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(54) **Station for supplying pressurized gas to tanks, in particular tanks mounted on motor vehicles**

(57) Station for supplying pressurised gas to tanks, in particular tanks installed on motor vehicles, of the type including a compression group (C), operated through transmission means by a motor (M), whose aspiration inlet is connected to a delivery net (RG) of the gas at low pressure, and whose delivery is functionally connected to a device (D) for delivering the gas at higher pressure by a plurality of connectors (U1, U_2, .., UN), which can be connected to as many users. The transmission means include at least one oil-pressure pump (P_{OL}), operated by the shaft of the motor (M) and a hydraulic motor (M_{OL}), fed by said the pump (P_{CL}) and driving into rotation the operation shaft of the compression group (C).

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Description

[0001] The present invention relates to the technical field concerned with stations for supplying pressurised gas, e.g. methane to tanks, mounted in particular on motor vehicles.

[0002] Stations of known type usually include an electric motor aimed at operating a multistage compression unit, which is supplied by the methane network at a pressure of about 8 to 10 bar, and supplies, in turn, a battery of tanks connected in parallel. When the pressurised gas is distributed to tanks of one or more motor vehicles, the battery acts as compensation device, which makes up for possible delays in the activation of the motor - compression unit assembly.

[0003] The Patent Application BO2003A 000061, owned by the same Applicant, refers to a station for supplying users' tanks with pressurised gas and resolves some important drawbacks of the prior art. It includes substantially: an electric unit, fed by an electric line for electric energy delivery, aimed at supplying at the outlet, an electric voltage of variable effective value and frequency, in accordance with the control and command signals issued by a command and control unit, to which it is connected; an electric motor powered by the electric unit; a compression unit, which is operated by the motor shaft, and whose inlet is connected to a low pressure methane network; a reference tank, connected to the supply of the compression unit; a device for delivering the pressurised gas, connected to the reference tank, and having a plurality of connectors, or delivery nozzles, which can be connected to as many users; a sensor for measuring pressure inside the reference tank, connected to the central unit. The central unit is capable of comparing a selected pressure reference value with the pressure value measured by the sensor, and of controlling the electric unit in relation to the difference between the two values. This results in the activation of the compression unit, in which the working cycles in time unit depend on the effective value and frequency of the motor power voltage.

[0004] Rules and guidelines fixed by the current regulations in this matter, national and supranational, and in this particular case concerning the delivery systems of methane for haulage, impose a series of measures to adopt when installing electric apparatuses (motor, electric central unit, instrument panel, etc.) in environments with explosion risk. Obviously, the observance of these rules requires enormous initial and periodical investments for the maintenance and the control of the parts considered at risk. Thus, the main object of the present invention is to propose a station for supplying pressurised gas, in particular methane, to the tanks of motor vehicles, which allows to keep the electric apparatuses or devices, such as motors and the instrument panel for managing and controlling the compressor and auxiliary devices, in distinct environments, separated from the apparatuses which co-operate directly in carrying and compressing the gas supplied by the distribution net, so as to allow to observe the current regulations and to be innovative, reliable and which can be obtained with easily available and cheap elements, with the same safety degree with respect to the known solutions.

[0005] Another object of the present invention is to propose a station, whose total cost will turn out to be relatively low in any case, with respect to the advantages to be obtained.

[0006] The above mentioned objects are obtained in accordance with the contents of the claims.

[0007] The characteristic features of the invention, not resulting from what has just been said, will be better pointed out in the following, in accordance with the contents of the claims and with the help of the enclosed figures, in which:

- Figure 1 is a partial block diagram of the station proposed by the invention, showing the blocks which are considered the most significant;
- Figure 2 is a partial block diagram of the station proposed by the invention, according to an embodiment, showing the blocks which are considered the most significant.

[0008] With reference to the enclosed Figures, an electric motor M is aimed at driving into rotation an oil-pressure pump P_{OL}, which is aimed at feeding an oil pressure motor M_{OL} through a hydraulic circuit 1, see Figure 1. The oil-pressure motor M_{OL}, in turn, is connected via the related shaft to a group C for compressing e.g. methane.

[0009] In known way, the inlet of the compression group C is connected to a low-pressure methane network RG, and its supply outlet is functionally connected to a device D for supplying the same higher pressure gas through a plurality of connectors or delivery gun, U_1, U_2, .., U_N, which can be connected to as many users, that is motor vehicles tanks.

[0010] The electric motor M and the oil-pressure pump P_{OL} are mounted inside a first environment A1, indicated with broken line, where also e.g. the instrument panel for managing and controlling the compressor and auxiliary devices, as well as the hydraulic unit, water pump of the cooling circuit and a related air-water exchanger (not shown, since known) are located.

[0011] The hydraulic motor M_{OL} and the compression group C as a whole are situated inside a second environment A2, likewise indicated with broken line, in which also supply pulsation dampeners (not shown as known), a measure cabinet, additional circuits for oil and methane cooling, and the instrumentation and compressor managing electrical-instrumental parts, are located. Consequently, the electrical apparatuses and the electrical and electronic elements in the second environment A2 are reduced to the minimum. Moreover, the second environment A2 constitutes, according to the current regulations, the compressor house and thus it is contained in a metallic cabinet, approved as a first degree safety system (not shown).

[0012] Therefore, the apparatuses and devices contained in the first environment A1 are functionally connected to those contained in the second environment A2, with which they co-operate to make the proposed supply station operate correctly: thus, due to the functional interposition of the hydraulic circuit 1, in which operate the oil-pressure pump P_{OL} and the hydraulic motor M_{OL}, the energised parts (first environment A1) are completely separated from the areas containing gas (second environment A2). Advantageously, the second environment A2 results more compact and the so-called "danger area" is reduced, and consequently, the first environment A1 must be protected only from the weather, which could be achieved simply by e.g. installing it under a roof.

[0013] To boost the proposed station (see Figure 2) a bypass channel 2 can connected in parallel with the oil-pressure motor M_{OL}, that is upstream and downstream thereof, and a device 3 can be functionally connected to the channel 2 for adjusting the quantity of fluid to be conveyed inside the latter (null or a part of the quantity of fluid circulating inside the hydraulic circuit 1) and otherwise aimed at feeding the oil-pressure motor M_{OL}. Due to this contrivance, it is possible to modulate the power of the hydraulic motor M_{OL} according to the time-by-time delivery needs, that is to adjust the number of revolutions of the compressor of the group C, according to the number of users connected to the delivery guns U_1, U_2, .., U_N.

[0014] Moreover, the configuration of the proposed station allows to use a gas motor instead of the electric motor M, observing totally the current regulations, which would allow to save on the costs of the electric cabin installation. Further, the introduction of an electric current generator would make the supply station self-sufficient, because the connection to the electricity network could be avoided.

[0015] An advantage of the present invention lies in the fact that it has conceived a station for supplying pressurised gas, in particular methane, to tanks of motor vehicles, which includes two distinct environments A1, A2, in which the energised parts are separated from the areas containing gas, due to the functional interposition of the electric motor M and the compressor group C of a hydraulic circuit 1, in which operate the oil-pressure pump P_{OL} and the hydraulic motor M_{OL}. In this way, the danger area is much smaller with respect to the known solutions, being limited only to the second environment A2. Actually, the electric motor M and the instrument panel are situated in the first environment A1, in which no gas is contained and which, according to current regulations, can be simply protected only from the weather, therefore they can be of the most wide-spread type, without requiring the particular safety degree, which is obligatory for the apparatuses situated in the danger areas. Therefore, some elements of the station can be found easier and at a lower cost. Consequently, the costs of the first installation and of the periodic maintenance of the station and the considerable technical-functional advantages that are obtained, make the present invention reliable and particularly attractive from the safety and economic points of view.

Claims

1. Station for supplying pressurised gas to tanks, in particular tanks installed on motor vehicles, of the type including a compression group (C), operated through transmission means by a motor (M), whose aspiration inlet is connected to a delivery net (RG) of said gas at low pressure, and whose delivery is functionally connected to a device (D) for delivering said gas at higher pressure by a plurality of connectors (U_1, U_2, .., U_N), which can be connected to as many users, **characterised in that** said transmission means include at least one oil-pressure pump (P_{OL}), operated by the shaft of said motor (M) and a hydraulic motor (M_{OL}), fed by said pump (P_{OL}) and driving into rotation the operation shaft of said compression group (C), to allow the definition of a first environment (A1), housing said motor (M) and oil-pressure pump (P_{OL}), and of a second environment (A2), separated from the first environment (A1), containing said hydraulic motor (M_{OL}), and the compression group (C).

2. Station, according to claim 1, **characterised in that** the hydraulic circuit (1) connecting said oil-pressure pump (P_{OL}) and hydraulic motor (M_{OL}) includes a bypass channel (2), connected in parallel with the same motor (M_{OL}) and **in that** it includes a device (3), functionally connected to said bypass channel (2) and adjusting the quantity of fluid to be conveyed through the latter, which would otherwise feed said oil-pressure motor (M_{OL}).

3. Station, according to claim 1, **characterised in that** said motor (M) is an electric motor.

4. Station, according to claim 1, **characterised in that** said motor (M) is gas-fed.