(No Model.)

W. MAYBACH.

APPARATUS FOR COOLING LIQUIDS EMPLOYED IN MOTORS AND COMPRESSORS.

No. 499,302. Patented June 13, 1893.

Fig. 1.

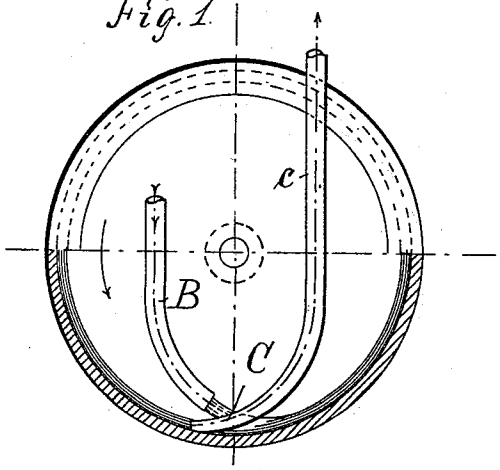


Fig. 3.

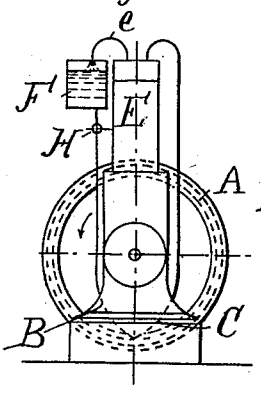


Fig. 4.

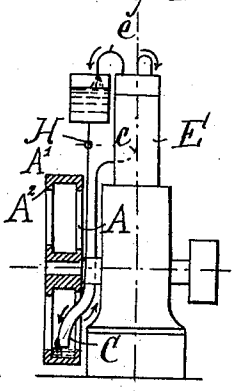


Fig. 2.

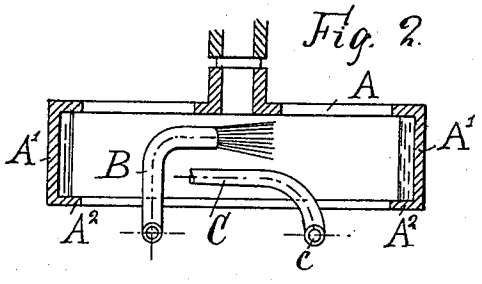


Fig. 6.

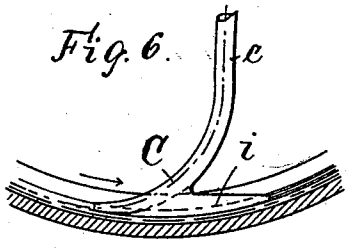


Fig. 6a

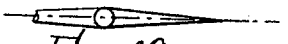


Fig. 7.

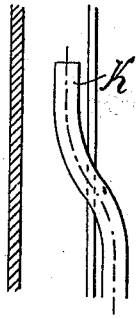


Fig. 8.

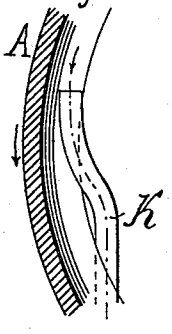
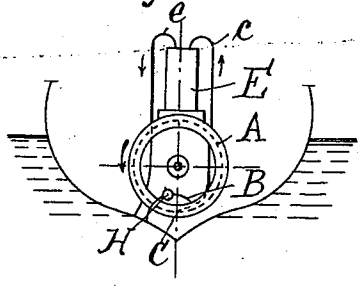


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILHELM MAYBACH, OF CANNSTADT, GERMANY.

APPARATUS FOR COOLING LIQUIDS EMPLOYED IN MOTORS AND COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 499,302, dated June 13, 1893.

Application filed October 15, 1892. Serial No. 449,032. (No model.)

To all whom it may concern:

Be it known that I, WILHELM MAYBACH, a subject of the King of Würtemberg, and a resident of Cannstadt, in the Kingdom of Würtemberg, Empire of Germany, have invented a new and useful Apparatus for Effecting a Continuous Circulation and Cooling of Cooling-Liquids Employed in Motors and Compressors, of which the following is a full, clear, and exact specification.

My invention relates to an apparatus in which the *vis viva* of a liquid (generally water) subjected to a rotary motion is utilized for raising this liquid into the part of the machine where it is to be employed for cooling purposes.

My invention also consists in cooling this liquid by causing it to be rotated again in contact with the atmospheric air, so that it may be used continuously for cooling purposes.

My invention further consists of means whereby the cooling effect may be improved, and the water or other liquid prevented from splashing, as will be more clearly described hereinafter, and pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, illustrating the principle of my improved apparatus. Fig. 2 is a sectional plan of the same. Fig. 3 is a front elevation showing the application of my invention to a gas- or petroleum-motor. Fig. 4 is a side elevation of the same, partly in section. Fig. 5 illustrates the application of my invention to a motor for boats and launches. Fig. 6 is a detail elevation, partly in section, of a contrivance for preventing the water from splashing. Fig. 6^a is a plan view of the same. Figs. 7 and 8 are a front elevation and a side elevation respectively of a contrivance for removing the vapors on the surface of the water.

Like letters of reference indicate corresponding parts throughout the several views.

The principle of my invention is to lead the water or other liquid to be cooled on a disk rotated by the motor or compressor, so that a high velocity is imparted to said water, and the latter may thus be propelled to a certain height or distance. The wind caused by the rotation of the disk simultaneously effects a cooling of the water partly by direct action, by increasing the evaporation, and partly by indirect action, by cooling first the rotating disk.

In the drawings A is the rotating disk, which may at the same time constitute the fly-wheel of the engine. This disk is provided with a cylindrical rim A′, at the front end of which an annular disk A^2 projects inwardly.

B is the pipe through which the water is fed to the inner circumference of A′, the end of this tube being curved in the direction in which the disk A rotates, and C is a pipe serving for scooping the water and conveying it to the place where it is to be utilized; the end of this tube is curved opposite to the direction in which the disk A rotates.

When the disk A is rotated in the direction indicated by the arrow, the water supplied through pipe B and impinging on the rim A′ of the disk A will assume almost momentarily the velocity of the latter. After partaking of the rotation of the disk A for at least one revolution (in the apparatus constructed as shown) the water will strike against the scoop-like end of pipe C and rise in the latter according to the *vis viva* it has acquired. It will be obvious that this water is thoroughly cooled by the wind produced during the rotation of the disk A, as thereby the evaporation is facilitated, and the outer surface of the rim A′ becoming cooled by its swift rotation will contribute to reduce the temperature of the water contained in the chamber formed by the disk A, rim A′, and annular disk A^2. It will be further obvious that the before described apparatus may be employed very conveniently for forcing cooled water through pipe C into a serpentine pipe or any other cooling apparatus, and for cooling this water again by causing it to flow back through pipe B. Thus a very regular circulation of water and a most effective cooling will be obtained. In order to improve the cooling effect of the rotating disk A, the latter may be provided with wings or vanes, or its surface increased by a suitable formation of the rim.

In Figs. 3 and 4 I have shown the practica application of my principle to a gas- or petroleum-engine. A is the fly-wheel of the engine, and is constructed substantially as described with reference to Figs. 1 and 2. B is the pipe for supplying water from a tank F, after opening the cock H. C *c* is the delivery-pipe connected with an annular space around the cylinder E of the engine. *e* is a pipe completing the circuit by connecting the said annular space with the tank F. The operation of this apparatus is as follows: When the disk A is rotated, and the cock H opened, the water rotating with the disk A will be scooped by the end of pipe C and rise through the delivery-pipe *c* into the annular space around the cylinder E. Here the water will cool the wall of the cylinder, and then flow into the tank F through the pipe *e*. From here the water will return to the rotating disk A and after being cooled, as described, it will again rise in pipe C *c*. Thus a continuous circulation of water and cooling of the cylinder E will be effected as long as cock H is open and disk A continues to rotate. All complicated arrangements for effecting a renewal of water are dispensed with, as the same water is used over again. When it becomes desirable to stop the engine, the cock H is closed, so that the whole quantity of water will be driven through the pipes C *c* and *e* into the tank F. In this manner the stopping of the engine may be effected without any loss of water.

In Fig. 5 I have shown the application of my invention to an engine for boats and launches. This is but a slight modification of the before described construction, and is characterized by taking the feed-water supplied through pipe B directly from the water in which the boat floats, thus dispensing with the tank F. The pipe *e* is of course likewise immersed in the water with its lower extremity. The operation of this modification is substantially the same as above described, with the only difference that the water entering through pipe B is continually renewed, and the water escaping through pipe *e* is not used again. The fly-wheel is in this case employed only for driving water up through the pipe C.

In Figs. 6 and 6ª I have shown means for preventing the water from splashing when scooped by the end of pipe C. This pipe is provided with a tapering elongation *i* in the direction in which the disk A rotates; the water in motion will adhere to and glide along this elongation, and thus be prevented from splashing.

The means illustrated by Figs. 7 and 8 will improve the cooling effect of the apparatus. It will be obvious that during the rotation of the disk A the air in contact with the surface of the water to be cooled will become warm and saturated with vapors, whereby the efficiency of the apparatus is impaired. In order to obviate this, I arrange a scoop connected with a pipe, or a pipe without a scoop, as close as possible to the surface of the water, as shown at K. I may of course employ several pipes or scoops. It will be understood that the pipe K will remove the warm and moist air from the surface of the rotating water, so that fresh air will have access to that surface; thus the evaporation and consequent cooling will be increased.

The rotating disk A forming the main part of my invention may be employed as a brake-disk. The water will absorb the heat produced by friction and thus prevent the brake-disk from becoming too hot. This water may be cooled afterward by the rotation of the disk A and employed for cooling purposes as before described, or drawn off directly through a waste pipe.

What I desire to secure by Letters Patent of the United States is—

1. In a motor or compressor, the combination with the cylinder or other portion thereof capable of becoming heated during the operation of the same of a rotatable disk having an annular chamber formed on the inside of its rim, a stationary pipe for feeding a liquid into said chamber, and a stationary pipe adapted to scoop the rotating liquid and convey it to and around the heated portion of the motor, for the purpose specified.

2. In combination with a motor, a fly-wheel A, having a rim A′, and an annular front disk A^2, a stationary pipe B for feeding water into the annular chamber formed between the annular disk A^2 and the fly-wheel A proper, a delivery-pipe C adapted to scoop the rotating water and to convey it to a chamber surrounding the cylinder of the motor, and a pipe *e* for conveying the water back to the place from which it is taken, for the purpose described.

3. In combination with a motor, a fly-wheel A, having a rim A′ and an annular front disk A^2, a water-tank F, a cock H for letting the water out of the same, a stationary pipe B for feeding water from tank F into the annular chamber formed between the annular disk A^2 and the fly-wheel A proper, a delivery-pipe C adapted to scoop the rotating water and to convey it to a chamber surrounding the cylinder, and a pipe *e* for conveying the water back into the tank F, substantially as and for the purpose described.

4. The combination with the cylinder of a motor, of a rotatable disk having an annular chamber formed on the inside of its rim, means for supplying a liquid to said chamber a delivery pipe C one end of which is in communication with the interior of the disk and adapted to scoop the water therefrom and discharge it at its opposite end around the cylinder of the motor, and a rearwardly-extending tapering elongation *i*, on said delivery pipe, as described for the purpose specified.

5. In an apparatus of the character described; the rotatable disk A, constructed

substantially as described, in combination with the stationary feed-pipe B, the stationary delivery-pipe C, and pipe K for scooping the vapors and warm air on the surface of the water, substantially as and for the purpose described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILHELM MAYBACH.

Witnesses:
ERNST NOEWES,
CARL LINCK.