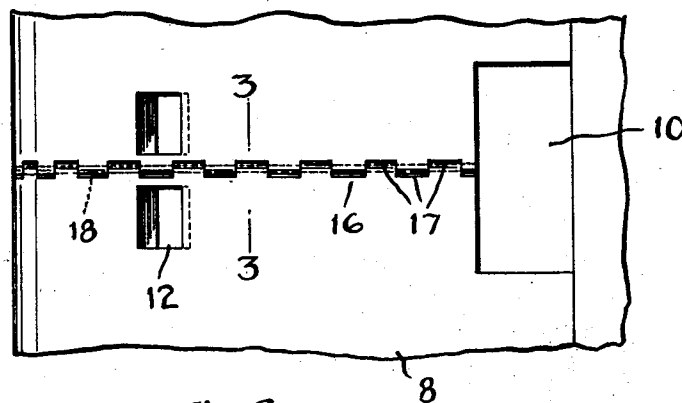
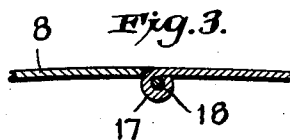
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1,757,783

GOWL CONSTRUCTION

Filed Dec. 11, 1929

2 Sheets-Sheet 1



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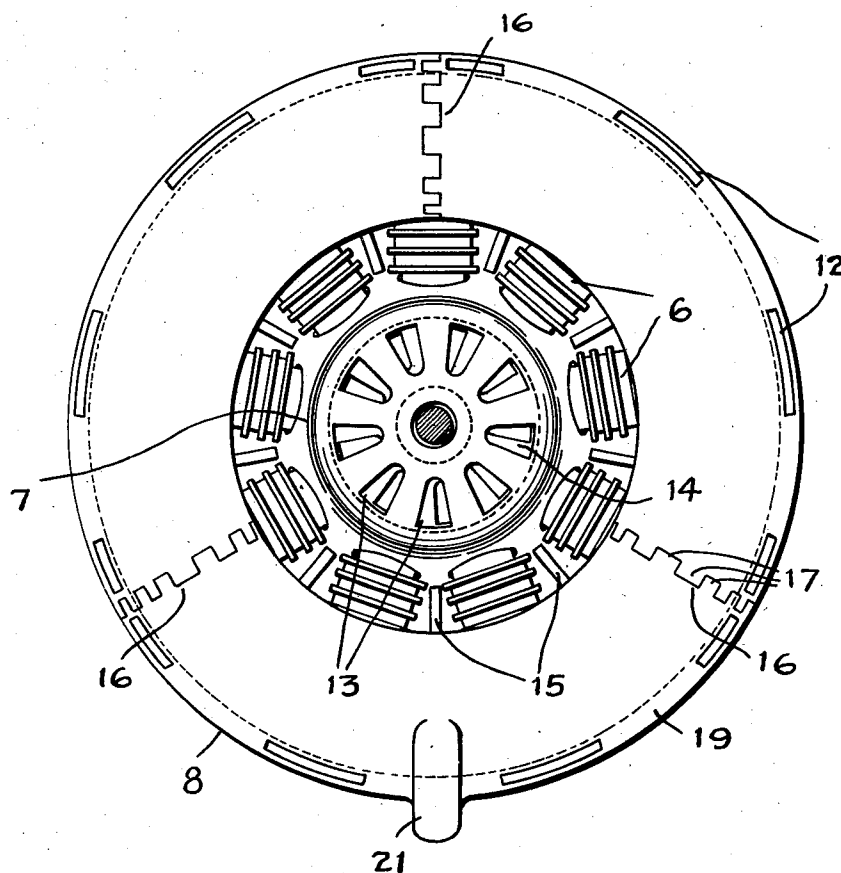
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COWL CONSTRUCTION

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Fig. 4.



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COWL CONSTRUCTION

Application filed December 11, 1929. Serial No. 413,218.

The invention relates to improvements in cowl construction for aeroplanes and particularly to that type of aeroplane in which a radial-type, air-cooled, internal combustion engine is used.

Among the objects of the invention are to provide a cowl construction of extreme simplicity, great efficiency and one that readily lends itself to economy of manufacture.

Numerous other objects and advantages will become apparent as this specification proceeds. Referring to the drawings forming a part thereof and in which one embodiment of the invention is illustrated:

Fig. 1 is a longitudinal sectional view, a typical radial-type, air-cooled, internal combustion engine being illustrated diagrammatically;

Fig. 2 is an elevational fragmentary detail view showing the method of fastening the segments of the outer annular casing together;

Fig. 3 is a detail cross sectional view taken on line 3—3 of Fig. 2; and

Fig. 4 is a front elevation.

Referring again to the drawings the reference numeral 5 designates the crank case of a radial-type, air-cooled, internal combustion engine and 6 the cylinders thereof. The engine may be supported in any conventional or well known manner and as such supporting means forms no part of this invention it is not thought necessary to illustrate same.

In its broad aspect the improved cowl construction comprises two members, one a generally cone-shaped casing 7 and the other an annular outer casing 8. The general contour of the cone-shaped casing may be changed to conform to the various types of radial, air-cooled, internal combustion engines.

This cone-shaped casing preferably is in close proximity to the crank case of the engine although sufficient space is left between the crank case and the casing for a free passage of air, controlled as hereinafter described. The rear part of the casing 7 as indicated at 9 in Fig. 1 may flare outwardly and thus replace the usual fire wall partition.

However, in some constructions it may be de-

sirable to have the casing 7 extend rearwardly to the fire wall partition. As illustrated in the drawings the casing 7 is a one-piece construction. If desired, for purposes of assembly and economy of manufacture the front and rear parts may be made separable or a segmental construction might be employed.

The casing 7 is apertured for the cylinders of the engine so as to allow the cylinders to be exposed.

The outer annular casing 8 is provided with openings 10 which are aft or rearward of the engine cylinders. This outer annular casing 8 may be formed as an extension from the main body of the aeroplane in which event the openings 10 as illustrated would be provided or the casing 10 might be a separable member suitably spaced from the body of the aeroplane.

The cone-shaped casing 7 and the outer annular casing 8 are spaced apart so as to form an annular passage 11 through which air may be directed to cool the exposed cylinders of the engine, the air having egress through the openings 10. The passage is preferably of stream line formation and greatly adds to the efficiency of the plane. The inner casing encloses a number of irregular parts of the engine which ordinarily cause eddy currents and increased head resistance. The only exposed parts of the engine within the airstream are the cylinders which is a decided advantage due to the fact that the bulk of the heat of the engine is generated in the cylinders and they receive the maximum amount of cooling. The contour of the cylinders is fairly regular and therefore does not greatly increase the head resistance. It has been proven in practice that as much as seventeen miles an hour has been added to the speed of a plane equipped with the improved cowl construction.

Additional means are provided for directing air over portions of the engine cylinders requiring special cooling. This means comprises openings or louvers 12 in the forward part of the outer annular casing 8. These openings permit of additional air being directed toward the exhaust valves of the cyl-

inders or for that matter toward any part of the engine cylinders in which excessive heat may be generated.

The invention also contemplates means whereby air may be directed on the crank case of the engine for cooling the oil. This means comprises a series of openings 13 in the forward part of the cone-shaped casing 7. The openings 13 are provided with an adjustable shutter 14 for controlling the amount of air to be admitted to the crank case. If desired the position of the shutter 14 may be controlled from within the aeroplane by any conventional means of transmitting motion, such as a push-rod, pull-wire, or torsion shaft.

Means are provided for evenly distributing the flow of air through the annular passage formed by the cone-shaped casing and the outer annular casing. In addition this means may be utilized for supporting the outer annular casing. A series of radial vanes 15 are secured by suitable means between the inner and outer casing. These vanes act as partitions and break up the swirl caused by the propeller and thus causes the air stream to be evenly distributed.

Another important aspect of the invention is the segmental construction of the outer annular casing. As illustrated this casing is composed of a plurality of segments which are secured to each other at 16. The method of securing the segments together may be widely varied, the essential feature being that any one of the individual segments may be readily removed. The method illustrated, by way of example, for securing the segments together comprises forming the adjoining edges of each of the segments with interfitting ears 17 through which a flexible rod or wire 18 may be passed and suitably held in position.

This segmental construction has a number of advantages, one of the principal advantages being that any segment may be readily and quickly removed for access to the engine. With the casing all in one piece if it is desired to make a minor adjustment on some part of the engine the propeller must be removed and the entire casing taken off which entails a large amount of work. It is also very advantageous from a standpoint of economy of manufacture. The cost for making tools for a complete casing of this character would be almost prohibitive as a different set of highly expensive punches and dies would have to be made for various radial-type engines and different constructions of fuselage. In manufacturing the casing in one piece by spinning it or by hand, the cost of the individual casing then becomes almost prohibitive. With the segmental construction simple and inexpensive tools may be employed in producing it.

A further object of the invention is to in-

corporate the exhaust manifold or collector ring in the outer annular casing. As illustrated the forward edge of the casing 8 is curved inwardly and rearwardly so as to form the exhaust manifold 19. The exhaust manifold is thus positioned so as to receive the maximum amount of cooling and being close to the engine cylinders and exhaust ports a minimum amount of resistance is encountered by the spent gases. Suitable connections 20 lead from the exhaust ports to the manifold and a trailing conduit 21 permits of the gases escaping to atmosphere.

From the foregoing it is thought to be apparent that an improved cowl construction is provided for aeroplanes having radial-type, air cooled internal combustion engines and a construction that has numerous advantages over present known types. Applicant wishes to stress the point that the problem which confronted him was to provide a cowl construction particularly designed for the present type of radial, air-cooled internal combustion engines and does not wish the invention confused with constructions that might have been used for rotary type engines.

Numerous changes may be made in details of construction and arrangements of parts by one skilled in the art and all such changes are to be construed as coming within the spirit of the invention and the scope of the appended claims.

I claim:

1. A cowl construction for aeroplanes provided with radial-type, air-cooled, internal combustion engines, said cowl construction having in combination a generally cone-shaped casing in proximity to the crank case of said engine and being apertured for the cylinders of said engine, an outer annular casing having openings aft of the engine cylinders, said cone-shaped casing and said outer annular casing being spaced apart so as to form an annular passage of stream-like formation through which air may be directed to cool the exposed cylinders of said engine, and other openings in the forward or leading edge of said annular outer casing, said openings being especially adapted for directing air over the portions of the engine cylinders requiring special cooling.

2. A cowl construction for aeroplanes provided with radial-type, air-cooled, internal combustion engines, said cowl construction having in combination a generally cone-shaped casing in proximity to the crank case of said engine and being apertured for the cylinders of said engine, an outer annular casing having openings aft of the engine cylinders, said cone-shaped casing and said outer annular casing being spaced apart so as to form an annular passage through which air may be directed to cool the exposed cylinders of said engine, and a series of vanes for sup-

porting said outer annular casing and providing a means for evenly distributing the flow of air through said annular passage formed by said cone-shaped casing and said outer annular casing.

3. A cowl construction for aeroplanes provided with radial-type, air-cooled, internal combustion engines, said cowl construction having in combination a generally cone-shaped casing in close proximity to the crank case of said engine, an outer annular casing having openings aft of the engine cylinders, said cone-shaped casing and said outer annular casing being spaced apart so as to form an annular passage through which air may be directed to cool the exposed cylinders of said engine, and an exhaust manifold formed in said outer casing.

4. A cowl construction for aeroplanes provided with radial-type, air-cooled, internal combustion engines, said cowl construction having in combination a generally cone-shaped casing in close proximity to the crank case of said engine, an outer annular casing having openings aft of the engine cylinders, said cone-shaped casing and said outer annular casing being spaced apart so as to form an annular passage through which air may be directed to cool the exposed cylinders of said engine, an exhaust manifold formed in the forward part of said outer casing, and connections between said exhaust manifold and the exhaust ports of said cylinders.

5. A cowl construction for aeroplanes provided with air-cooled, internal combustion radial-type engines, said cowl construction having in combination, a generally cone-shaped casing in close proximity to the crank case of said engine and being apertured for the cylinders of said engine, an annular outer casing having openings aft of the engine cylinders, said cone-shaped casing and said outer annular casing being spaced apart so as to form an annular passage of stream-like formation through which air may be directed to cool the exposed cylinders of said engine, other openings in the forward end of said annular outer casing, said openings being especially adapted for directing air over the portions of the engine cylinders requiring special cooling, a series of openings in the forward part of said cone-shaped casing through which air may be directed to cool the crank case of said engine, and an adjustable shutter for said openings for controlling the amount of air admitted through said openings.

6. A cowl construction for aeroplanes provided with air-cooled, internal combustion radial-type engines, said cowl construction having in combination, a generally cone-shaped casing in close proximity to the crank case of said engine and being apertured for the cylinders of said engine, an annular outer casing having openings aft of the engine cylinders, said cone-shaped casing and said outer

annular casing being spaced apart so as to form an annular passage of stream-like formation through which air may be directed to cool the exposed cylinders of said engine, and said outer annular casing being formed of a plurality of segments any one of which may be individually removed for access to the engine, other openings in the forward end of said annular outer casing, said openings being especially adapted for directing air over the portions of the engine cylinders requiring special cooling, a series of openings in the forward part of said cone-shaped casing through which air may be directed to cool the crank case of said engine, an adjustable shutter for said openings for controlling the amount of air admitted through said openings, a series of vanes for supporting said outer annular casing and providing a means for evenly distributing the flow of air through said annular passage formed by said cone-shaped member and said outer annular casing and an exhaust manifold formed in said outer casing.

In testimony whereof I affix my signature.
CARL SCHLESINGER.