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(54) **SYSTEMS AND METHODS FOR CONTROLLING, MONITORING, AND OPERATING REMOTE OIL AND GAS FIELD EQUIPMENT OVER A DATA NETWORK WITH APPLICATIONS TO RAW NATURAL GAS PROCESSING AND FLARE GAS CAPTURE**

(71) Applicant: **Pioneer Energy Inc.**, Lakewood, CO (US)

(72) Inventors: **Andrew Young**, Wheat Ridge, CO (US); **Matthew Lewis**, Lakewood, CO (US); **Gevorg Sargsyan**, Lakewood, CO (US); **Kevin Hotton**, Arvada, CO (US); **Robert M Zubrin**, Golden, CO (US)

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(57) **ABSTRACT**

An intelligent controls system for a field-deployable system for producing dry natural gas (NG) and natural gas liquids (NGLs) from a raw gas stream is disclosed. The control system is used to ensure correct specifications of both dry NG (above a desired minimum methane number) and NGLs (below a desired maximum vapor pressure) from any supplied raw natural gas source by controlling three system parameters: inlet gas flow rate, system operating pressure, and separator-reboiler temperature set point. The input parameters include: heat content of the input gas stream, volume of the input gas stream, desired methane number of the NG, and desired vapor pressure of the NGLs. The controls system allows any piece of remote field equipment for performing complex chemical processing to be monitored, controlled, and operated remotely. A large array of distributed field equipment situated around the world can all be controlled primarily through a single interface provided in a central control center.
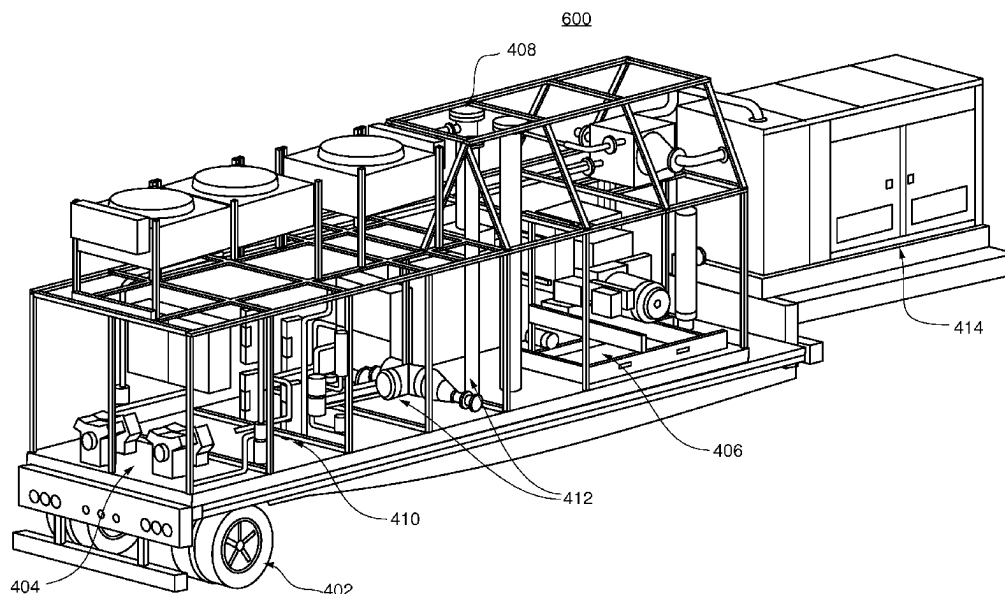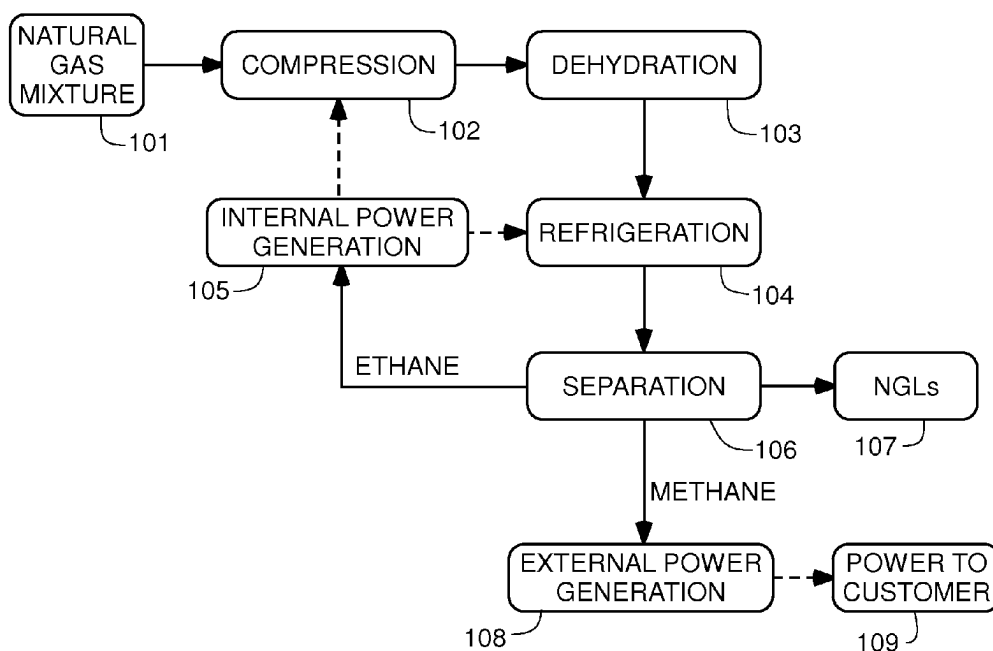
Fig. 1

<u>100</u>

Fig. 2

200

GAS OUTLET

252

204

208

207

203

LOW STAGE
AUTOCASCADE STAGE

206

205

202

201

210

213

HIGH STAGE CASCADE STAGE

212

211

209

251
GAS INLET

Fig. 3

300

START — 302

BRING PORTABLE MAGS
SYSTEM TO OIL FIELD FLARE — 304

RECEIVE RAW NATURAL
GAS FROM THE FLARE SITE — 306

COMPRESS THE NATURAL GAS
STREAM UTILIZING A COMPRESSOR — 308

REMOVE WATER
UTILIZING A DEHYDRATOR — 310

LOWER THE GAS TEMPERATURE UTILIZING
A CASCADE/AUTOCASCADE REFRIGERATOR — 312

SEPARATE THE GAS STREAM
INTO 3 PRODUCT STREAMS — 314

COLLECT THE NGLs
FOR TRANSPORT — 316

GENERATE ELECTRICITY
UTILIZING THE LEAN METHANE STREAM — 318

UTILIZE ETHANE STREAM
FOR SELF-POWER — 320

(OPTIONAL) USE CH_4 STREAM TO CREATE
CNG, LNG, OR LIQUID FUELS — 322

(OPTIONAL) USE CH_4 STREAM TO
CREATE CO_2 AND H_2 FOR EOR — 324

(OPTIONAL) TRANSMIT
ELECTRICITY TO GRID — 326

END — 328

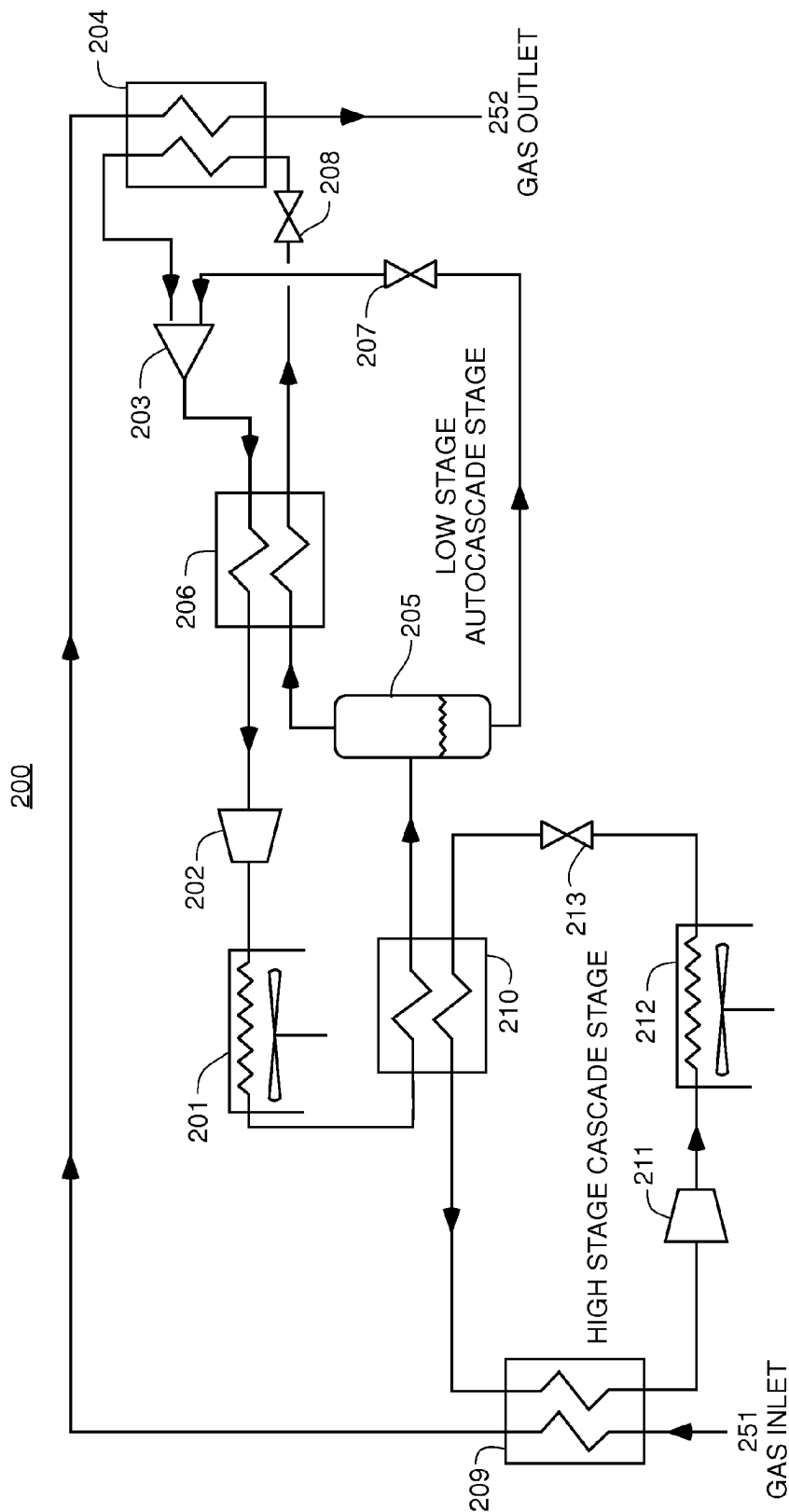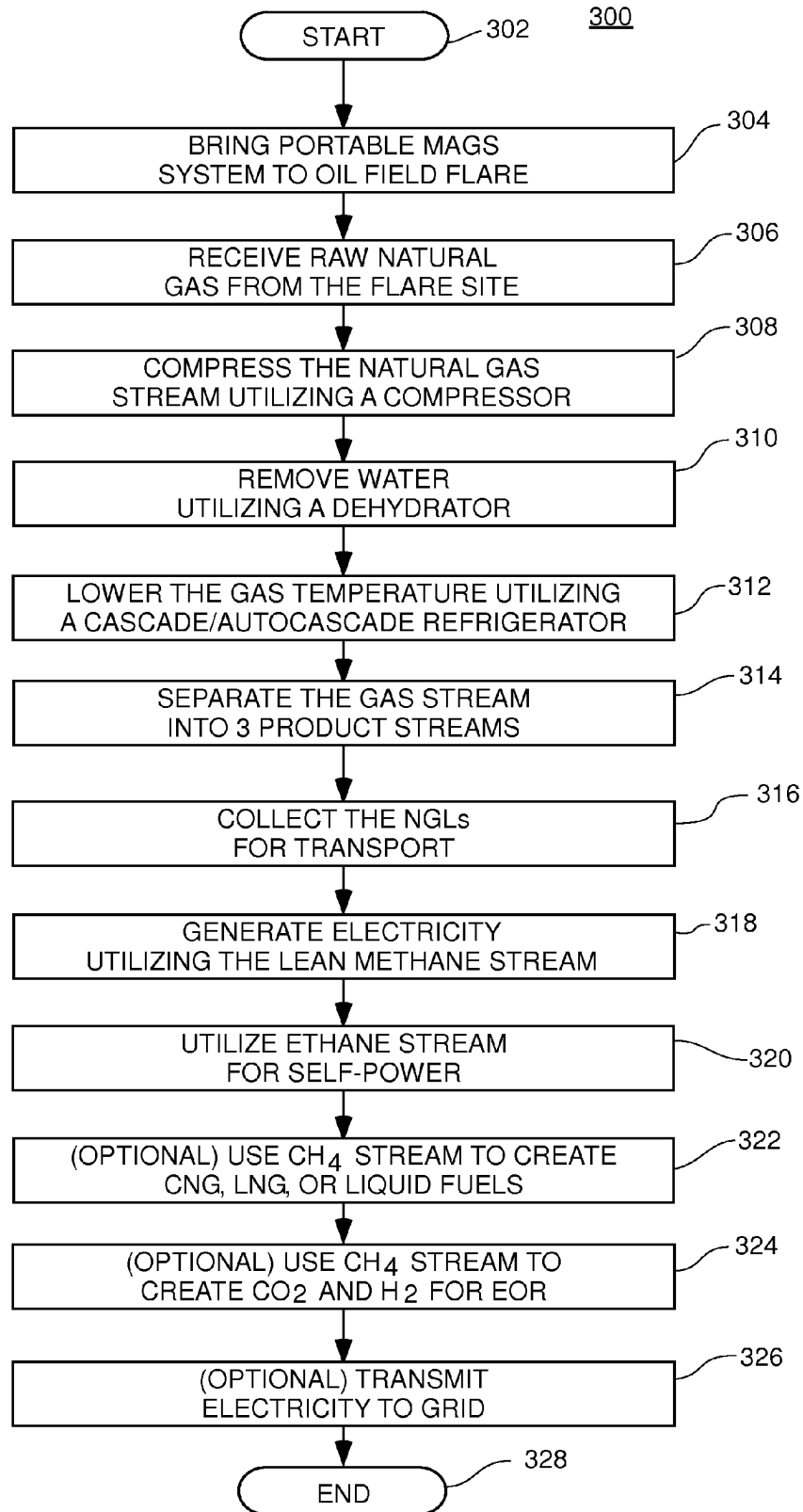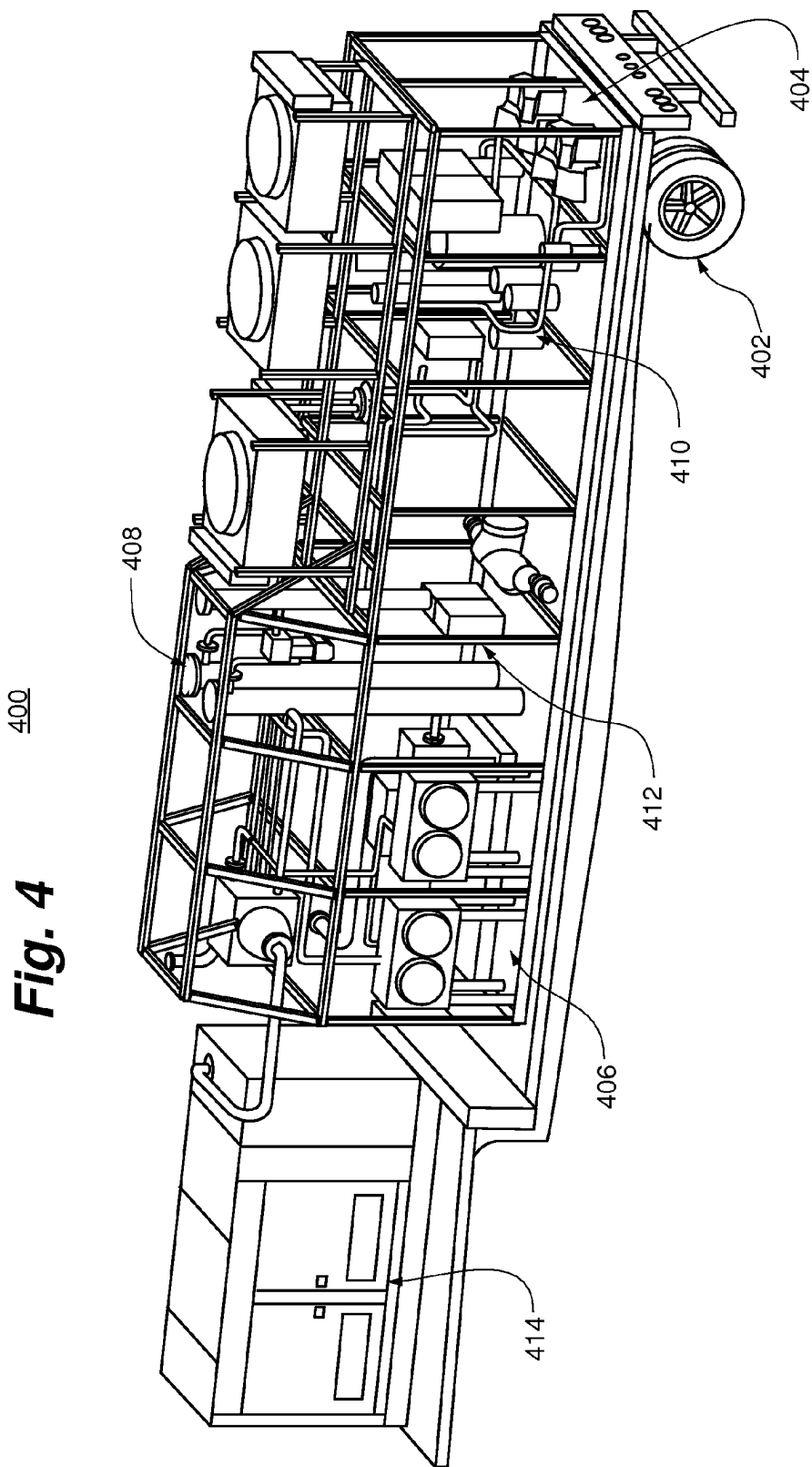Fig. 4

400

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