

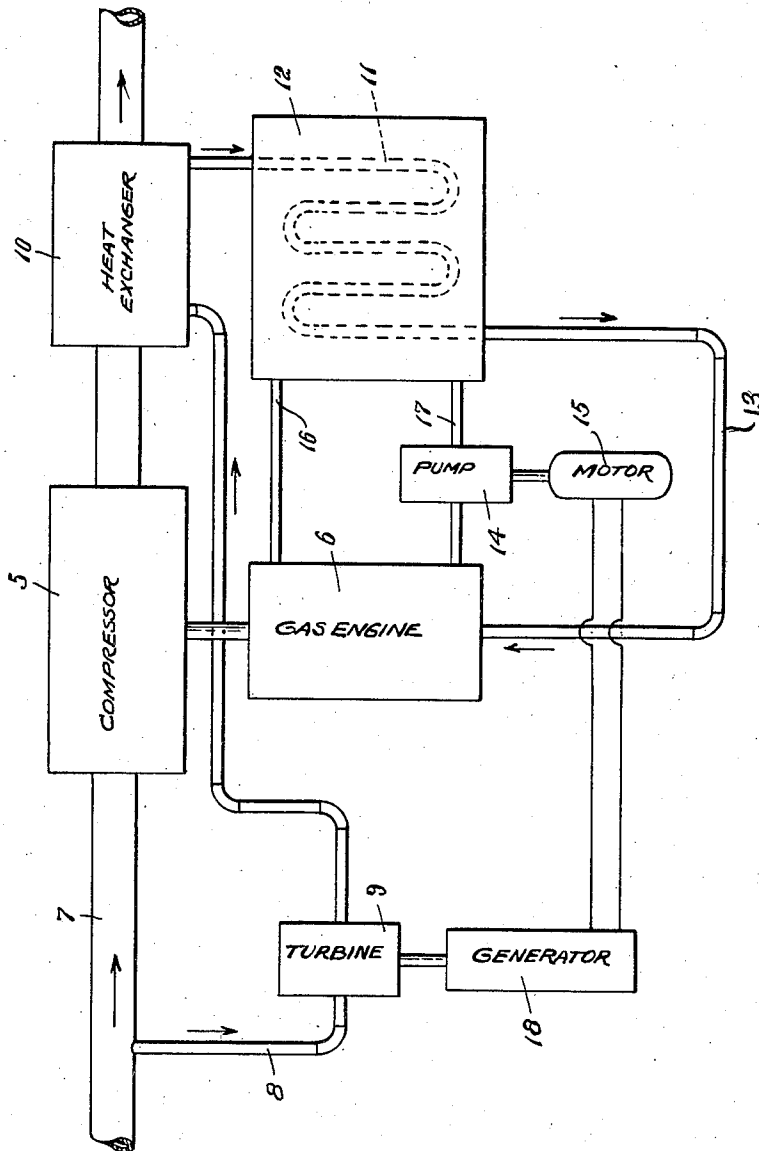
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GAS COMPRESSOR STATION

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GAS COMPRESSOR STATION

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3 Claims. (Cl. 62—136)

This invention relates to natural gas supply systems and has as an object the recovery of energy in reducing the pressure for use, of high pressure natural gas.

Natural gas is piped long distances from the fields where it is derived, to many places of use. At spaced intervals, compressor stations are provided for increasing the pressure of the gas. The compressors in these stations are usually driven by gas engines supplied with gas, for combustion, from the natural gas mains. The pressure in the gas mains may be at, say for example, two hundred pounds per square inch, this pressure to be increased by the compressor to say, four hundred and fifty pounds per square inch. The gas engine however, cannot operate at a gas supply pressure of two hundred pounds, so it is usual to drop the pressure to about one pound through a pressure reducing valve. The energy released in the pressure reduction is lost.

This invention provides for utilizing the energy released in reducing the pressure of the gas for supplying refrigeration and power and will now be described with reference to the drawing which illustrates diagrammatically one embodiment of the invention.

The compressor 5 driven by the gas engine 6 increases the pressure of the gas in the natural gas main 7. Gas from the main 7 is supplied through the pipe 8 into the gas turbine 9. The gas has its pressure reduced in the turbine and its temperature is lowered thereby. The cold gas from the outlet of the turbine, passes through the shell and tube type heat exchanger 10 in indirect contact with the gas compressed by the compressor 5 and partially cools the compressed gas. It then passes through the pipe 11 submerged in water in the water cooler 12, and then through the pipe 13 into the gas inlet of the engine 6.

The pump 14 driven by the motor 15 recirculates jacket water from the engine 6, through the pipes 16 and 17 and the water cooler 12.

The turbine 9 drives the generator 18 which supplies electric current to the pump motor 15.

The turbine performs three functions. It lowers the pressure of the gas from the main 7 to that required by the gas engine 6. In lowering the pressure, the gas is expanded and cooled and the cold gas used for cooling the gas compressed by the compressor and for cooling the jacket water of the gas engine. Power is generated by the turbine and this power is used in the compressor station.

The turbine 9 may be a single or multiple stage turbine depending upon the pressure reduction required. If a multiple stage turbine, gas for cooling may be taken off between stages.

While one embodiment of the invention has

been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. In a gas compressor station having a high pressure gas main, an internal combustion engine requiring low pressure gas for fuel, the combination of a gas expansion engine, means for supplying gas from said main into the inlet of said expansion engine, a water cooler, means for passing the gas from the outlet of said expansion engine in indirect contact with the water in said cooler and then into the gas inlet of said internal combustion engine, and means for recirculating the jacket water of said internal combustion engine through said cooler.

2. In a gas compressor station having a high pressure gas main, a gas compressor for compressing the gas flowing through said main, and an internal combustion engine driving said compressor, said engine requiring low pressure gas for fuel, the combination of a gas expansion engine, means for supplying gas from said main into the inlet of said expansion engine, a heat exchanger, a water cooler, means for recirculating the jacket water of said internal combustion engine through said cooler, means for passing the compressed gas from said compressor through said exchanger, and means for passing the gas from the outlet of said expansion engine through said exchanger in indirect contact with the gas from said compressor, then through said cooler in indirect contact with the water therein and then into the gas inlet of said internal combustion engine.

3. In a gas compressor station having a high pressure gas main, a gas compressor for compressing the gas flowing in said main, and an internal combustion engine driving said compressor, said engine requiring low pressure gas for fuel, the combination of a gas expansion engine, means for supplying gas from said main into the inlet of said expansion engine, a water cooler, means for passing the gas from the outlet of said expansion engine in indirect contact with the water in said cooler and then into the inlet of said internal combustion engine, means including a pump for recirculating the jacket water of said internal combustion engine through said cooler, an electric generator driven by said expansion engine, and an electric motor connected electrically to said generator and connected mechanically to said pump for driving said pump through electric energy derived from said generator.

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