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KARL-HEINZ ADAMEK
DIESEL ELECTRIC LOCOMOTIVE WITH BRAKE RESISTANCES
AND ASSOCIATED VENTILATOR COOLING

3,079,509

Filed June 24, 1960

2 Sheets-Sheet 1

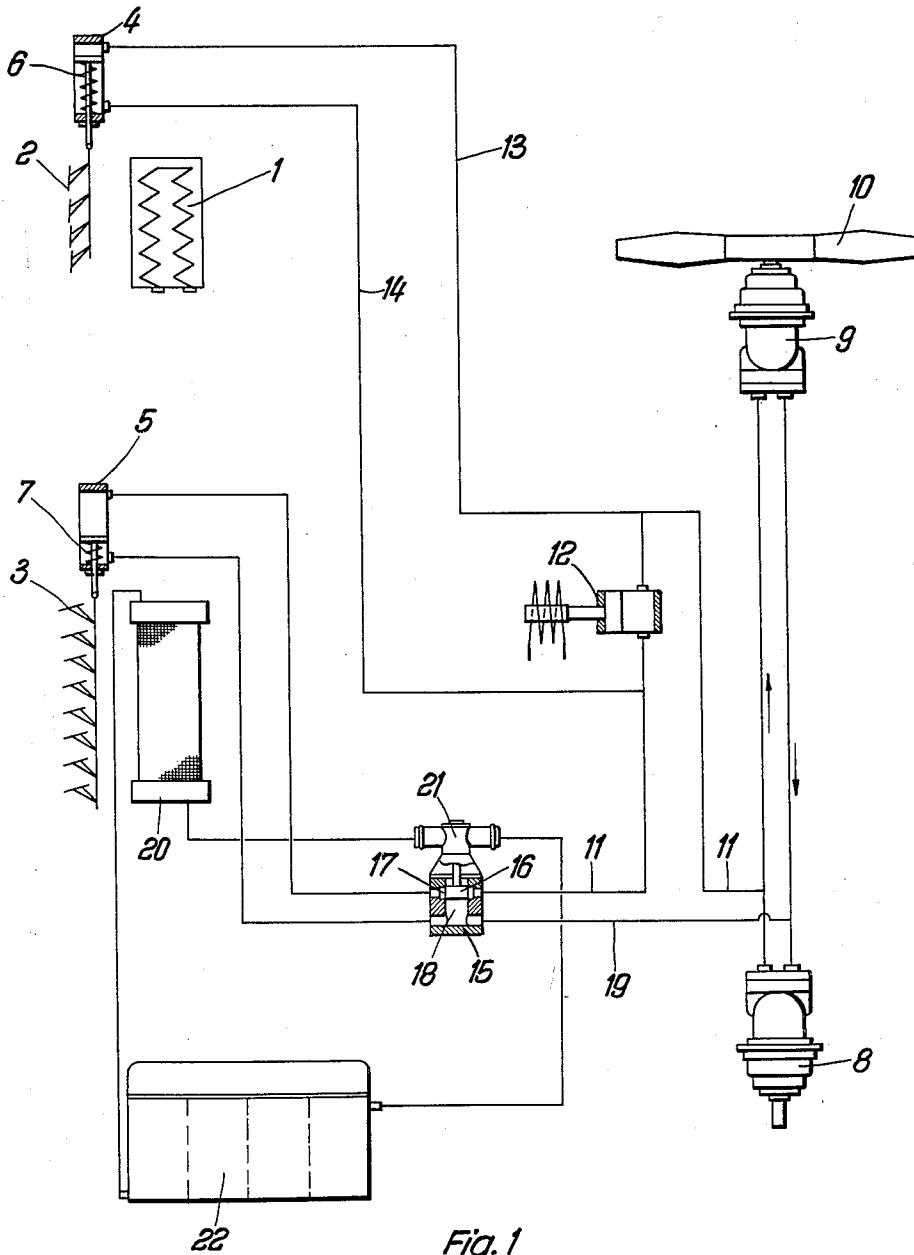


Fig. 1

Inventor:
KARL-HEINZ ADAMEK
BY *Robert H. Jacob*
AGT.

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Fig. 2

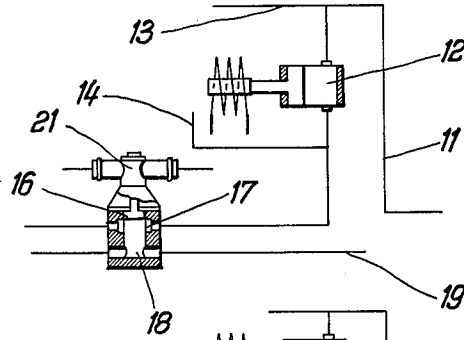


Fig. 3a

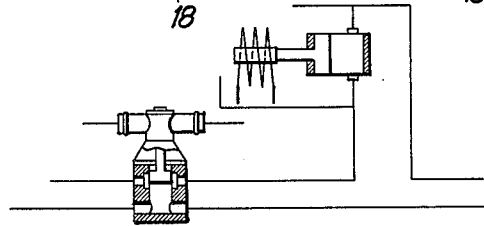


Fig. 3b

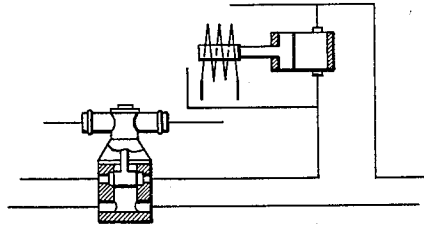


Fig. 4a

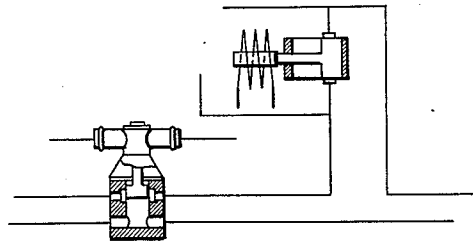
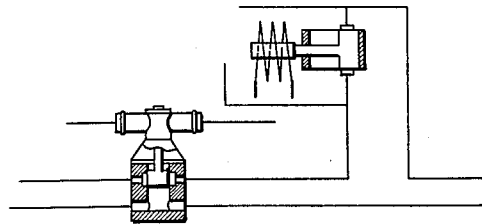


Fig. 4b



Inventor:
KARL-HEINZ ADAMEK
BY Robert H. Jacob
AGT

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DIESEL ELECTRIC LOCOMOTIVE WITH BRAKE RESISTANCES AND ASSOCIATED VENTILATOR COOLING

Karl-Heinz Adamek, Ludwigsburg, Wurttemberg, Germany, assignor to Sueddeutsche Kuehlerfabrik Julius Fr. Behr, Stuttgart-Feuerbach, Germany

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3 Claims. (Cl. 290—3)

It is known in connection with diesel electric locomotives to close or completely or partly open the cooling air supply for cooling the motors as well as also the resistances used in the resistance braking system independently of one another by means of suitable louvers or shutters. In this connection the opening of the louver for the cooling of the engine is effected by hydraulic means which are adjusted automatically by means of a thermostat in direct relationship to the temperature of the cooling water. Means are also known which permit opening or closing of the louvers for the cooling of the brake resistances from the cab of the locomotive engineer.

It is an object of the invention to provide a control arrangement which automatically sets the supply of cooling air for each possible driving condition for the engine as well as also for the brake resistances in direct relationship to the operating condition.

It is a further object of the invention to provide such an arrangement in a simple fashion which is at the same time reliable in operation.

In accordance with the invention a separate louver or shutter means is associated with the diesel engine cooling as well as also with the brake resistance cooling. The setting of the louver for the diesel engine cooling is effected hydraulically in a known manner by means of a thermostat. In addition, the operation of the means for setting the louver for the cooling of the brake resistances is effected automatically, simultaneously with the shifting of the driving motors to the resistance braking operation, and these means comprise a hydraulic means which is connected to the hydraulic system for setting the louver for the diesel engine cooling.

The means for setting the louver for the diesel engine cooling and the means for setting the louver for the brake resistance cooling are therefore coupled, and that in a manner that when shifting the vehicle from running operation to resistance braking and vice versa, automatic adaptation sets in of the cooling air supply for the engine as well as also for the brake resistances which is particularly suitable for each condition of operation.

If the louvers for the resistance cooling open, the louvers for the engine cooling are closed automatically. This can be accomplished in accordance with the invention in a most advantageous manner in that in the conduit from the liquid pump of the hydraulic system to a control for the hydraulic cylinder of the cooling water louver setting means, which is known per se and is provided with a short circuit connection, a closing member is provided, which on shifting the locomotive to resistance braking closes this conduit, so that the input or output for the hydraulic cylinder of the louver adjusting means for the brake resistances is connected before or behind the shutoff element to the conduit leading from the liquid pump to the control.

In accordance with the invention the operation of such a diesel electric locomotive can be furthermore simplified with respect to the control of the cooling means and suitably improved as to operational reliability, in that only one continuously operated ventilator is provided which is associated with the louver for the diesel engine cooling as well as also with the louver for the brake resistance cooling.

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The arrangement in accordance with the invention does not compel the engineer when shifting to braking operation to manipulate additional handles for opening the louver for the resistance cooling. The cooling for the brake resistances or the cooling for the diesel engine is shifted or adjusted automatically, depending on the prevailing operating conditions. These circumstances constitute not only a facility as far as the work of the engineer is concerned, but they also contribute to an increase of the driving safety, because frequently the shifting to braking operation is caused by suddenly arising danger which calls for close concentration and the full attention of the engineer. Particularly in such a case the engineer should not be distracted by being compelled to attend other manipulating means. The combination of this hydraulic control for the louvers associated with the resistances with the hydraulic system for the motor cooling advantageously provides a simplification and economic advantage in the entire structure, because both control circuits can be attended to and serviced with the same liquid pump. In addition to that, further sources of possible errors are avoided.

Other objects and advantages of the invention will become apparent if reference is had to the accompanying drawings illustrating an embodiment of the invention and in which:

FIG. 1 is a schematic showing of the control arrangement including the hydraulic system and the parts to be cooled;

FIGS. 2, 3a, 3b, 4a and 4b indicate several positions of the control member for the hydraulic system for the motor cooling as well as the corresponding positions of the shutoff element.

In accordance with FIG. 1 the electric resistances 1 to be cooled are associated with a louver 2, and a louver 3 is associated with the cooler 20 of the motor 22. The setting of the louvers 2, 3 is effected with the aid of the associated hydraulic means 4, 5 consisting of cylinder and piston, while the setting is effected against the effect of springs 6 and 7, respectively.

The hydraulic liquid is moved by the pump 8 which in addition can drive a ventilator motor 9 for the ventilator 10. In the conduit 11 which leads from the pump 8 to the hydraulic system a shutoff element 12 is inserted. Before or after the shutoff element 12 the input or output conduits 13, 14 for the hydraulic system 4 are connected to the conduit 11. Thence the conduit 11 leads to a control 15, the piston 16 of which is moved by a control referred to as an expansion material control 21, the operation of which depends on the temperature of the cooling water. Furthermore, the control 15 has a closed annular space 17 and a central area 18.

In operation, when the locomotive starts to move the shutoff member 12 and the control piston 16 are in the position indicated in FIG. 2. Since the annular space 17 and the central space 18 of the control form a short circuit connection in this position and the shutoff element 12 permits the hydraulic fluid to pass through unimpededly, the hydraulic fluid flows back to the pump 8 by way of conduit 19 without operation of the hydraulic means 5. Therefore, both louvers 2, 3 are closed. This meets also the operational safety requirements, because the cooling water for the motor must be raised as fast as possible to the most favorable operating temperature. When the normal operating temperature is attained, the expansion material control shifts the piston 16 into the position in accordance with FIG. 3a. The short circuit connection 17, 18 is then choked, the corresponding pressure difference at the control effects the adjusting of the hydraulic means 5, and thus a corresponding opening of the louver 3. FIG. 3b shows the limit condition where

the cooler louver 3 is opened as far as possible and the motor has a certain excess temperature.

On changing over from the usual control condition of FIG. 3a, i.e. driving operation at normal cooling water temperature to braking operation, then the hydraulic means 4 of the resistance cooling is rendered operative as a result of the locking position of the shutoff member 12 (control condition in accordance with FIG. 4a), and thus the louver 2 is opened.

At that time except for the liquid flowing back from the operating cylinder of the hydraulic means 4, no fluid stream flows through the control 15. As a result no pressure difference can arise there so that under these conditions the hydraulic means 5 is inoperative and the louver 3 closes. Thus the electric resistance arrangement is cooled in a manner corresponding to the operating requirements, but the cooling water temperature is not reduced in an undesirable manner by introduction of cooling air.

If the shifting to braking operation is effected from the operating conditions in accordance with FIG. 3b, the control members are first in the position in accordance with FIG. 4b. In that case the hydraulic means 4, 5 are in series, because the short circuit connection in the control 15 is completely interrupted. Thus the louver or shutter 2 for the electric resistance is not opened immediately, but only after a certain brief change-over period during which, as a result of a minor decrease of the cooling water temperature, the piston 16 is moved upwardly to such an extent that a short circuit connection of minor cross-sectional passage is established inside the control 15. The velocity of the ventilator motor can likewise be influenced in a known manner not separately illustrated by means of the thermostat which measures the cooling water temperature and controls the movement of the piston 16. The ventilator is arranged in a known manner in the roof of the locomotive and moves the cooling air.

The return of the oil from the cylinder 4 does not in any way affect the effectiveness of the element 12. When shut-off element 12 is open there is no pressure differential between conduits 13 and 14 so that the spring 6 maintains the piston in cylinder 4 in the upper end position and the louver 2 remains closed. When the shut-off element 12 is closed during the change over to braking the conduit 13 is connected as before with the pressure side of the pump 8 while the conduit 14 which is cut off from the pressure side of the pump, is normally in communication with the suction side of the pump by way of the control valve. Now the pressure differential between the pressure side and the suction side of the pump becomes effective at conduits 13 and 14 and opens the louver 2. This condition obtains also in the event of a minor leak in cylinder 4.

The control of the short circuit connection can be arranged in a manner as described in detail in German published specification (Auslegeschrift) No. 1,050,626.

Having now described my invention with reference to the embodiment illustrated in the drawings, I do not wish to be limited thereto, but what I desire to protect by Letters Patent of the United States is set forth in the appended claims.

I claim:

1. In a diesel electric locomotive with a load resistance brake system and automatically operative ventilator cooling means for the brake, and engine control means for shifting the locomotive from running condition to resistance braking condition; water cooling and louver means for the diesel engine cooling system and louver means for the cooling system of the load resistances, hydraulic louver adjusting means for said diesel engine

cooling means including thermostat controlled louver adjusting means, automatically operative means connected to said engine control means for shifting the louver means for cooling the load resistances in response to a change in the operating condition of said diesel engine cooling means, said automatically operative means comprising a hydraulic circuit connected to said hydraulic louver adjusting means of the cooling means for said diesel engine.

2. In a diesel electric locomotive with a load resistance brake system and automatically operative ventilator cooling means for the brake, and engine control means for shifting the locomotive from running condition to resistance braking condition; water cooling and louver means for the diesel engine cooling system and louver means for the cooling system of the load resistances, hydraulic louver adjusting means for said diesel engine cooling means including thermostat controlled louver adjusting means, automatically operative means connected to said engine control means for shifting the louver means for cooling the load resistances in response to a change in the operating condition of said diesel engine cooling means, said automatically operative means comprising a hydraulic circuit connected to said hydraulic louver adjusting means of the cooling means for said diesel engine, said engine cooling means further including a hydraulic cylinder and said hydraulic means including a pump, and a fluid conduit system and a hydraulic control device defining a short circuit connection in that part of said conduit system supplying said hydraulic cylinder for the engine cooling means, and a shut off device connected with said control means for shifting the engine adapted to close said conduit system on shifting the locomotive to the braking condition, said resistance cooling means including a hydraulic cylinder and conduits for setting said louvers for the brake resistance cooling system connected behind said shut off device to the conduit leading from said pump to said control device.

3. In a diesel electric locomotive with a load resistance brake system and automatically operative ventilator cooling means for the brake, and engine control means for shifting the locomotive from running condition to resistance braking condition; water cooling and louver means for the diesel engine cooling system and louver means for the cooling system of the load resistances, hydraulic louver adjusting means for said diesel engine cooling means including thermostat controlled louver adjusting means, automatically operative means connected to said engine control means for shifting the louver means for cooling the load resistances in response to a change in the operating condition of said diesel engine cooling means, said automatically operative means comprising a hydraulic circuit connected to said hydraulic louver adjusting means of the cooling means for said diesel engine, said engine cooling means further including a hydraulic cylinder and said hydraulic means including a pump, and a fluid conduit system and a hydraulic control device defining a short circuit connection in that part of said conduit system supplying said hydraulic cylinder for the engine cooling means, and a shut off device connected with said control means for shifting the engine adapted to close said conduit system on shifting the locomotive to the braking condition, said resistance cooling means including a hydraulic cylinder and conduits for setting said louvers for the brake resistance cooling system connected behind said shut off device to the conduit leading from said pump to said control device, and a continuously operative ventilator associated with both said louver means for the engine cooling system and for the brake resistance cooling system.

No references cited.