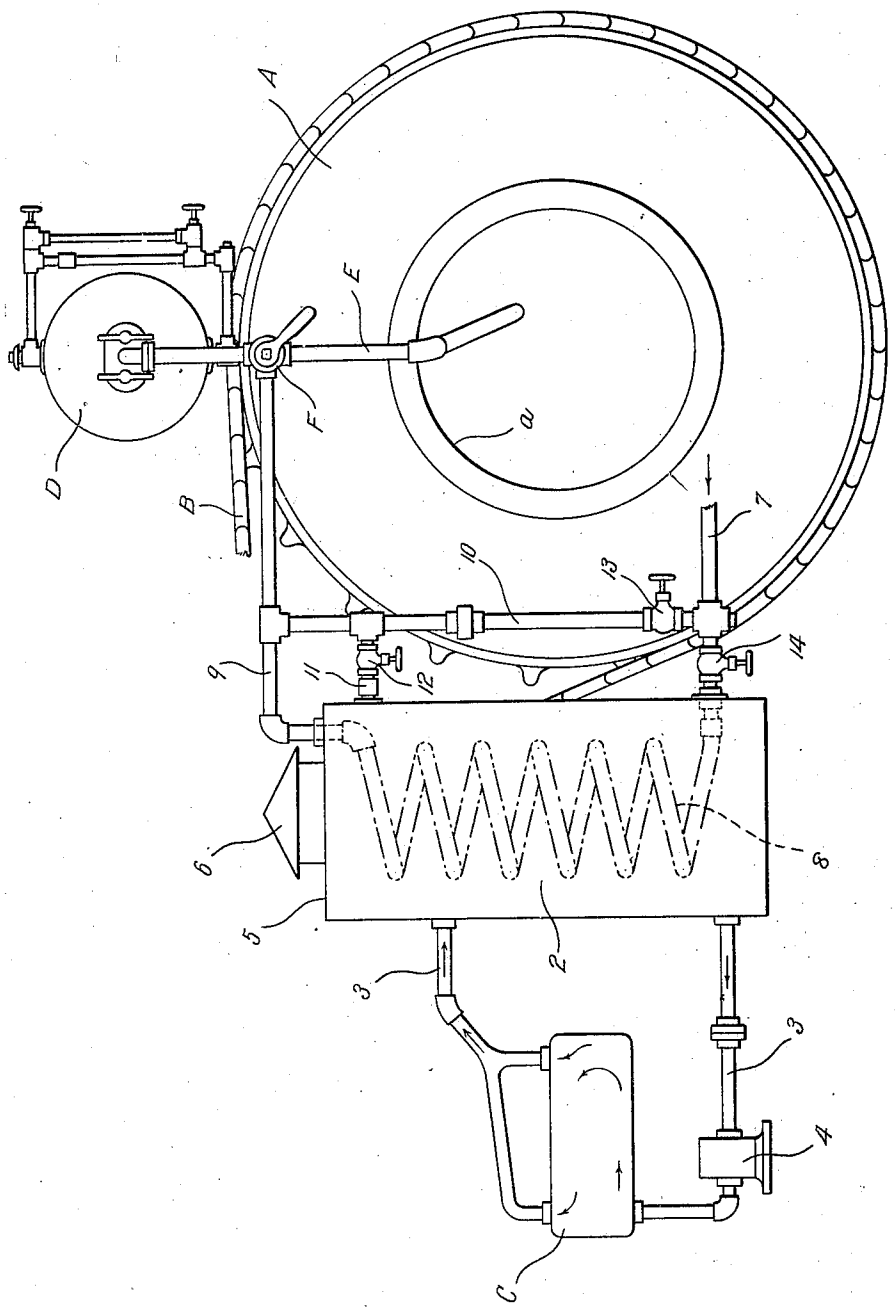
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MEANS FOR TEMPERING WATER FOR CONCRETE MIXERS AND FOR COOLING THE MOTOR THEREFOR

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MEANS FOR TEMPERING WATER FOR CONCRETE MIXERS AND FOR COOLING THE MOTOR THEREFOR

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In the operation of concrete mixing machines generally and particularly in connection with paving machines, the use of the internal combustion engine as the motor element is becoming increasingly common. This necessitates the employment of means for keeping cool the engine, and it is now recognized that the most efficient and economical system for effecting such cooling is what is known as the tank system, in which is employed a large tank containing a body of water that is circulated to and about the engine and returned to the tank, where the heat taken up from the engine by the water is given off by radiation. There are however disadvantages incident to the use of this system. For instance, it frequently happens that the radiation from the tank is not sufficiently rapid to keep the temperature of the water employed for cooling down to the desired degree, and as a result the engine overheats. The remedy for this has usually been to draw off some of the hot water within the tank and replenish it with cold water. This is a waste of water, which, especially when operating in arid regions, is very undesirable. Again, especially in the use of paving machines, the problem of taking care of this waste hot water sometimes became serious, as it is not desirable to have the water discharged near the machine, as it would be likely to run upon the subgrade and there interfere with the working of fine grading just ahead of the freshly poured concrete. Further, it is desirable that the water used for cooling purposes should be free from certain impurities often found in the available water supply that may be close to a given paving operation; but this has not in the past been found practicable where the body of cooling water has to be constantly drawn off and renewed, except by the expensive method of hauling desirably pure water for engine-cooling purposes from a distance.

My invention has for its object to provide a cooling system for the internal combustion engine operating a concrete mixer, that has the advantages of the tank-cooling system, that does not have the features of disadvantage that have been referred to, and that at the same time may be utilized for heating the water that is employed in the concrete mixing operations.

In the accompanying drawing I have illustrated my invention applied to a concrete mixer, by means of a single view largely diagrammatic in character, showing the mixing machine in end elevation.

Referring to such drawing A designates the mixing drum provided at one end with an opening *a* through which it is charged with the materials to be mixed, such as broken stone, sand and cement, and water sufficient to hydrate the cement and render the concrete sufficiently wet for handling. B designates a sprocket chain by which the drum is turned, this chain being driven by an internal combustion engine C through a gear train that is not illustrated in detail.

The particular style of engine employed is not material, nor is the particular construction of the mixing drum, or the mechanism between the engine and the drum by which the latter is revolved.

D indicates a tank in which is held the water that is periodically delivered to the mixing drum as the latter is charged to produce batches of concrete. The tank is intermittently filled and discharged, there being means provided for governing the amount of water delivered therefrom to the drum at each emptying of the tank. This is a well known feature of concrete mixing machines and it need not be further described. E designates the pipe through which water from the tank D is discharged into the mixing drum. The flow of water to the tank D, and from the latter to the mixing drum, is controlled by a three-way valve F which may be manually controlled.

2 designates a tank, preferably of rather large size, for containing a supply of water employed in cooling the engine C. There are circulating pipe connections 3 between the engine and the tank 2, in which is located a pump 4. The upper end of the tank is preferably tightly closed by a cover 5 welded to the body of the tank, and in this cover may be formed a filling opening closed by a cap 6. The arrangement described is adapted to

serve as a closed circulating system for the water employed in cooling the engine. The tank is filled with clean water and closed, and such water is used repeatedly and until it must be replenished due to loss by evaporation or leakage.

7 indicates the supply pipe through which water for tank D and to be used in mixing the concrete is received. The water employed for this purpose may contain impurities that would make it highly undesirable as the circulating cooling medium for the engine, but which are not seriously undesirable in the mixing of the concrete. The pipe 7 is provided with a long coil 8 that is located within the cooling tank 2, and between the coil and the valve F in the pipe E there is a section of pipe 9.

It will be understood from the foregoing description taken in connection with the drawing that the temperature of the water within the tank 2 is reduced by the intermittent flow of cool water through the coil 8 as the tank D is successively filled and emptied. This has been found to be a very satisfactory way of maintaining engine-cooling water at a satisfactory temperature, without the necessity of drawing off water when it gets too hot and replenishing it, as has been herein before described. The arrangement shown has also another and very decided advantage in that it heats the water that is delivered to the mixing drum for hydrating the cement. It has long been recognized that better results are obtained if the water employed in the mixing of concrete be warm, as the hydration then takes place more rapidly and perfectly, and the warming of the water becomes absolutely essential if the concrete mixing is carried on in freezing weather.

It may sometimes happen that the flow of cool or cold water through the coil 8 will reduce the temperature of the body of water within the tank 2 to an undesirably low degree. I therefore provide, between the sections 7 and 9 of the mixing water supply pipe and outside the tank 2, a by-pass 10; and further provide a valve 14 in the pipe 7 between the by-pass and the tank 2, and a valve 13 in such by-pass. By properly manipulating these two valves, 13 and 14, the flow through the coil 8 can be entirely cut off, as for instance when the engine is first started and it is desirable to quickly heat the water within the tank 2. If at any time it should be found that the water in the tank 2 is becoming undesirably cool and the system is running with the valve 13 closed and valve 14 open, these valves may be manipulated so as to diminish the flow through the pipe 8 and allow some flow to pass through the by-pass 10. I arrange a pipe connection 11 between the by-pass 10 and the interior of the tank 2 through which the latter may be filled directly from the supply pipe 7, when this is found practicable and desirable. There is a cut-off valve 12 in the pipe 11.

The manner of using my invention will be apparent from the foregoing description taken in connection with the drawings, and its advantages have been pointed out in the description of the apparatus.

What I claim is:

1. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, and a conduit through which water is delivered to the drum for wetting the material therein, the said conduit leading through the tank of the cooling water-circulating system, the parts operating as described to cool the water in the tank and to heat the water delivered to the mixing drum.

2. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, another tank from which water is periodically delivered to the drum for use in mixing the concrete and a water supply conduit delivering to the second named tank, such conduit extending through the tank of the cooling, water-circulating system.

3. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a closed water-circulating system for cooling the engine, including a tank containing a large body of water used for cooling and pipe connections between the tank and the engine, a conduit through which water is delivered to the drum as required for concrete mixing purposes, said conduit having a coil portion located within the tank of the cooling water-circulating system, and means for controlling the flow of water through the conduit irrespective of the flow of water in the cooling system.

4. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank for containing a relatively large body of water used for cooling, and circulating connections between the tank and engine, a tank in which water used in mixing the concrete is collected and from which it is discharged into the mixing drum, a water supply conduit for the second-mentioned tank including the coil located within the tank of the circulating cooling water system and a valve by which the flow of water to the second named tank and from that tank to the drum is regulated and controlled.

5. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a

tank containing a relatively large body of the water used for cooling purposes, a conduit through which water used in mixing the concrete is delivered into the drum, this conduit having a portion located within the tank of the cooling water-circulating system, and means for determining the proportion of the water that is delivered to the drum for mixing purposes that shall pass through the part of the supply conduit located within the tank of the cooling water-circulating system.

6. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, a conduit through which water used in mixing the concrete is delivered to the drum, a portion of said conduit extending through the tank of the cooling water-circulating system, a by-pass in the said supply conduit by which the water supplied to the mixer may be shunted around the said tank, and valves for controlling the flow of water through the by-pass portion of the conduit supplying water to the mixer.

7. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, a conduit through which the water used in mixing the concrete is delivered to the drum, this conduit having a coil portion located within the tank of the engine-cooling system, a by-pass located outside the tank through which water supplied to the tank may be diverted, and valves by which the relative proportions of water being supplied to the mixer, flowing respectively through the said coil and the by-pass, may be regulated.

8. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, a second tank in which water used in mixing the concrete is collected and intermittently delivered into the drum, a supply conduit for the said second tank including a coil within the tank of the cooling water-circulating system, a valve for controlling the flow of water from the supply conduit to the second tank and from the latter to the drum, a by-pass connected with the supply conduit located outside the tank of the cooling water system and valves for controlling the flow of water respectively through the coil and the by-pass.

9. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a closed water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling, a conduit through which water used for mixing the concrete is supplied to the drum and a valve-controlled passage from the supply pipe to the tank of the cooling water-circulating system by which the latter may be filled from the said supply pipe.

10. In a concrete mixing apparatus the combination with a mixing drum and an engine for driving it, of a water-circulating system for cooling the engine, including a tank containing a large body of the water used for cooling the engine, a second tank in which the water used in mixing the concrete is collected and from which it is periodically delivered to the mixing drum, a conduit for supplying the second tank, including a coil portion located within the tank of the cooling water-circulating system, a by-pass outside the said tank through which the water for mixing purposes may be shunted past the coil portion within the tank, valves by which the flow of water through the said coil portion and the by-pass of the supply conduit may be respectively controlled and regulated, a pipe-connection leading from the by-pass to the tank of the cooling water-circulating system by which the latter may be filled from the supply conduit, and a valve in the last said pipe connection.

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