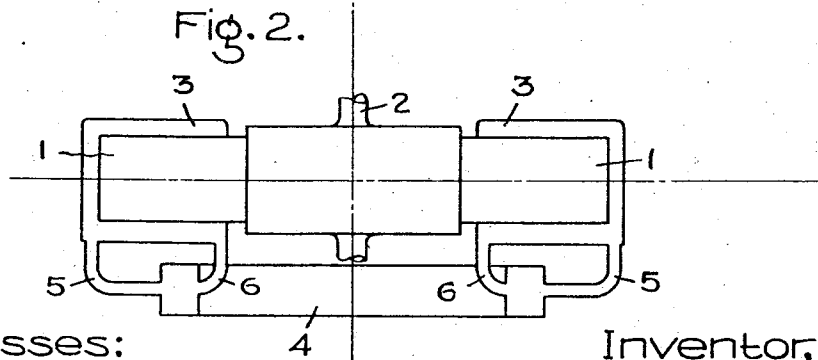
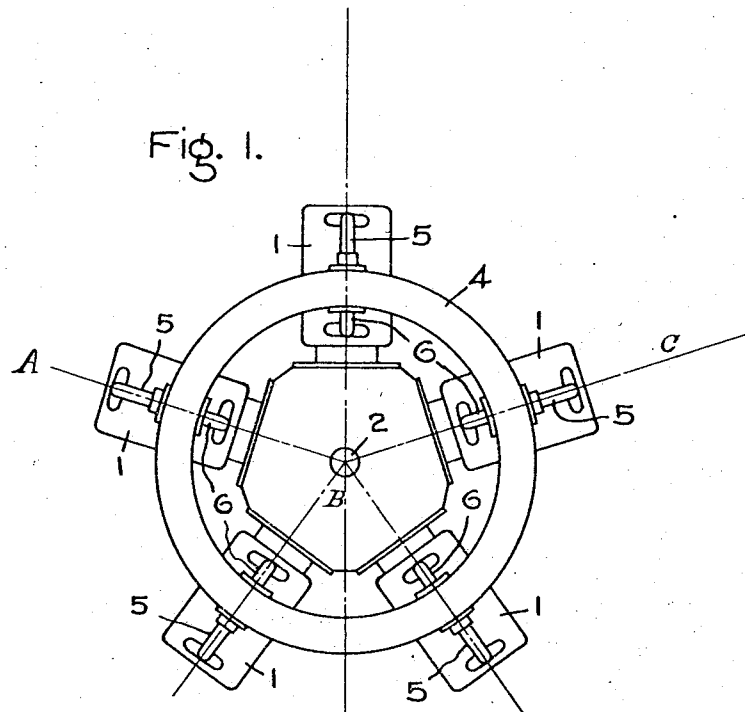


O. WINKLER.
COOLING DEVICE FOR REVOLVING MOTORS.
APPLICATION FILED JAN. 31, 1912.

1,114,564.

Patented Oct. 20, 1914.



Witnesses:
Marcus L. Byng.
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Att'y.

UNITED STATES PATENT OFFICE.

OTTO WINKLER, OF CÖPENIK, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

COOLING DEVICE FOR REVOLVING MOTORS.

Specification of Letters Patent.

Patented Oct. 20, 1914.

1,114,564.

Application filed January 31, 1912. Serial No. 674,511.

To all whom it may concern:

Be it known that I, OTTO WINKLER, a subject of the King of Prussia, residing at Cöpenik, Germany, have invented certain new and useful Improvements in Cooling Devices for Revolving Motors, of which the following is a specification.

This invention relates to internal combustion engines of the multicylinder type in which the cylinders revolve around a stationary shaft. This class of engines is now largely used for driving flying machines, as the rapid revolution of the motor tends to keep it cool. The application of water cooling to such an engine is somewhat difficult if the circulation is to be maintained by a pump, while the thermo-siphon principle is equally impracticable owing to the constant change of position of the cylinders. Moreover, in the water cooling systems which have been devised for such engines, it has been customary to surround each cylinder with its own jacket to which the water is fed independently of the others. With that arrangement, however, there is a possibility that one jacket may become leaky and cause its cylinder to run hot, thus putting the entire engine out of commission. Furthermore, the radiator is bulky and heavy. The present invention aims to obviate these difficulties, by connecting all the water jackets to an annular radiator of moderate dimensions, and by arranging the connecting passages so that circulation is maintained by a combination of thermo-siphon and centrifugal forces, as hereinafter set forth and particularly pointed out in the claims.

In the accompanying drawing, Figure 1 is a front elevation of a revolving motor equipped with my improved water cooling system, and Fig. 2 is a cross-section of the same on the line A—B—C, Fig. 1.

The motor is represented as having five cylinders 1 arranged radially around a central stationary shaft 2 and spaced equidistantly. Each cylinder has a water jacket 3, and adjacent to all of said jackets is an annular radiator 4 concentric with the shaft 2 and located preferably near the inner ends of said cylinders so that the outer ends of said cylinders extend radially beyond said radiator. The outer end of each jacket 3 is connected by a pipe 5 with the outer portion of the radiator, while a pipe 6 con-

nects the inner portion thereof with the inner end of said water jacket.

The operation is as follows:—The water in the radiator is colder than that in the jackets and is consequently heavier. The action of centrifugal force, as the motor revolves, throws this colder heavier water out through the pipes 5 to the outer ends of the jackets 3, where it displaces the lighter heated water and forces it inwardly along through the jackets to the inner pipes 6, by which it passes to the radiator and there becomes cooled. The operation is thus in effect that of a thermo-siphon system, but the circulation is effected by centrifugal force instead of by gravity. In case a cylinder or jacket becomes defective, so that its water leaks away, the supply of cooling fluid is supplemented from the others, so that the jacket cannot become empty, and the machine is prevented from running hot. The radiator is convenient and is accessible for inspection and repairs.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is:—

1. A revolving multicylinder internal combustion engine provided with a water jacket for each cylinder, a radiator, and means connecting the radiator and jackets for effecting a thermo-siphon circulation of the water therethrough by centrifugal force when said engine is running.

2. A revolving multicylinder internal combustion engine provided with a water jacket for each cylinder, a radiator, and means for enabling the colder heavier water in the radiator to be thrown to the outer ends of the water jackets by centrifugal force, to displace and force inwardly through said jackets the lighter heated water therein.

3. A revolving multicylinder internal combustion engine provided with a water jacket for each cylinder, and a radiator to which are connected the outer and inner ends of each jacket.

4. A revolving multicylinder internal
combustion engine provided with a water
jacket for each cylinder, an annular radiator
adjacent to said cylinders, and pipes
5 connecting said radiator with the inner and
outer ends of each jacket.
5. A revolving multicylinder internal
combustion engine provided with a water
jacket for each cylinder, an annular radiator
10 adjacent to said cylinders and near the

inner ends thereof, and pipes connecting said
radiator with the inner and outer ends of
each jacket.

In witness whereof, I have hereunto set
my hand this 15th day of January, 1912.

OTTO WINKLER.

Witnesses:

ALBERT RINGER,
HERMANN TIETZ.