J. A. CHARTER.

COOLING DEVICE FOR GAS ENGINES.

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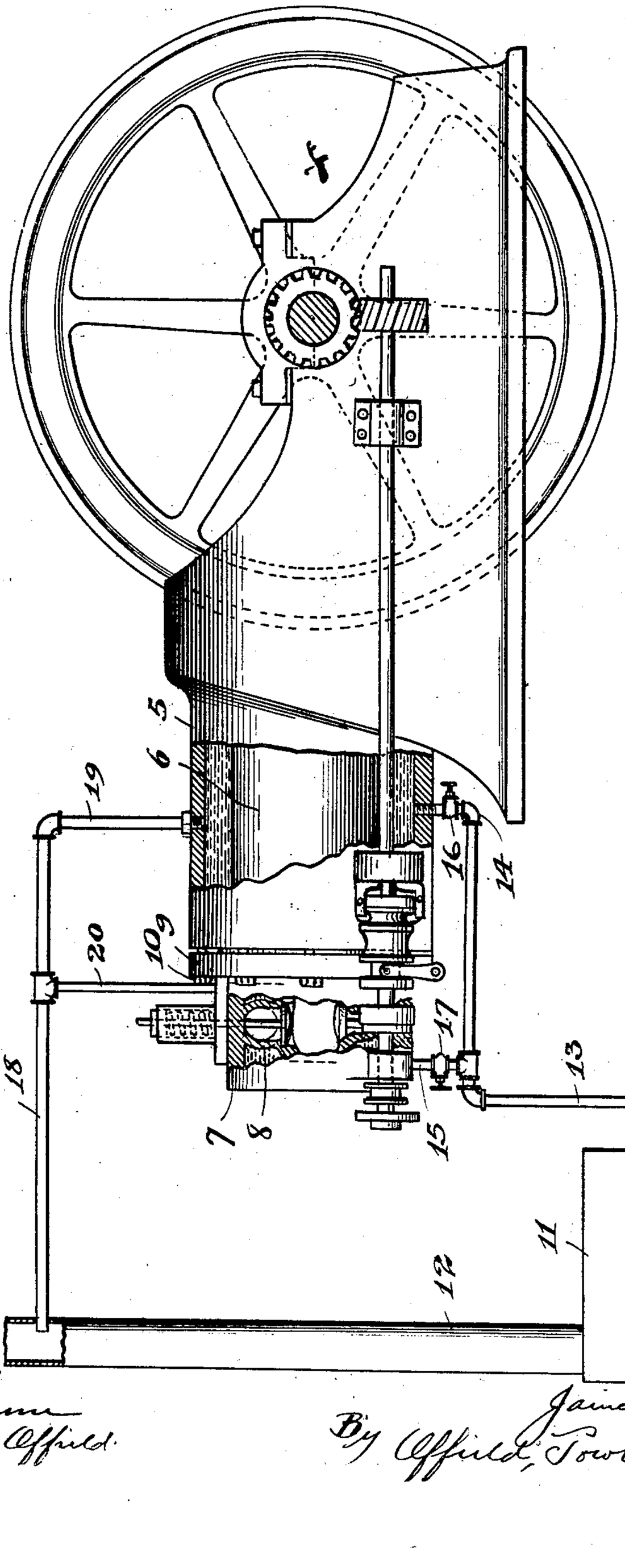
954,780. **Patented Apr. 12, 1910.**



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UNITED STATES PATENT OFFICE.

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COOLING DEVICE FOR GAS-ENGINES.

954,780. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed July 28, 1908. Serial No. 445,781.

To all whom it may concern:

Be it known that I, JAMES A. CHARTER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cooling Devices for Gas-Engines, of which the following is a specification.

This invention relates to the art of internal combustion engines, and has reference more particularly to a new and improved means for effecting the cooling of the cylinder of the engine, whereby to increase its efficiency.

My improvements belong to that type of cooling devices wherein a practically continuous circulation of the cooling medium through the cooling jacket of the cylinder is maintained; and one object of the invention is to provide a means for the ready escape and disposition of any steam that may form in the cooling water.

In carrying out my invention I employ a water tank suitably located with reference to the engine and preferably below the cylinder of the latter, a standpipe of relatively large size on said tank, which standpipe communicates freely at its upper end with the atmosphere, a pipe leading from the water tank to the jacket of the cylinder, in which pipe is preferably located the water-forcing means, and a return pipe from the water jacket tapping the standpipe in such a way as to allow the return water to descend freely into the tank, while any steam carried thereby may freely escape through the open upper end of the standpipe.

Another feature of the invention resides in separating the water jackets of the cylinder proper and cylinder-head and providing independent means for controlling the circulation of water through each, so that the application of the cooling medium to both the head and cylinder may be independently regulated as the conditions of service may require.

My invention will be readily understood when considered in connection with the accompanying drawing, which illustrates one practical mechanical embodiment thereof, and in which the figure is a side elevation of a gas engine with my improved cooling device applied thereto, the cylinder and cylinder-head being partially broken out to more clearly display the water jacket.

Referring to the drawing, 5 designates that portion of the frame constituting the cylinder housing or shell of the cylinder water-jacket, and 6 indicates the cylinder proper secured therein.

7 designates as an entirety the cylinder head, which is internally cored to provide a space 8 for the circulation of the cooling medium, and which is provided with a marginal flange 9 by which it is secured to the end of the cylinder-housing, as by bolts 10. The water spaces of the cylinder and cylinder-head are entirely separated.

11 designates a water tank, preferably located on a plane somewhat below that of the cylinder, and 12 designates a standpipe of relatively large diameter that rises from the tank 11 and at its upper end is in free and open communication with the atmosphere. Leading from the bottom of the water tank 11 is a water-supply pipe 13 having at its other end a pair of branches 14 and 15 leading into the water circulation spaces of the cylinder and head, respectively. The branches 14 and 15 are equipped with controlling valves 16 and 17, respectively.

18 designates a water return pipe which communicates by branches 19 and 20 with the water circulation spaces of the cylinder and head, respectively. The other end of the pipe 18 is tapped into the standpipe 12.

In the supply pipe 13 is a water-forcing device, herein indicated as a rotary pump 19, for maintaining the circulation of water.

In the operation of the device, water from the tank 11 is continuously forced through pipe 13 and its branches 14 and 15 into the water circulation spaces of the cylinder and head, respectively, absorbing the heat generated in the latter, and flowing off through branch pipes 19 and 20 and pipe 18 into the standpipe 12, through which it again descends into the tank 11 for re-use. The standpipe 12 is empty of water, as indicated in the drawing (excepting, of course, for the shower of return water falling from the end of pipe 18); so that the water in the tank 11 is at all times subjected only to atmospheric pressure and not to the hydrostatic pressure of a column of water in the stand-pipe 12. This greatly facilitates the cooling of the return water and the liberation of steam therefrom by permitting the return water to fall in a shower or spray from the end of the return pipe 18 to the

top of the body of water in the tank 11. The circulating pump 19, it may be noted, is valveless, which, by opening of the valves 16 and 17, permits the water to flow backwardly through the same when it is idle; and this feature, in association with the non-continuous body of circulating water as above described, is of importance in engines used on vehicles or subjected to freezing weather, since, when the engine is idle, the water from the jacket may be drained back into the tank through the supply-pipe, thus emptying the jacket and preventing injury thereto which would result from the freezing of the water therein.

I am aware that it has heretofore been proposed to maintain the circulation of a continuous or solid body of water between a supply-tank and the water-jacket of a gas engine, the circulation being maintained by heating up the water in the supply-pipe between the tank and the jacket by the exhaust gases. My invention is radically distinguished from such a system in the fact that it does not employ a solid or uninterrupted body of circulating water, and consequently of necessity employs a mechanical water-forcing device to maintain the flow.

By suitable regulation of the valves 16 and 17, any desired proportions of the cooling water may be caused to flow through the jackets of the cylinder and head, respectively, it being found that with certain classes of fuel the cylinder-head can be, and should be, maintained at a much higher temperature than the cylinder, since there are no moving or sliding parts in the head which might be damaged or injured in respect to operation through excessive heat.

The standpipe 12 being of large diameter relative to the other circulation pipes, the hot water, as soon as it is discharged into said standpipe, freely spreads or separates itself in the latter, thus facilitating the liberation of the steam.

I claim:

The combination with the cylinder and cylinder-head of a gas engine having non-communicating water-jackets, of a water-tank, a stand-pipe on said water-tank open to the atmosphere, a water supply pipe from said tank having branches communicating with the water-jackets of said cylinder and cylinder-head, respectively, a return-pipe connecting into said stand-pipe and having branches communicating with said water-jackets, respectively, a pump in said supply-pipe, and independently operable controlling-valves in the branches of said supply-pipe, respectively, substantially as described.

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