

No. 818,735.

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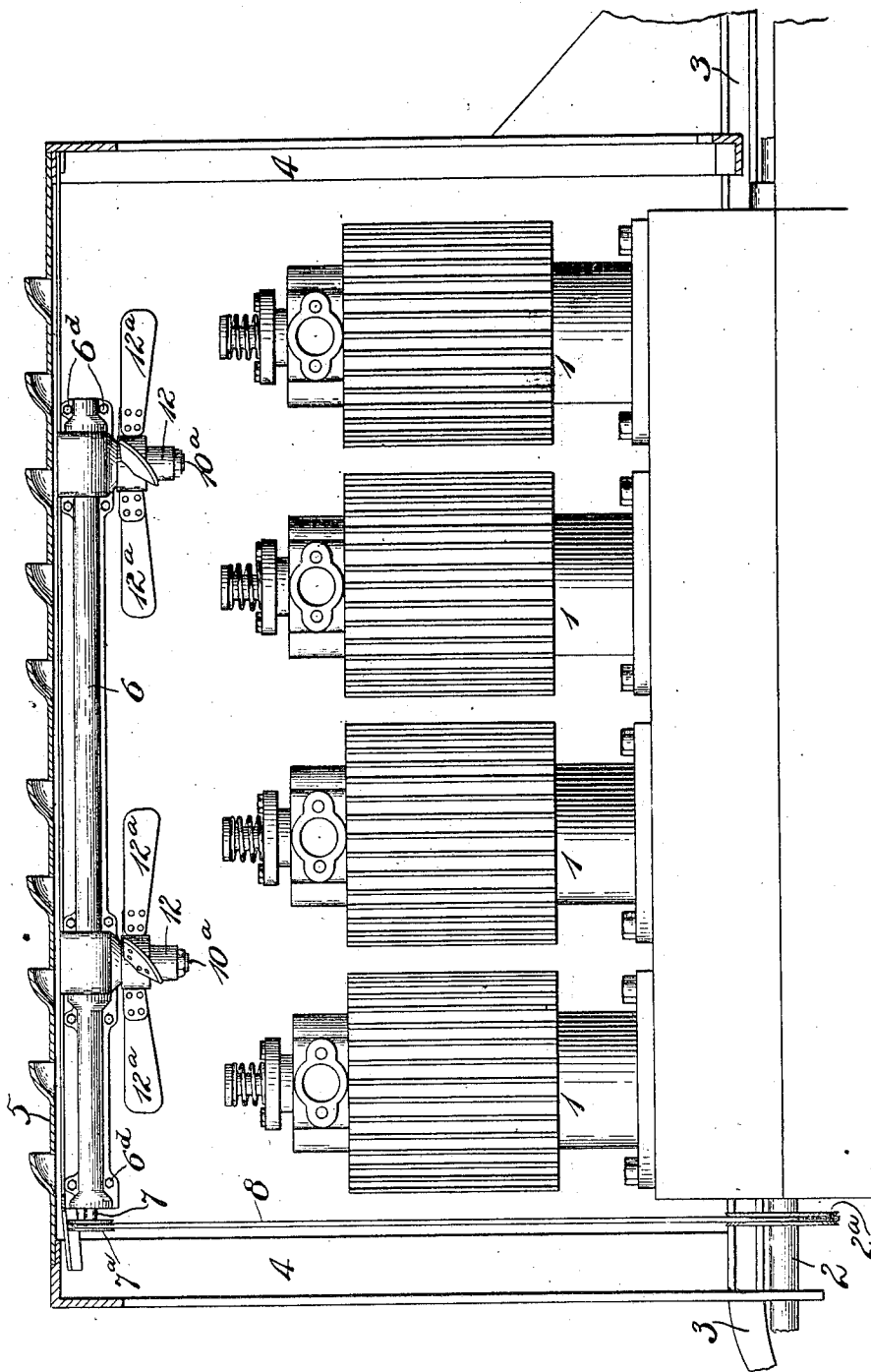
F. H. BOGART.

MEANS FOR COOLING INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 4, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses  
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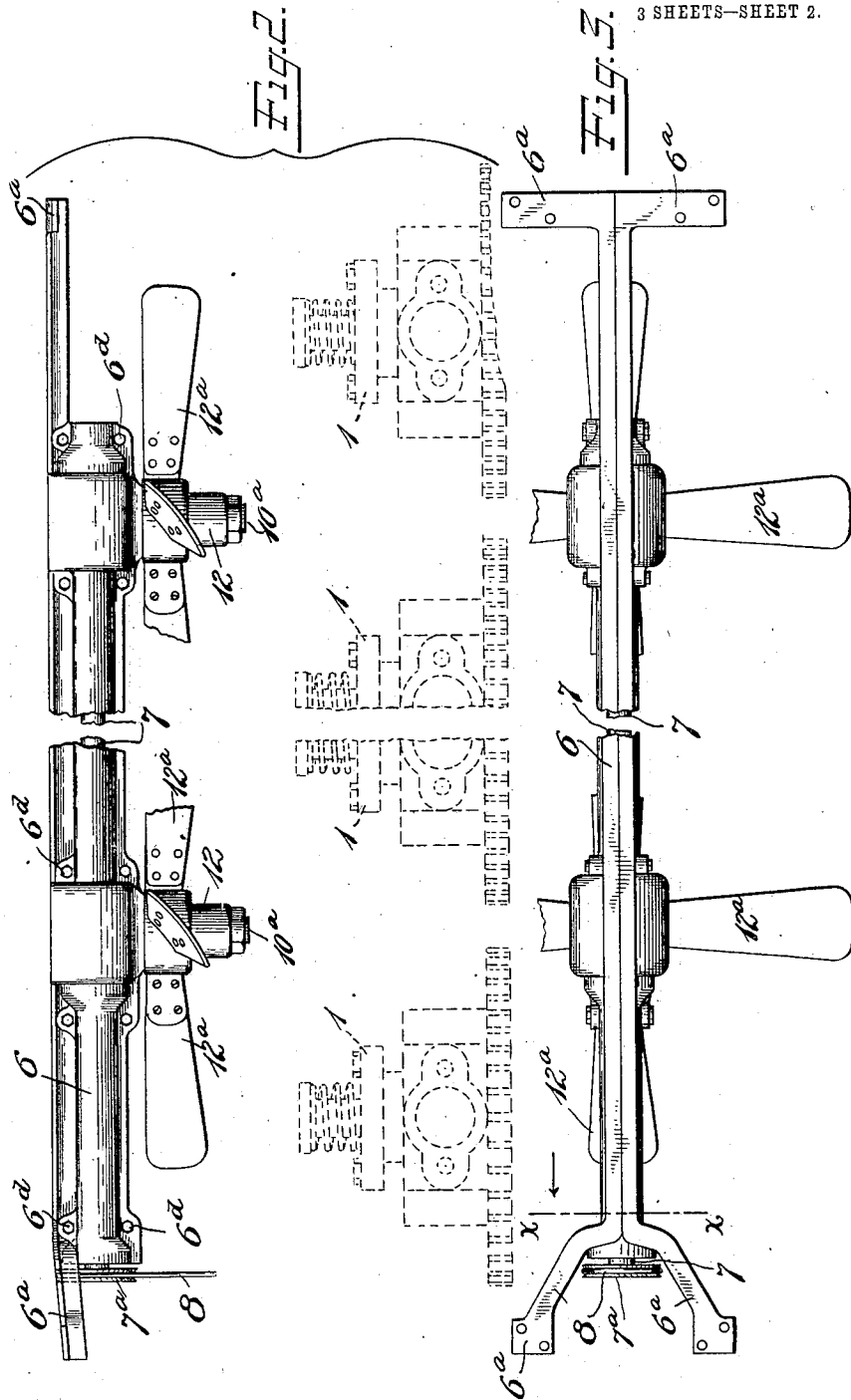
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MEANS FOR COOLING INTERNAL COMBUSTION ENGINES.

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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 4.

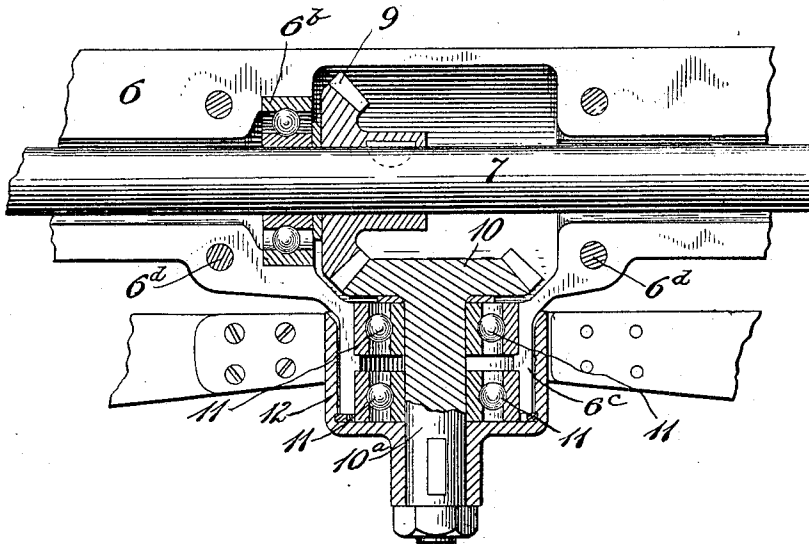
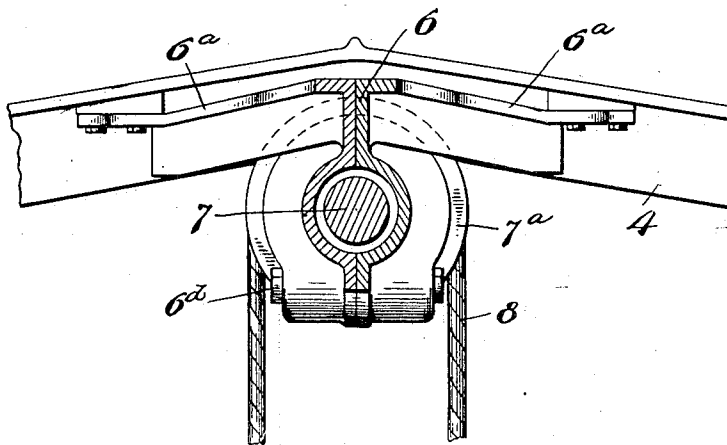


Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## MEANS FOR COOLING INTERNAL-COMBUSTION ENGINES.

No. 818,735.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed April 4, 1905. Serial No. 253,816.

*To all whom it may concern:*

Be it known that I, FRED H. BOGART, a citizen of the United States, residing at New Britain, Connecticut, have invented certain new and useful Improvements in Means for Cooling Internal - Combustion Engines, of which the following is a full, clear, and exact description.

My invention relates to improvements in means for cooling motors of the internal-combustion type for use on automobiles and the like.

The object of the invention is to provide an effective air-cooling apparatus of the fan type, the construction being simple and practically noiseless in use.

Figure 1 conventionally illustrates in side elevation the forward part of an automobile, showing the engine-cylinders and the relative position of the fans and the means by which they are driven. Fig. 2 is a relatively enlarged side elevation of the fans and the fan-support detached. Fig. 3 is a plan view thereof. Fig. 4 is a still further enlarged view of the parts, partly in elevation and partly in section, showing details of construction. Fig. 5 is a view on the line X X, Fig. 3, looking in the direction of the arrow.

This invention is essentially an improvement upon the apparatus made the subject-matter of United States Letters Patent No. 764,893, dated July 12, 1904, of which apparatus I was a joint inventor. As formerly, the engine is designed to be carried on the forward part of the vehicle underneath a hood, and suitable fans are provided to insure circulation of air, the cylinders being of the air-cooled type. In the former construction the fans were driven by bevel-gears arranged within the engine-case, and vertical shafts were provided carrying fans at their upper ends.

It is the purpose of my present improvement to eliminate the thrust of the engine directly upon the bevel-gears, to remove bevel-gears from within the crank-gears, and to eliminate the vertical shafts, the bearings of which owing to the arrangement of gears are rapidly worn. By eliminating these features and by providing the improved construction hereinafter described it has been found that the apparatus is more effective and durable and when in use is practically noiseless.

In the drawings, 1 1 1 1 represent the cylinders of the engine, the same being furnished with suitable radiating devices over and around which air freely circulates.

2 is the engine-shaft.

3 3 represent a certain fixed portion of the automobile-body, on which the engine is carried.

4 4 are uprights in front of and to the rear of the engine.

5 represents the top portion of a hood, which may overstand the top and sides of the engine. The front and top of this hood is preferably open or perforated to freely admit air.

6 is a frame which, as shown in Figs. 2, 3, and 5, is furnished with branch portions 6<sup>a</sup> 6<sup>a</sup> at each end. These frame branches may be secured fixedly to the uprights 4 4, so that the frame 6 will be arranged over the engine-cylinders and in line therewith. Carried within the frame 6 on suitable bearings 6<sup>b</sup> is a shaft 7.

7<sup>a</sup> is a pulley on the engine-shaft 2. 2<sup>a</sup> is a pulley on the engine-shaft 7. These pulleys are arranged in such manner that they may be connected by means of a belt 8, whereby when the engine is in motion the shaft 7 will be rotated.

The frame 6 is enlarged at suitable points for a housing to contain gears and bearings. (See Fig. 4.)

9 is a bevel-gear keyed upon the shaft 7.

10 is a bevel-gear, meshing with the gear 9, and carrying the arbor 10<sup>a</sup>. The arbor 10<sup>a</sup> is mounted in suitable bearings 11, supported in a sleeve-like extension 6<sup>c</sup> from the frame 6. The lower end of the arbor 10<sup>a</sup> projects below the sleeve 6<sup>c</sup>, and keyed thereto is the hub 12 of the fans. This hub is preferably cup-shaped and overstands the extension 6<sup>c</sup>, so as to make a practically dust-tight joint. Mounted on the hub 12 are the fan-blades 12<sup>a</sup>, of any desired number and pitched at a suitable angle to produce a powerful air-blast and direct it toward the cylinders 1 1. Any desired number of fans may be employed, depending upon the number of cylinders employed. On the particular form shown I use two fans.

The frame 6 is preferably split longitudinally and held together by bolts 6<sup>d</sup>. By detaching the frame 6 and loosening the bolts 6<sup>d</sup> access may be had to the interior for any pur-

pose. The bearings are preferably of the anti-friction type—for example, ball-bearing—and these, as well as the bevel-gears, being entirely inclosed within the frame 6 run noiselessly, or practically so. By coupling the main shaft to the fan-shaft by means of a belt the quick starting of the engine will not produce undue wear upon the bevel-gears, because this belt can momentarily slip so as to avoid any shock. The belt will, however, grip the pulleys with sufficient firmness to cause the fan-shaft 7 to respond in due course and drive the fans with the desired rapidity and certainty. Obviously any ordinary well-known form of belt tightener may be employed, if desired, but that is entirely immaterial and is not necessary.

The frame 6 performs the double function of supporting the fans and the associated parts and also connects the uprights 4 4 in such manner as to give rigidity to the same. It may also furnish the support for the hood 5. By this arrangement the fans and the associated parts may be readily cleaned or repaired without in any way disturbing the engine, and vice versa, since the same are entirely independent, save as they are connected by belt, as aforesaid.

What I claim is—

1. In an apparatus for cooling internal-combustion motors of the air-cooled variety, an engine-shaft, a fan-shaft substantially parallel therewith, an engine-cylinder between said shafts, a fan between said engine-cylinder and said fan-shaft, and a means of connection between said shafts.

2. In an apparatus for cooling internal-combustion engines of the air-cooled variety, an engine-shaft, a fan-shaft substantially parallel therewith, a flexible connection between said shafts, a cylinder between said shafts, a fan between said fan-shaft and said cylinder.

3. In an apparatus for cooling internal-

combustion engines of the air-cooled variety, 45 a fan-shaft, a pulley thereon, an engine-shaft, a pulley thereon, a belt connecting said pulleys, a fan arranged adjacent to said fan-shaft and revoluble in a plane substantially parallel therewith to create a draft of air, 50 and a cylinder arranged in the line of said draft and adjacent to said fan.

4. In a device of the character described, an engine-shaft, a plurality of cylinders, a second shaft arranged adjacent to said cylinders in line therewith and substantially parallel to the engine-shaft, a flexible connection between said engine-shaft and second shaft, a revoluble fan, bevel-gear connections, and an inclosing case or frame enveloping said shaft and said bevel-gear.

5. In a device of the character described, an engine-shaft, a plurality of cylinders, a second shaft arranged adjacent to said cylinders in line therewith and substantially parallel to the engine-shaft, a flexible connection between said engine-shaft and second shaft, a revoluble fan, bevel-gear connections, an inclosing case or frame enveloping said shaft and said bevel-gear, and anti-friction-bearings carried by said frames and supporting said second shaft and said gears.

6. In an air-cooling apparatus for air-cooled motors of the internal-combustion type for use on motor-vehicles, a shaft arranged adjacent to the motor and substantially parallel with the shaft thereof, a fan arranged between said first-mentioned shaft and the engine-cylinders, a frame supporting said first-mentioned shaft, an arbor for supporting said fan also supported by said frame, and beveled gears connecting said first-mentioned shaft and said fan-arbor.

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