

[54] AIR COMPRESSOR SYSTEM

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55/267, 62/90, 62/93
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418/97-100; 55/267-269; 62/90, 93;
184/104 R

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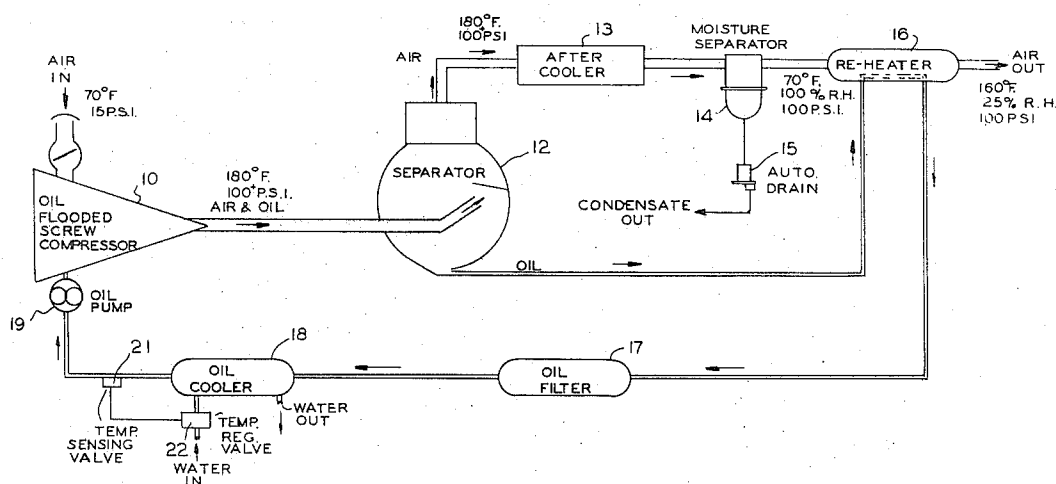
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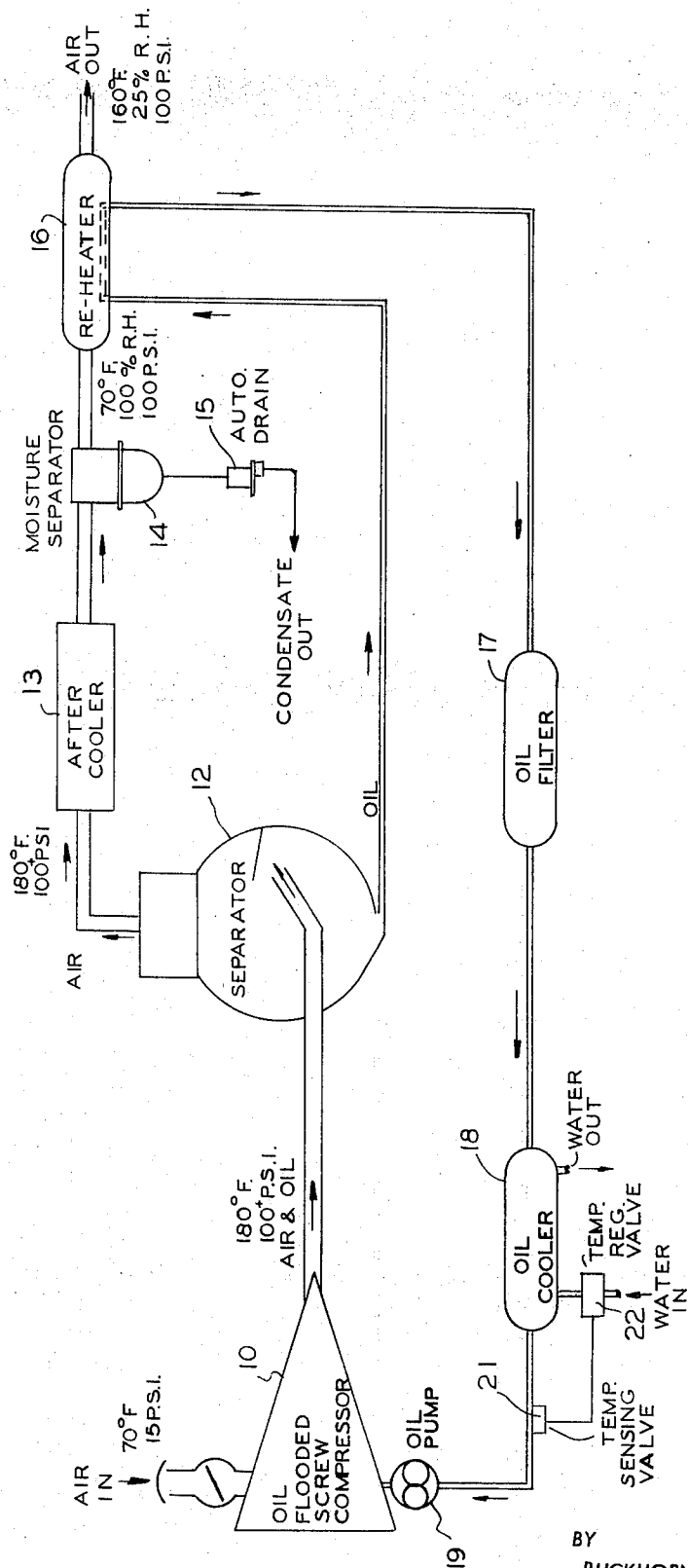
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[57] ABSTRACT

Air and oil are flowed through an oil flooded screw compressor which heats the air and oil, after which the air and oil are separated and the air is cooled to extract moisture therefrom. Then the cooled air and the hot oil are passed through a heat exchanger which heats the air to a desired temperature for use and cools the oil to a desired temperature for recirculation through the compressor.

3 Claims, 1 Drawing Figure





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AIR COMPRESSOR SYSTEM

This invention relates to an improved air compressor system, and more particularly to an air compressor system wherein hot compressor oil is used to heat compressed air.

An object of the invention is to provide a new and improved air compressor system.

Another object of the invention is to provide an air compressor system wherein hot compressor oil is used to heat compressed air.

Another object of the invention is to provide an air compressor system which lowers the relative humidity of the delivered air.

Another object of the invention is to provide an air compressor system minimizing heat rejection.

Another object of the invention is to provide an air compressor system which heats the delivered air.

Another object of the invention is to provide an air compressor system which conserves a substantial portion of the heat of compression.

In the drawing, the single FIGURE is a schematic view of an improved air compressor system forming one embodiment of the invention.

Referring now in detail to the drawing, there is shown therein an improved air compressor system forming one embodiment of the invention and including a known oil-flooded screw compressor 10 which compresses the air and pumps compressed air and oil through a known oil separator 12 at typical temperatures and pressures indicated on the drawing. The oil seals and lubricates the screw compressor as usual in this type of a compressor, and also absorbs most of the heat generated by the compressing of the air which is, for many typical installations, compressed from room temperature and atmospheric pressure to 100 p.s.i. The air leaves oil separator 12 and enters aftercooler 13. The air temperature is reduced by the aftercooler to a temperature below the dew point, and water condensate is separated within a suitable, known moisture separator 14, and withdrawn through a drain trap 15. A reheater 16 receives cool air with 100 percent relative humidity at the entering pressure condition. The reheater 16 also receives hot oil from the oil separator 12 resulting in an exchange of heat, the compressed air being heated to the temperature for use and the oil being cooled to a temperature near that desired for reuse. The air gains back the heat that was given up to the aftercooler 13 and leaves the reheater 16 warm and with a substantial reduction of relative humidity. The oil is cooled as it passes through reheater 16 and flows back to the compressor 10 through an oil filter 17, an oil cooler 18 and an oil pump 19. The coolant requirement for oil cooler 18 has been greatly reduced by the transfer of heat from the oil to the air at the reheater

16. A known temperature sensor 21 actuates a known valve 22 to regulate cooling water supplied to the cooler 18. Typical temperatures, pressures and relative humidities are shown on the drawing adjacent the various stages of the system.

The above-described compressor system, as contrasted with a system identical therewith except for omission of the reheater 16 requires 17 percent input power with a consequent reduction in cost of operation. The above-described system lowers relative humidity by 75 percent, lowers water consumption by 20 percent, reduces air line freeze-ups, and puts the energy normally lost in the oil cooler into the compressed air.

What is claimed is:

1. The method of producing compressed air comprising:

compressing moisture laden air in an oil flooded screw compressor, whereby the air and oil are heated to a predetermined temperature, separating the heated oil from the heated air, cooling the heated air to a second temperature substantially less than said predetermined temperature,

removing moisture from the air so cooled, passing the air and the separated, heated oil through a heat exchanger to reheat the air and cool the oil, and returning the cooled oil to the compressor.

2. In an air compressor system,

an oil flooded screw compressor having an air inlet and an air and oil outlet for compressing air whereby oil is heated,

an air-oil separator having an inlet connected to the air and oil outlet and also having an oil outlet and an air outlet for separating oil from the compressed air,

an aftercooler having an outlet and an inlet connected to the air outlet for cooling the compressed air,

a moisture separator having an outlet and an inlet connected to the outlet of the aftercooler for removing moisture from the cooled compressed air, a reheater heat exchanger having an air passage through which cooled compressed air from the moisture separator flows and also having an oil passage in heat exchanging relationship with the air passage and receiving oil from the air-oil separator, and pump means for pumping oil from the separator, through the reheater heat exchanger, to the compressor.

3. The air compressor system of claim 2 including an oil filter and an oil cooler positioned in series with and between the reheater heat exchanger and the pump means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,785,755 Dated January 15, 1974

Inventor(s) WALTER M. NOVAK and FRED A. THURMOND JR.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 8, after "17 percent" insert --less--

Signed and sealed this 21st day of May 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents