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(12) **United States Patent**
Kuehn et al.

(10) **Patent No.: US 11,401,779 B2**
(45) **Date of Patent: Aug. 2, 2022**

(54) **HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME**

(71) Applicant: **Downing Wellhead Equipment, LLC**, Oklahoma City, OK (US)

(72) Inventors: **Jordan Kuehn**, Forest Park, IL (US); **Austin Johnson**, Edmond, OK (US); **Ronnie B. Beason**, Lexington, OK (US); **Nicholas J. Cannon**, Washington, OK (US)

(73) Assignee: **DOWNING WELLHEAD EQUIPMENT, LLC**, Oklahoma City, OK (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/388,716**

(22) Filed: **Jul. 29, 2021**

(65) **Prior Publication Data**

US 2021/0355784 A1 Nov. 18, 2021

Related U.S. Application Data

(63) Continuation-in-part of application No. 17/319,854, filed on May 13, 2021, which is a continuation-in-part of application No. 16/855,749, filed on Apr. 22, 2020, which is a continuation-in-part of application No. 16/803,156, filed on Feb. 27, 2020, now Pat. No. 11,242,724, which is a continuation-in-part of application No. 16/436,623, filed on Jun. 10, 2019, now Pat. No. 11,208,856, and a continuation-in-part of application No. 16/248,633, filed on Jan. 15, 2019, now Pat. No. 10,584,552, and a continuation-in-part of application No. 16/248,648, filed on Jan. 15, 2019, now Pat. No. 10,724,682, and a continuation-in-part of application No. 16/100,741, filed on Aug. 10, 2018, now Pat. No. 10,689,938.

(60) Provisional application No. 63/189,663, filed on May 17, 2021, provisional application No. 62/836,761, filed on Apr. 22, 2019, provisional application No.
(Continued)

(51) **Int. Cl.**

E21B 43/26	(2006.01)
E21B 34/02	(2006.01)
E21B 33/068	(2006.01)
E21B 41/00	(2006.01)
E21B 43/11	(2006.01)
F16K 3/36	(2006.01)
F16N 11/00	(2006.01)
F16N 29/02	(2006.01)

(52) **U.S. Cl.**
CPC ***E21B 34/02*** (2013.01); ***E21B 33/068*** (2013.01); ***E21B 41/00*** (2013.01); ***E21B 43/11*** (2013.01); ***E21B 43/26*** (2013.01); ***E21B 43/2607*** (2020.05); ***F16K 3/36*** (2013.01); ***F16N 11/00*** (2013.01); ***F16N 29/02*** (2013.01); *F16N 2210/00* (2013.01)

(58) **Field of Classification Search**
CPC E21B 43/2607; E21B 43/26
See application file for complete search history.

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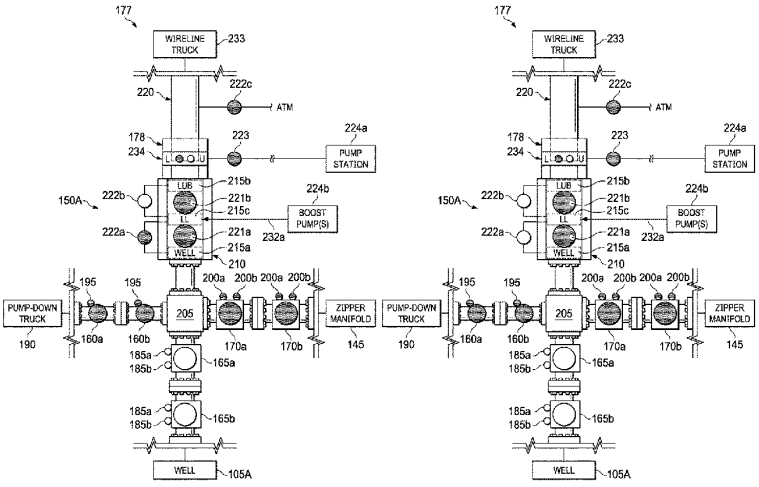
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Primary Examiner — Giovanna Wright
(74) *Attorney, Agent, or Firm* — Haynes and Boone, LLP

(57) **ABSTRACT**

A hydraulic fracturing plan executable by a hydraulic fracturing system to hydraulically fracture a plurality of oil and gas wells.

36 Claims, 50 Drawing Sheets



Related U.S. Application Data

62/755,170, filed on Nov. 2, 2018, provisional application No. 62/638,688, filed on Mar. 5, 2018, provisional application No. 62/638,681, filed on Mar. 5, 2018, provisional application No. 62/637,220, filed on Mar. 1, 2018, provisional application No. 62/637,215, filed on Mar. 1, 2018, provisional application No. 62/617,438, filed on Jan. 15, 2018, provisional application No. 62/617,443, filed on Jan. 15, 2018, provisional application No. 62/598,914, filed on Dec. 14, 2017.

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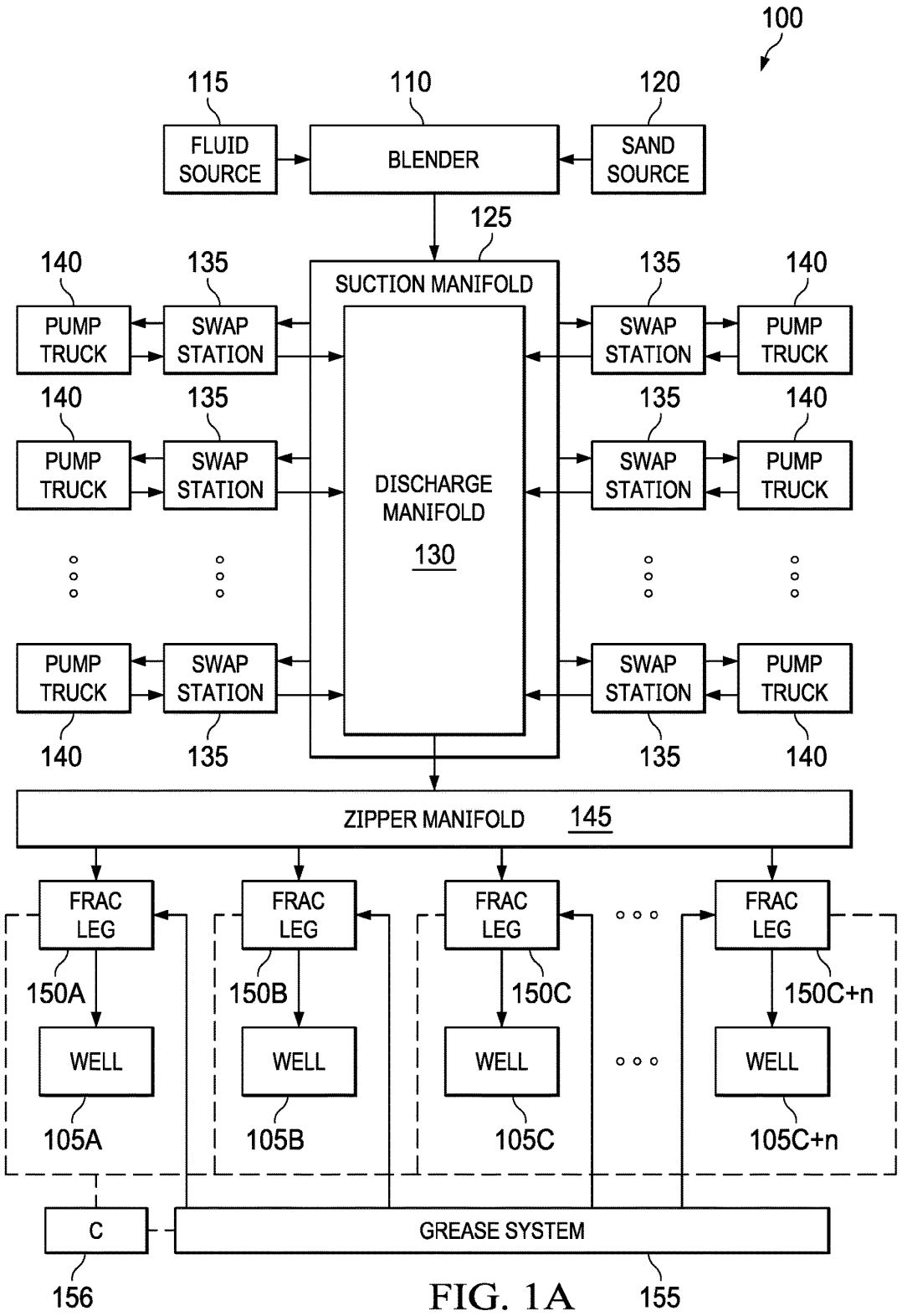

100
115
110
120
FLUID SOURCE
BLENDER
SAND SOURCE
125
SUCTION MANIFOLD
140
135
135
140
PUMP TRUCK
SWAP STATION
SWAP STATION
PUMP TRUCK
DISCHARGE MANIFOLD
130
ZIPPER MANIFOLD
145
FRAC LEG
150A
150B
150C
150C+n
WELL
105A
105B
105C
105C+n
C
156
GREASE SYSTEM
155

FIG. 1A

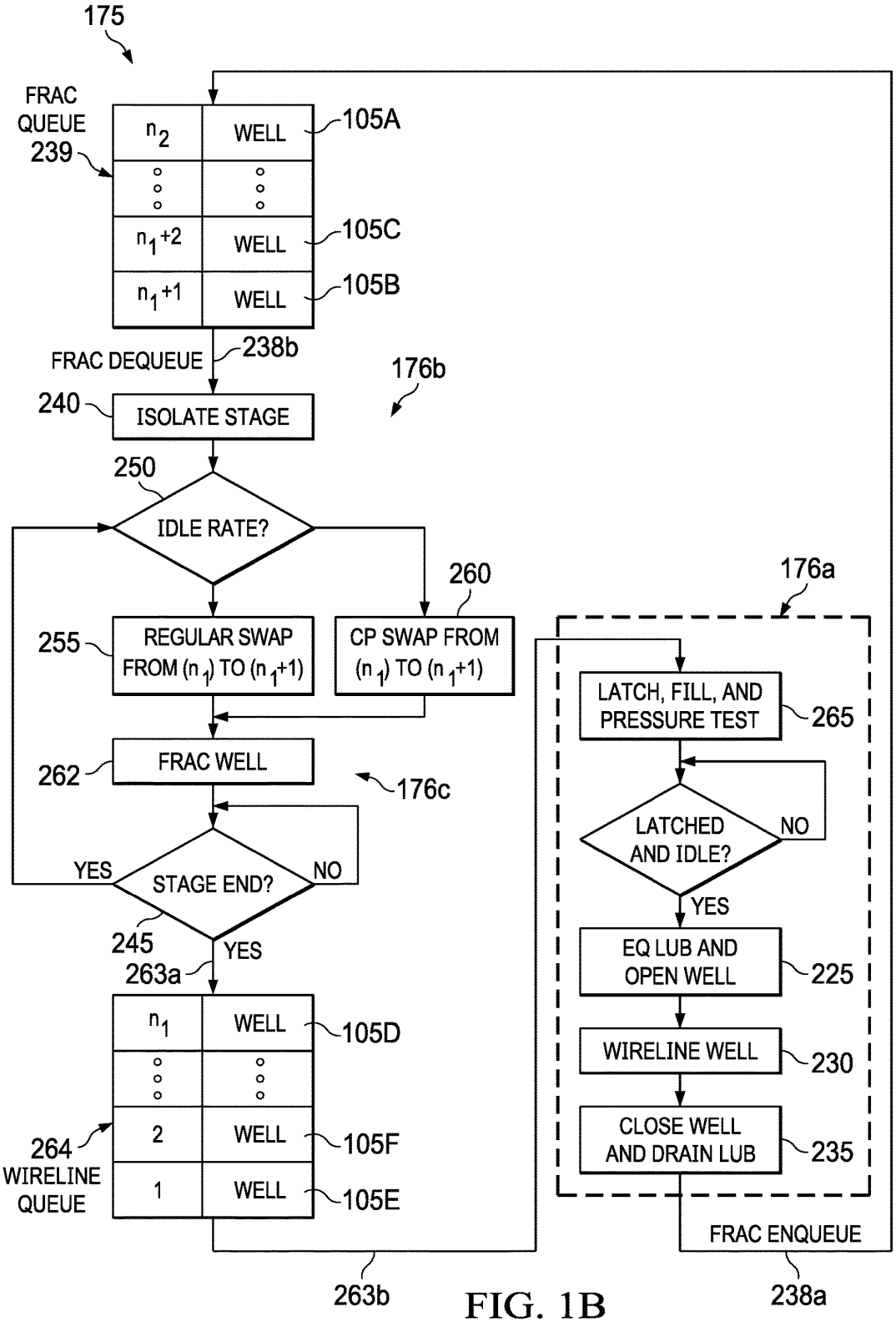

175
FRAC QUEUE 239
n_2 WELL 105A
n_1+2 WELL 105C
n_1+1 WELL 105B
FRAC DEQUEUE 238b
176b
240 ISOLATE STAGE
250 IDLE RATE?
260
176a
255 REGULAR SWAP FROM (n_1) TO (n_1+1)
CP SWAP FROM (n_1) TO (n_1+1)
LATCH, FILL, AND PRESSURE TEST 265
262 FRAC WELL
176c
LATCHED AND IDLE?
NO
YES
YES STAGE END? NO
245
YES
263a
EQ LUB AND OPEN WELL 225
WIRELINE WELL 230
CLOSE WELL AND DRAIN LUB 235
n_1 WELL 105D
2 WELL 105F
264 WIRELINE QUEUE
1 WELL 105E
FRAC ENQUEUE
263b
238a

FIG. 1B

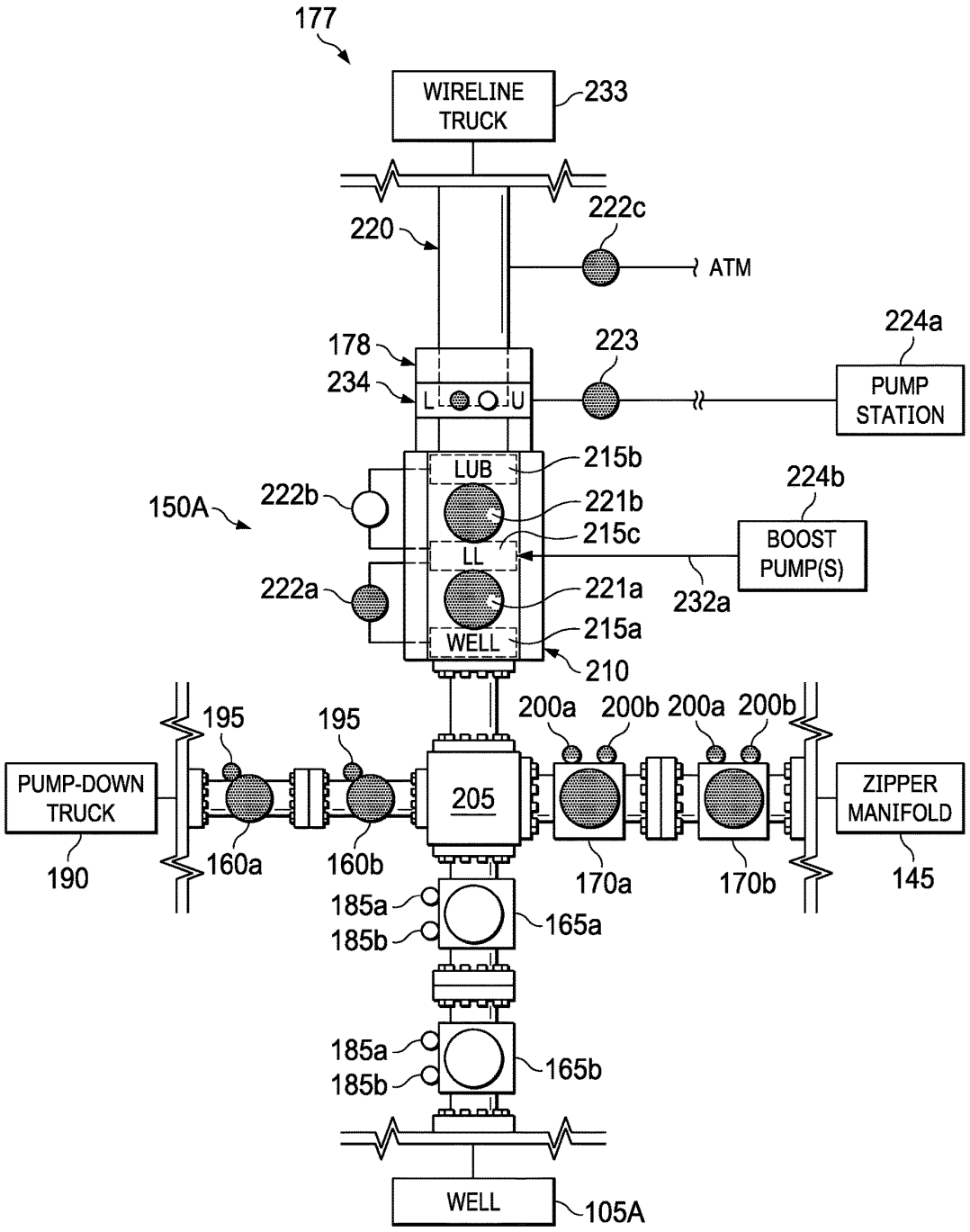

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WIRELINE TRUCK
233
220
222c
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
232a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2A

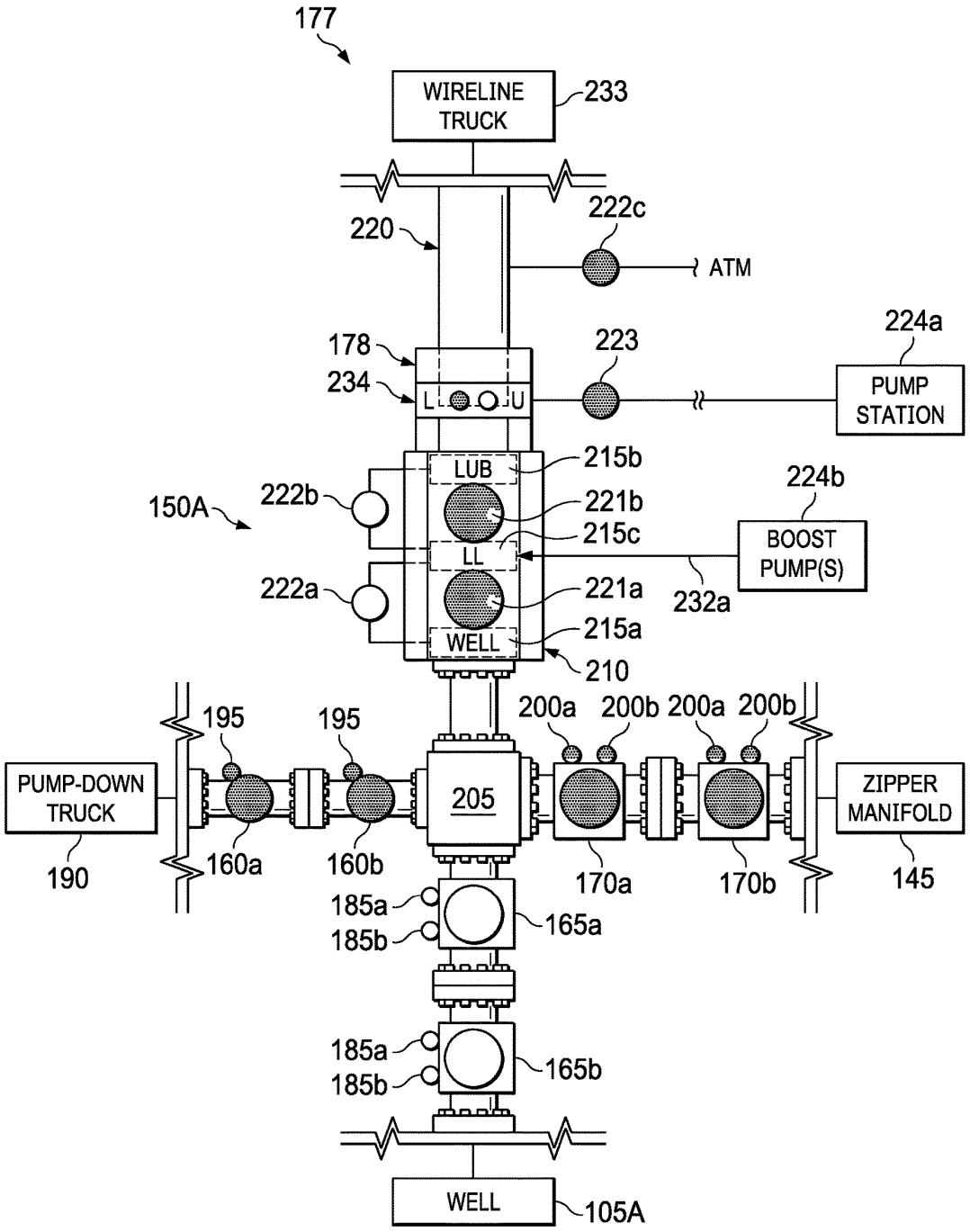

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ATM
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PUMP STATION
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LUB
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
232a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2B

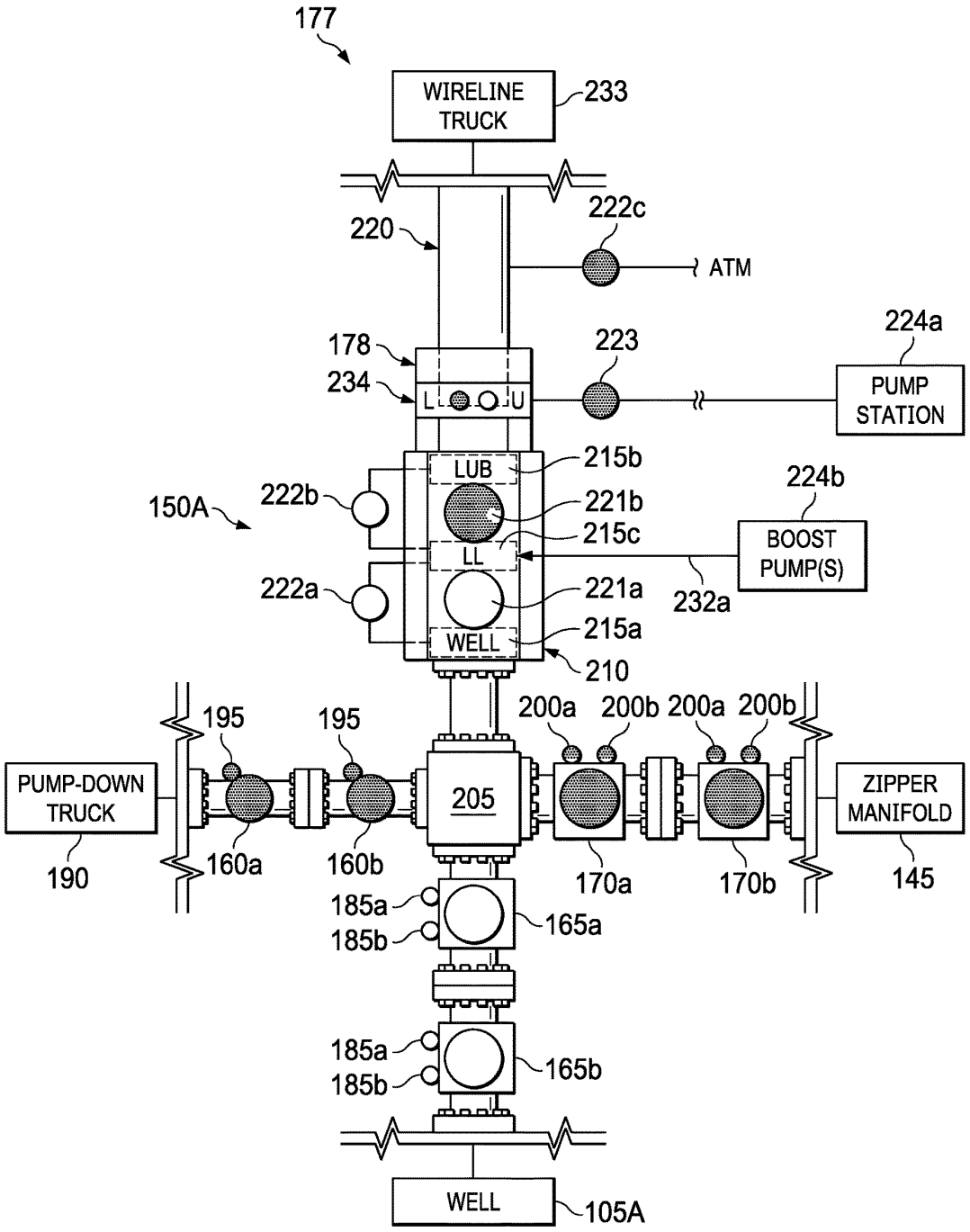

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WIRELINE TRUCK
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222c
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ATM
224a
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223
234
PUMP STATION
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LUB
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
232a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
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160a
160b
170a
170b
145
185a
165a
185b
185a
165b
185b
WELL
105A

FIG. 2C

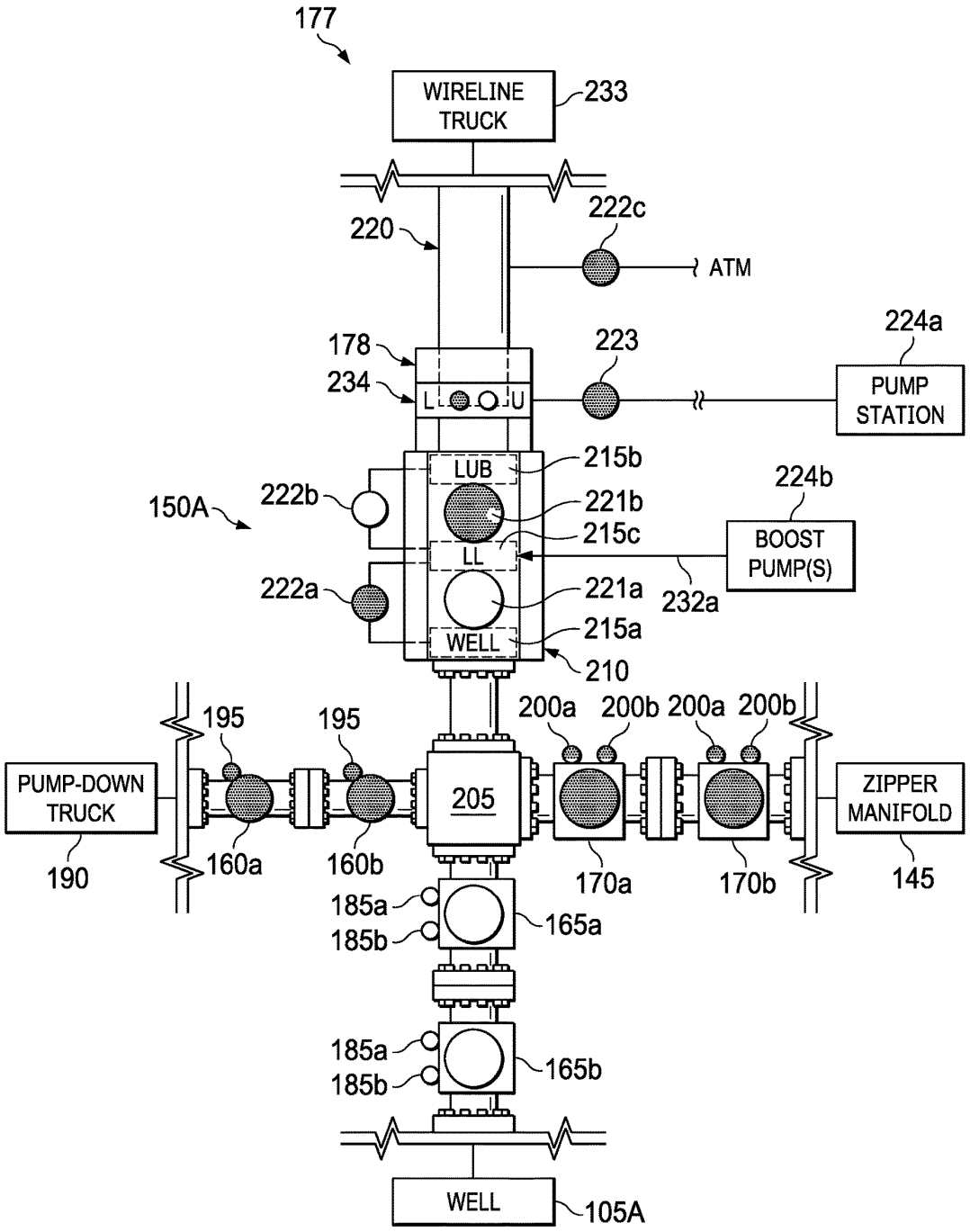

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222c
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ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150A
221b
215c
BOOST PUMP(S)
LL
222a
221a
232a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
165a
185b
185a
165b
185b
WELL
105A

FIG. 2D

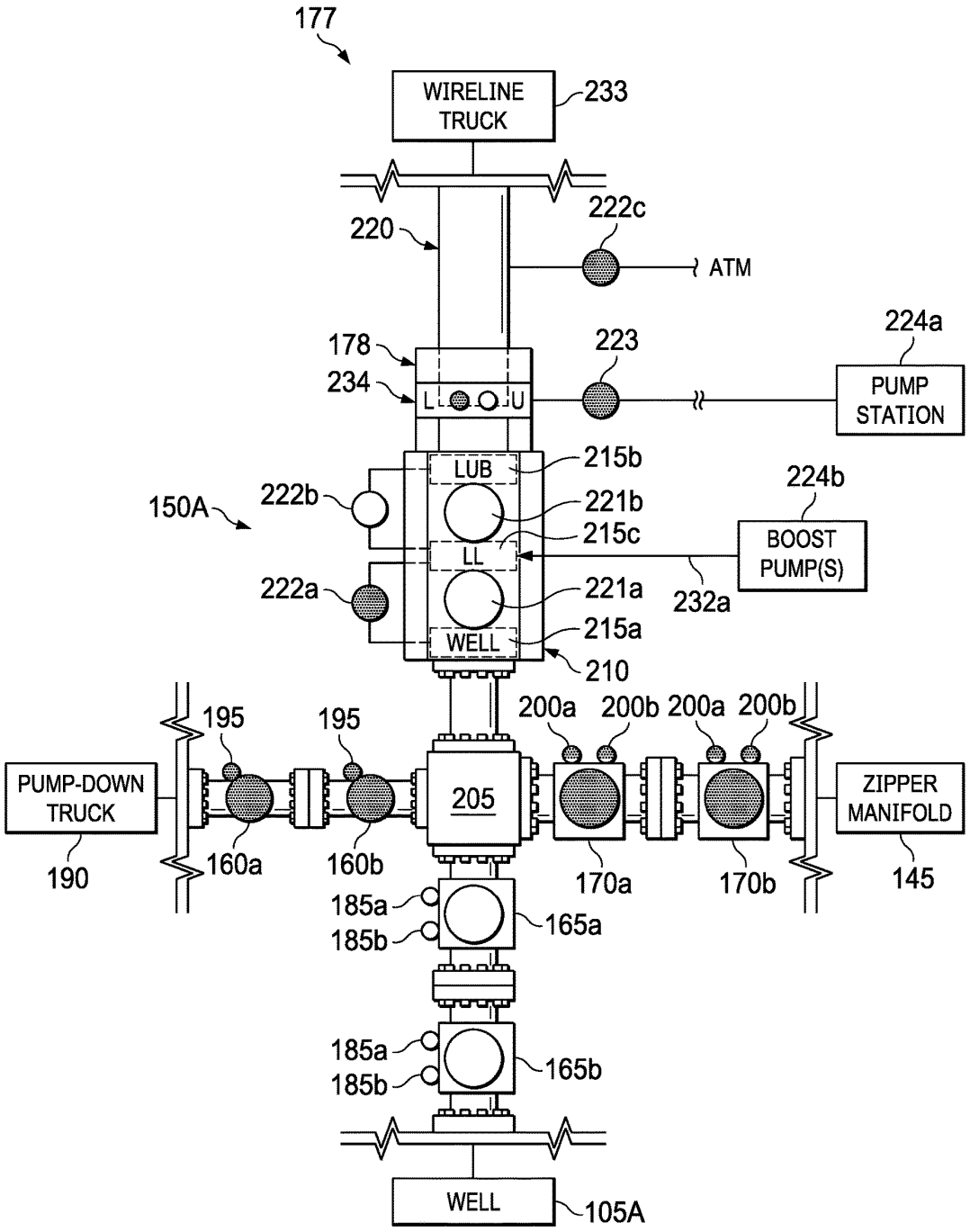

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WIRELINE TRUCK
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220
222c
ATM
178
234
223
224a
PUMP STATION
LUB
215b
150A
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
232a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2E

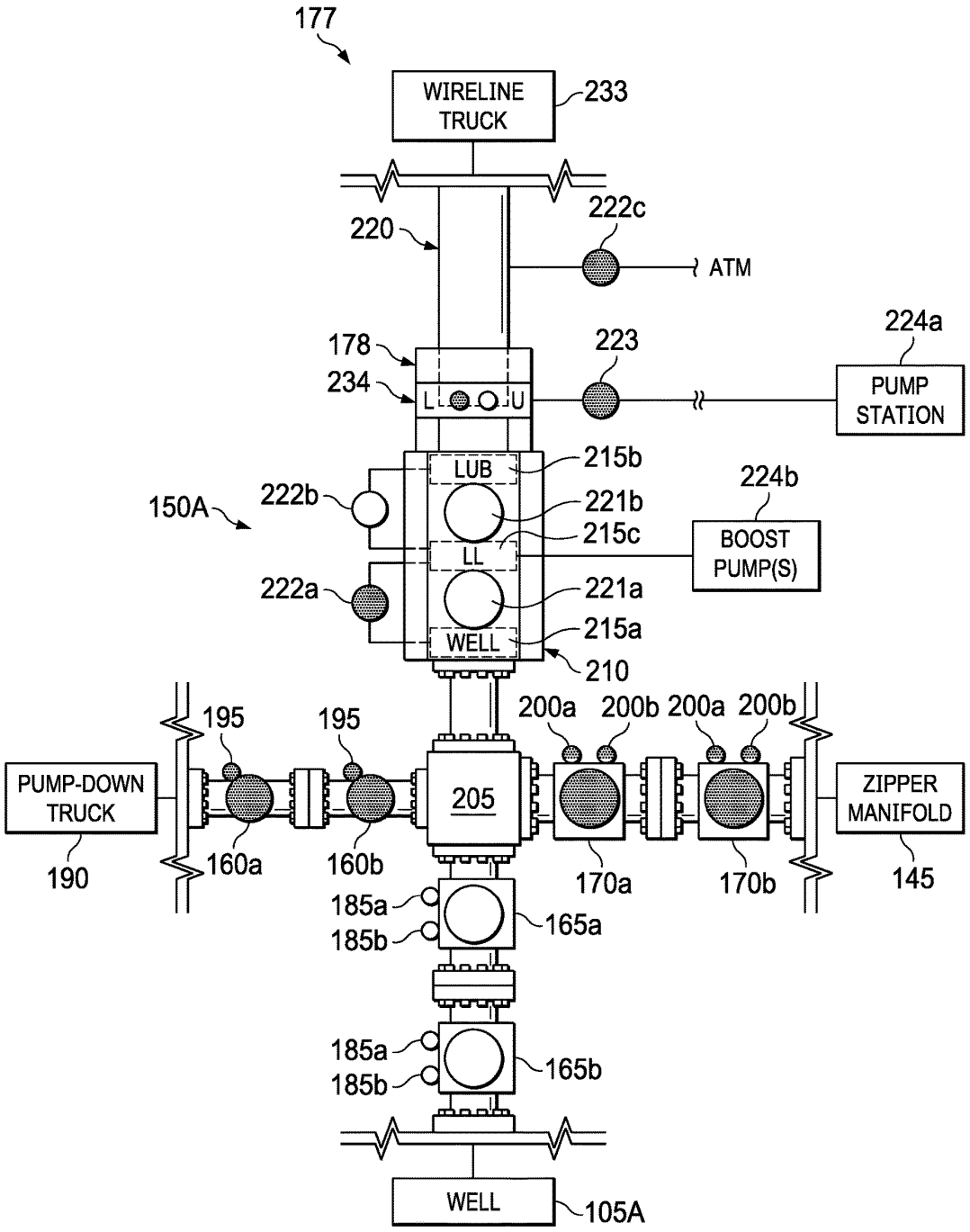

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WIRELINE TRUCK
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222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
221b
150A
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2F

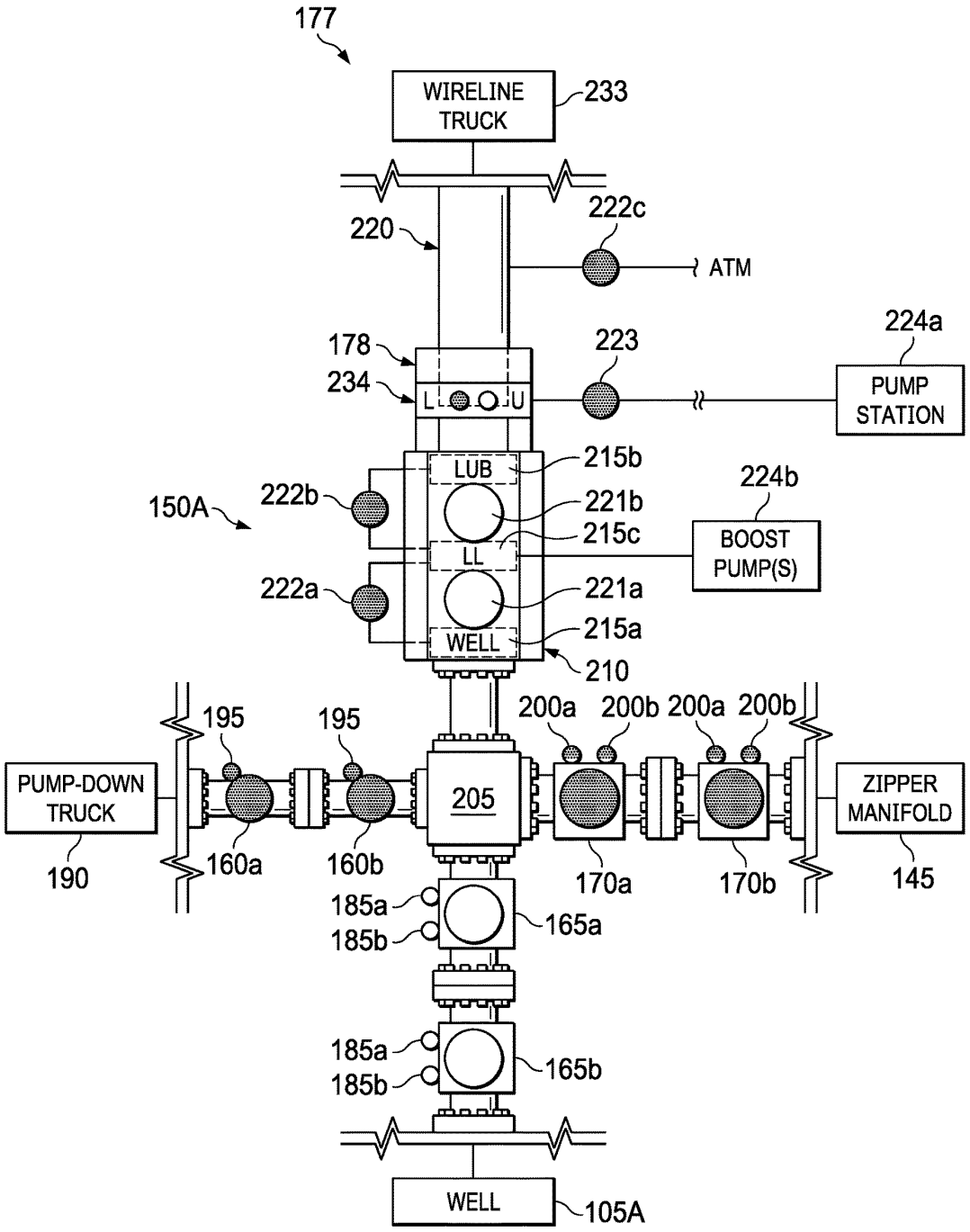

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WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150A
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2G

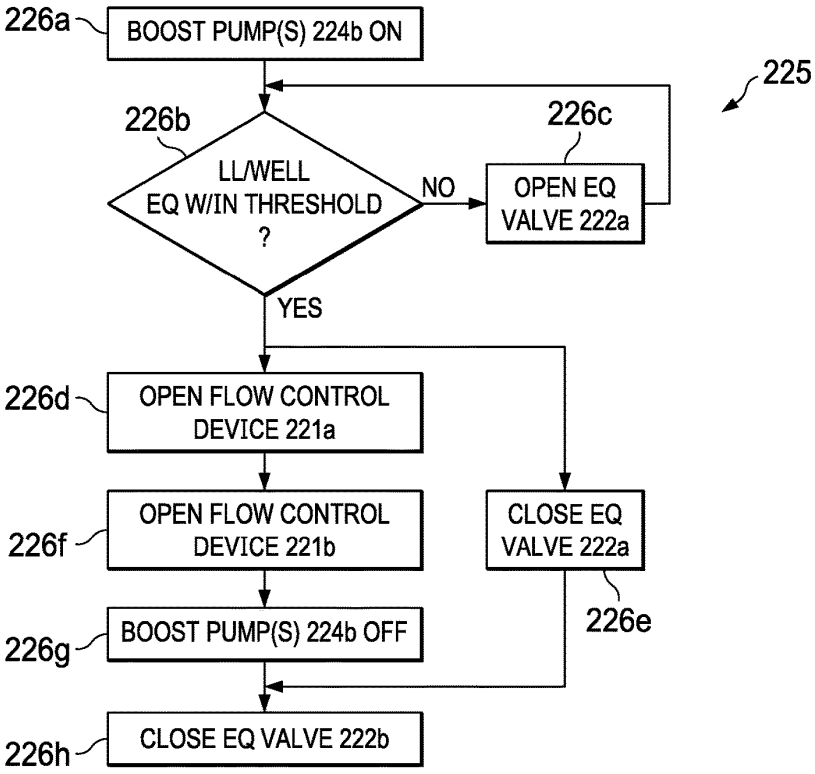

226a
BOOST PUMP(S) 224b ON
225
226b
LL/WELL EQ W/IN THRESHOLD ?
NO
226c
OPEN EQ VALVE 222a
YES
226d
OPEN FLOW CONTROL DEVICE 221a
226f
OPEN FLOW CONTROL DEVICE 221b
CLOSE EQ VALVE 222a
226e
226g
BOOST PUMP(S) 224b OFF
226h
CLOSE EQ VALVE 222b

FIG. 3

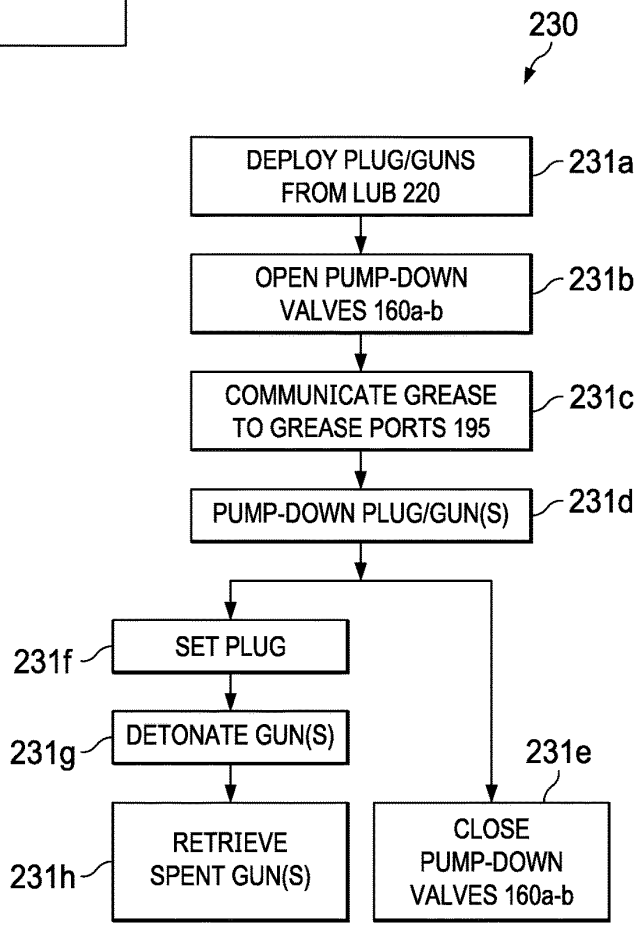

230
DEPLOY PLUG/GUNS FROM LUB 220
231a
OPEN PUMP-DOWN VALVES 160a-b
231b
COMMUNICATE GREASE TO GREASE PORTS 195
231c
PUMP-DOWN PLUG/GUN(S)
231d
231f
SET PLUG
231g
DETONATE GUN(S)
231e
231h
RETRIEVE SPENT GUN(S)
CLOSE PUMP-DOWN VALVES 160a-b

FIG. 4

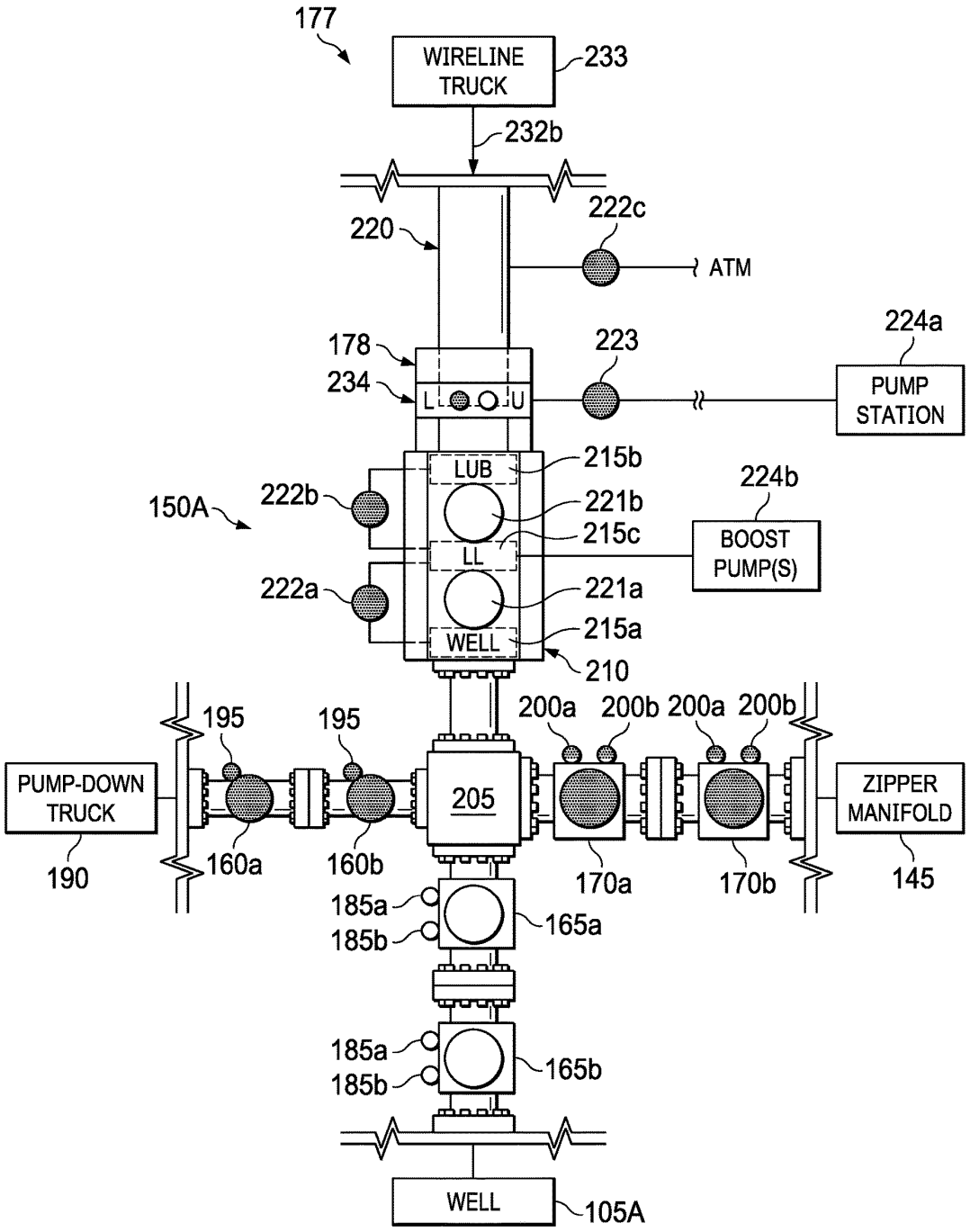

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WIRELINE TRUCK
233
232b
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150A
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 5A

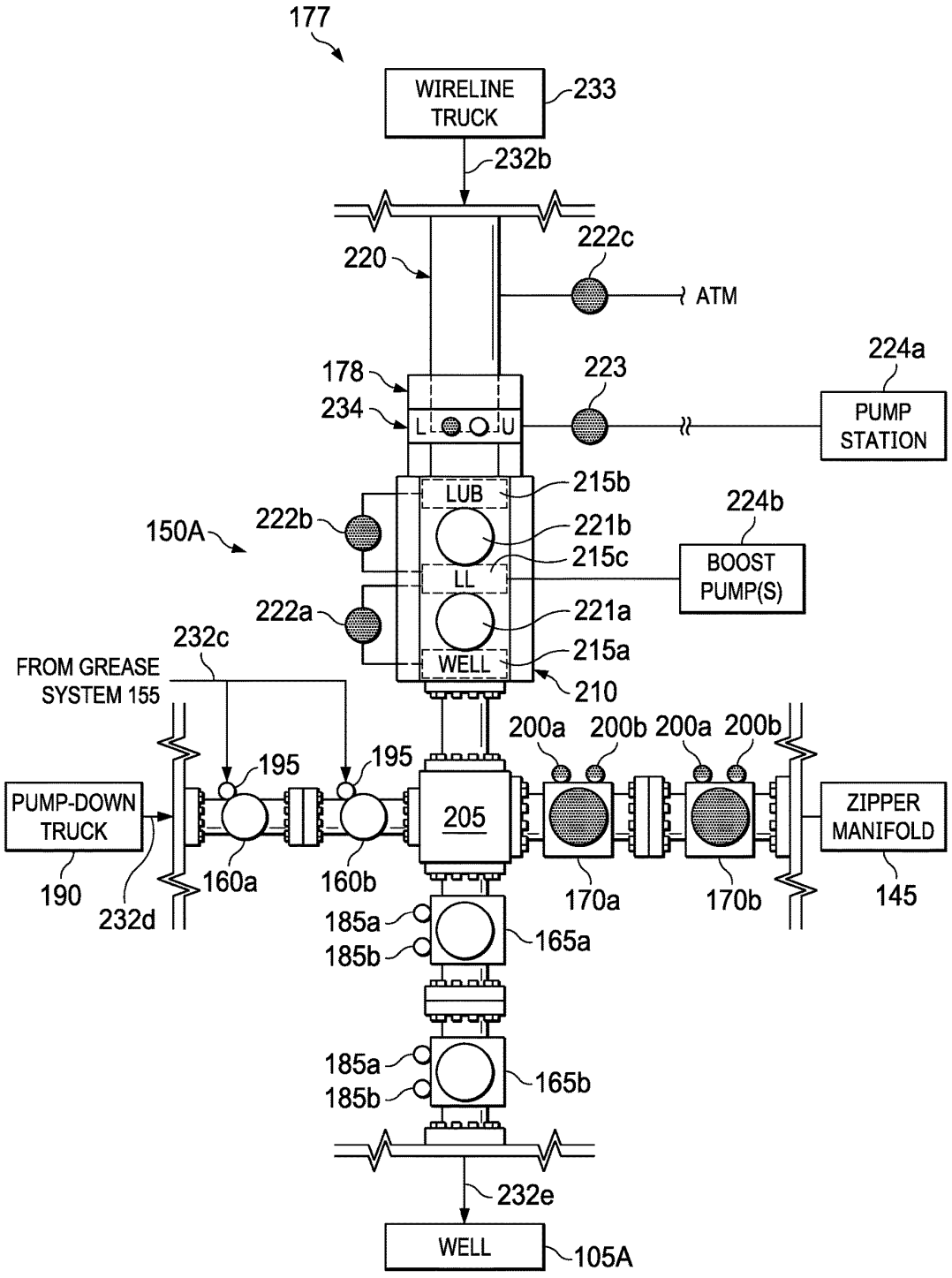

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WIRELINE TRUCK
233
232b
222c
220
ATM
224a
178
223
234
PUMP STATION
LUB
215b
224b
222b
221b
150A
215c
BOOST PUMP(S)
LL
222a
221a
232c
215a
FROM GREASE SYSTEM 155
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232d
185a
165a
185b
185a
165b
185b
232e
WELL
105A

FIG. 5B

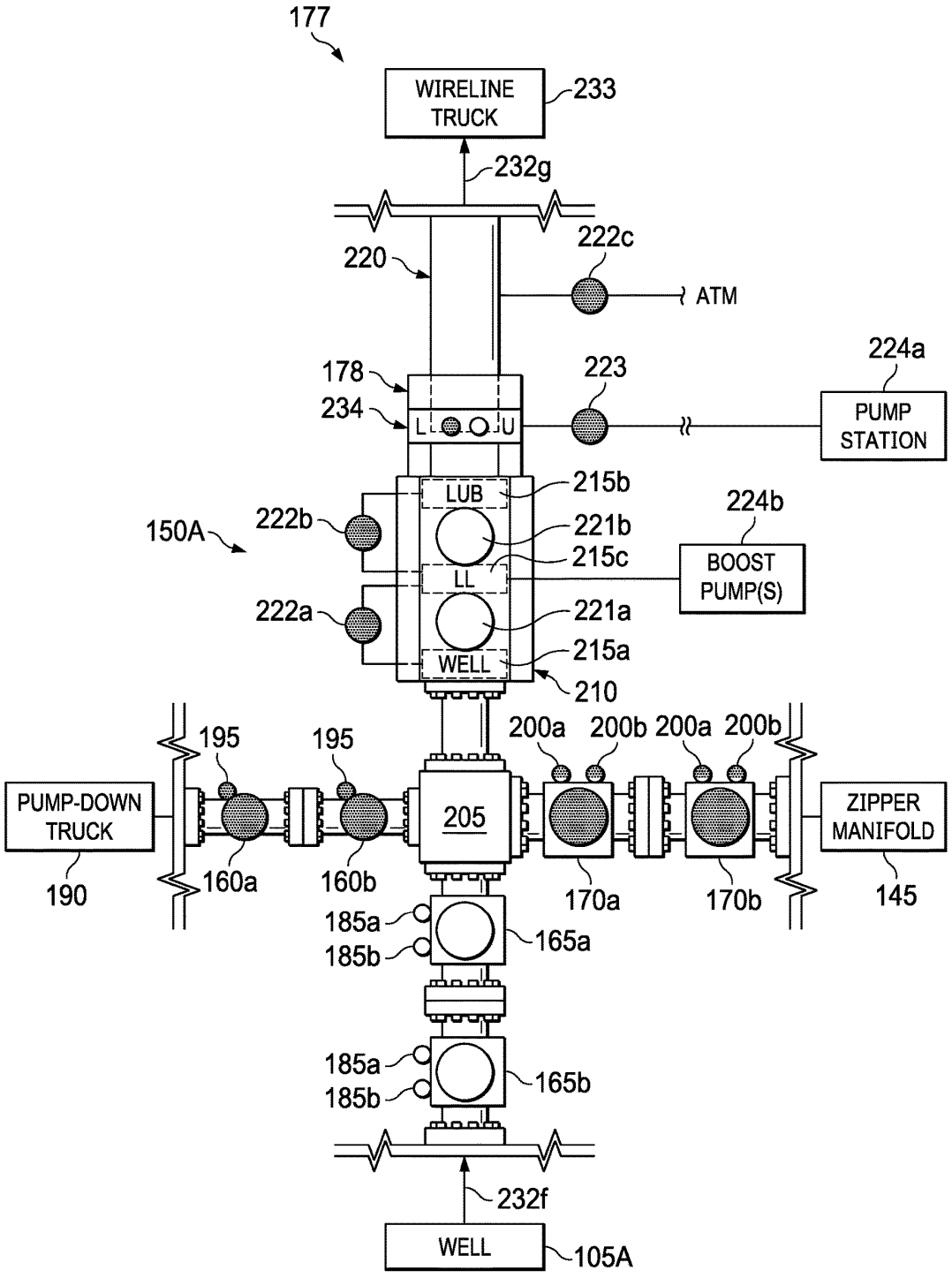

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WIRELINE TRUCK
233
232g
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
232f
WELL
105A

FIG. 5C

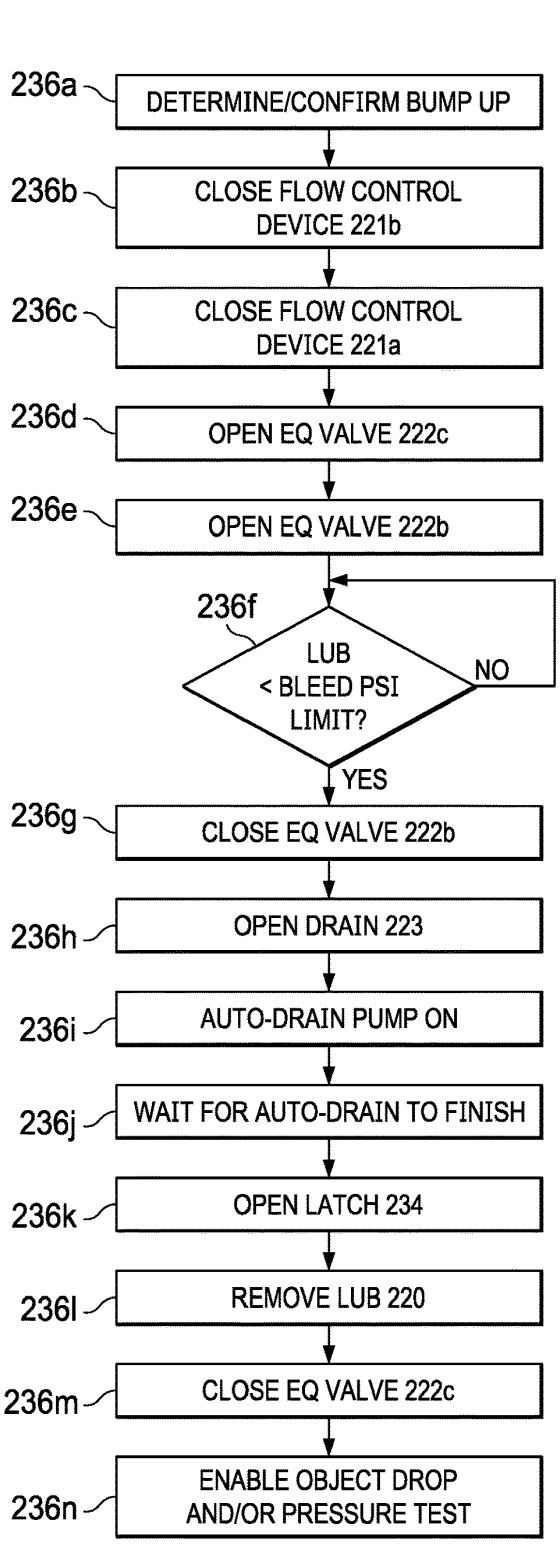

235
236a
DETERMINE/CONFIRM BUMP UP
236b
CLOSE FLOW CONTROL DEVICE 221b
236c
CLOSE FLOW CONTROL DEVICE 221a
236d
OPEN EQ VALVE 222c
236e
OPEN EQ VALVE 222b
236f
LUB < BLEED PSI LIMIT?
NO
YES
236g
CLOSE EQ VALVE 222b
236h
OPEN DRAIN 223
236i
AUTO-DRAIN PUMP ON
236j
WAIT FOR AUTO-DRAIN TO FINISH
236k
OPEN LATCH 234
236l
REMOVE LUB 220
236m
CLOSE EQ VALVE 222c
236n
ENABLE OBJECT DROP AND/OR PRESSURE TEST

FIG. 6

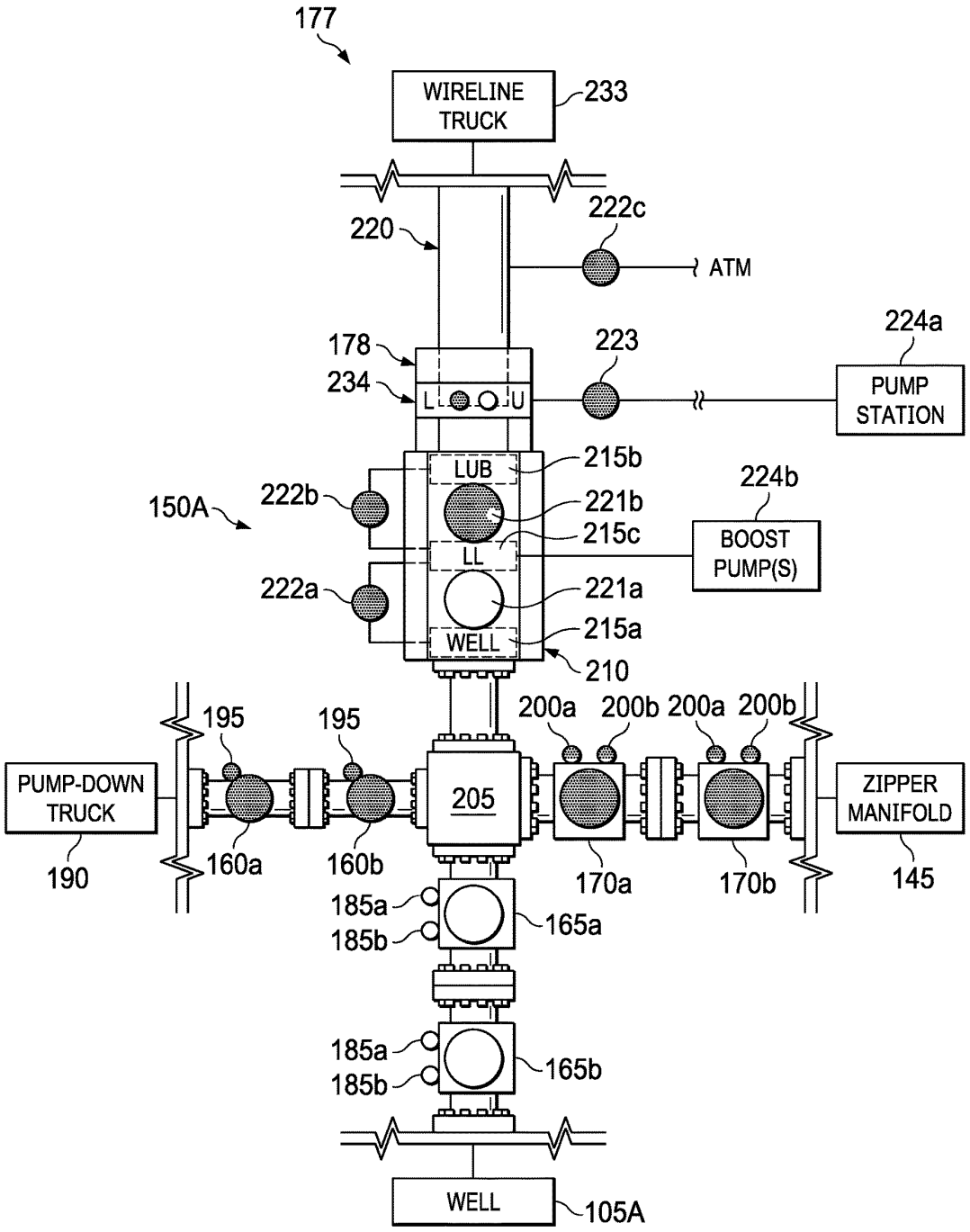

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WIRELINE TRUCK
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220
222c
ATM
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178
223
234
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7A

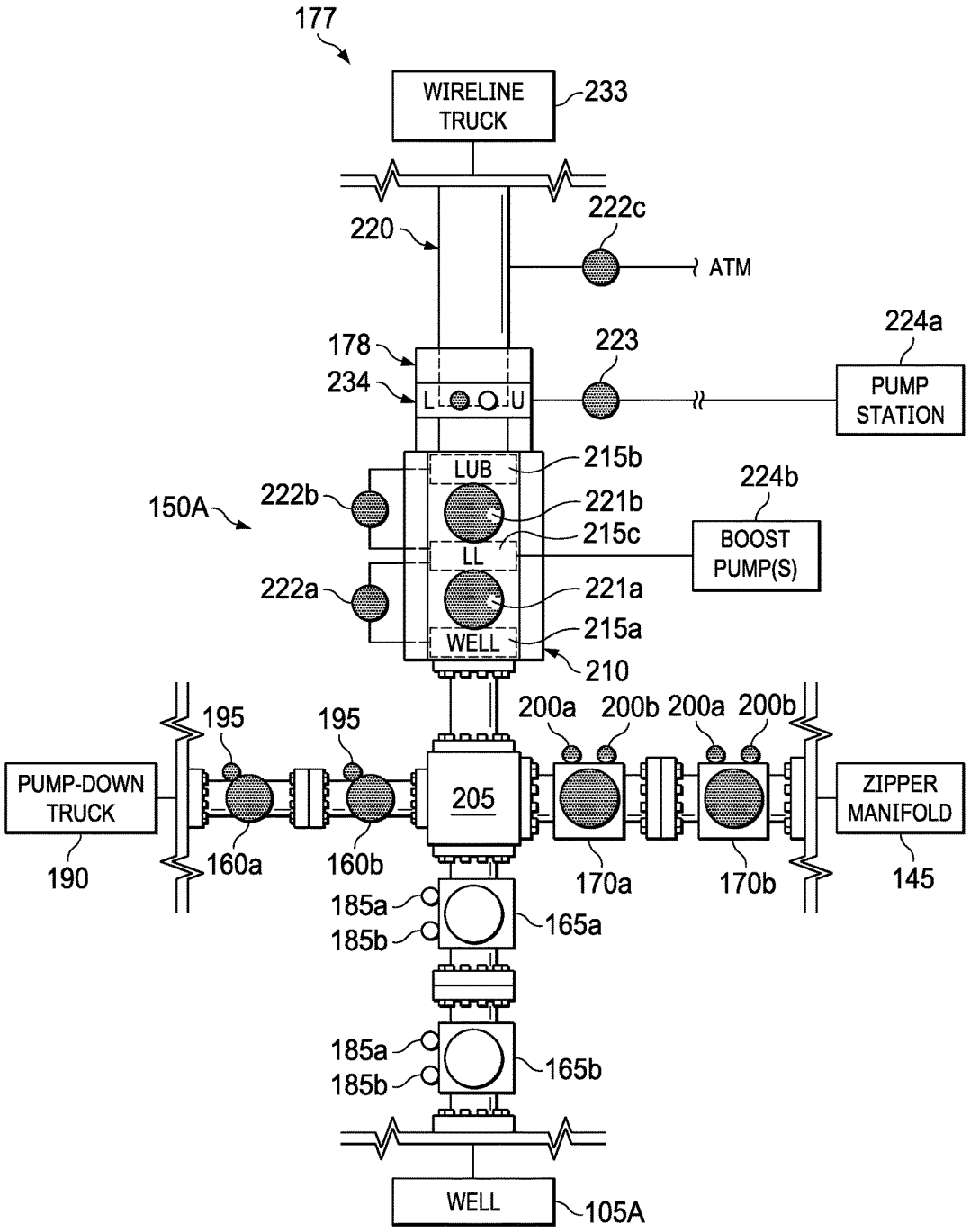

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LUB
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221b
150A
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7B

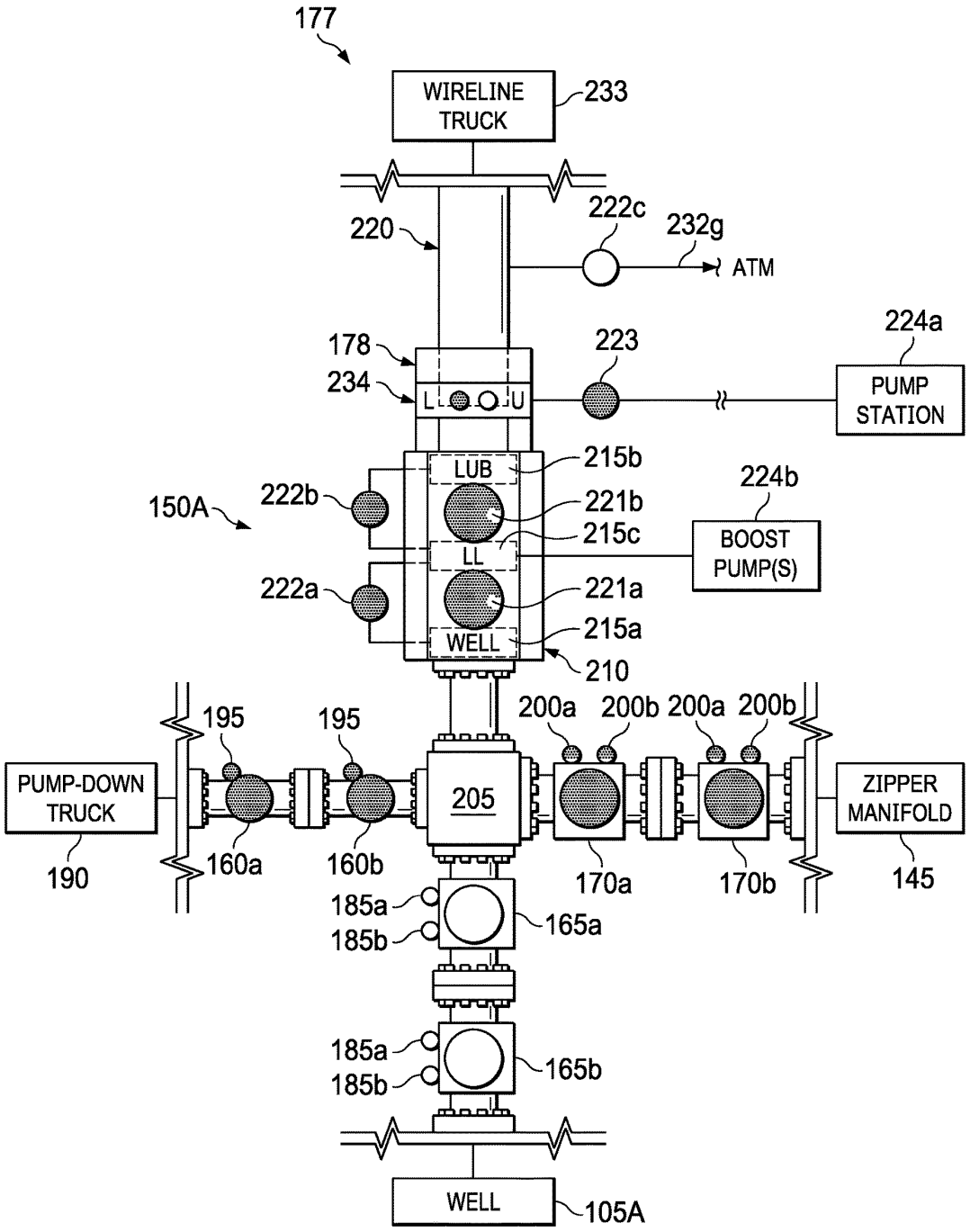

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PUMP STATION
LUB
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150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7C

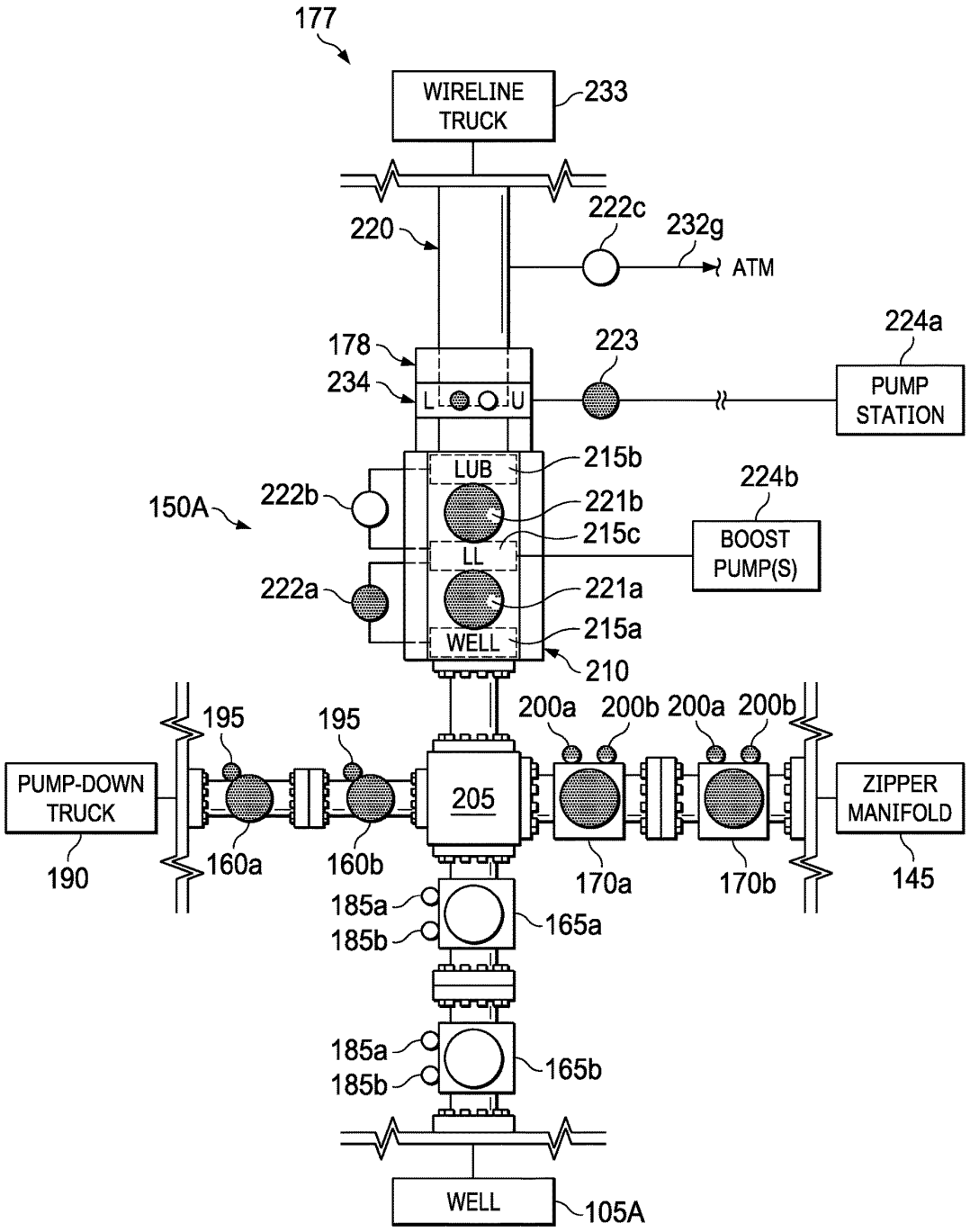

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221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
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WELL
105A

FIG. 7D

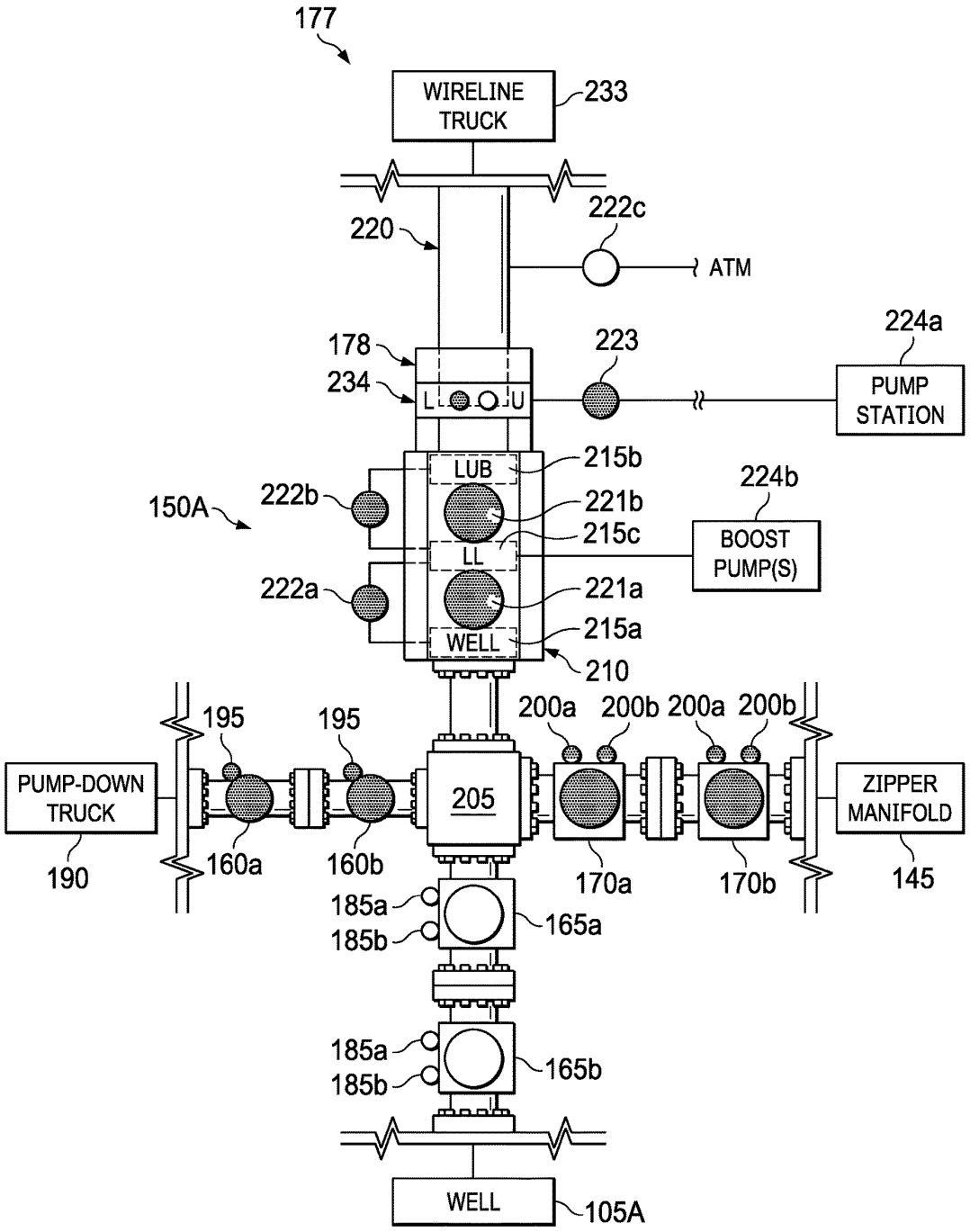

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LUB
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221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
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165b
WELL
105A

FIG. 7E

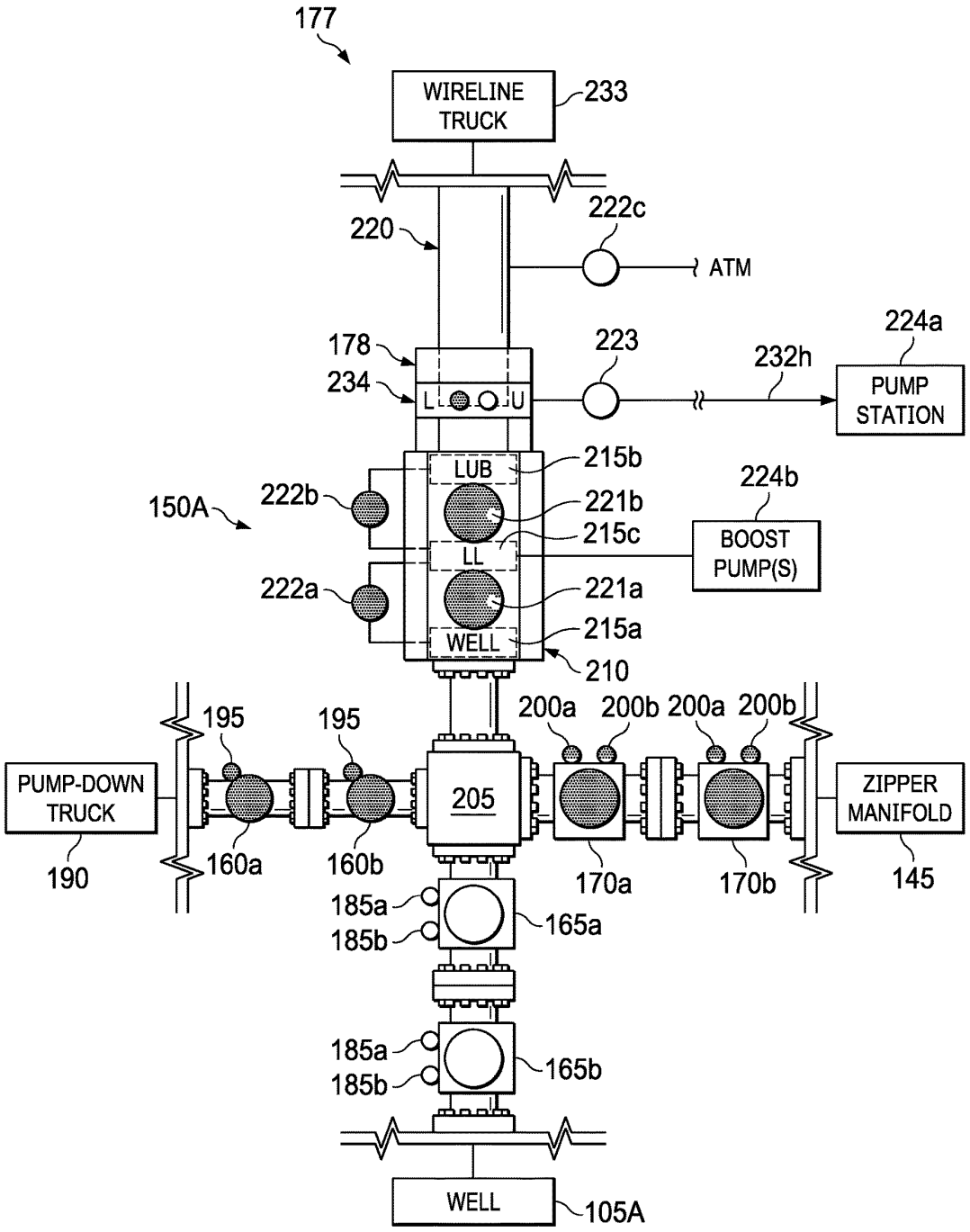

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WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
232h
234
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7F

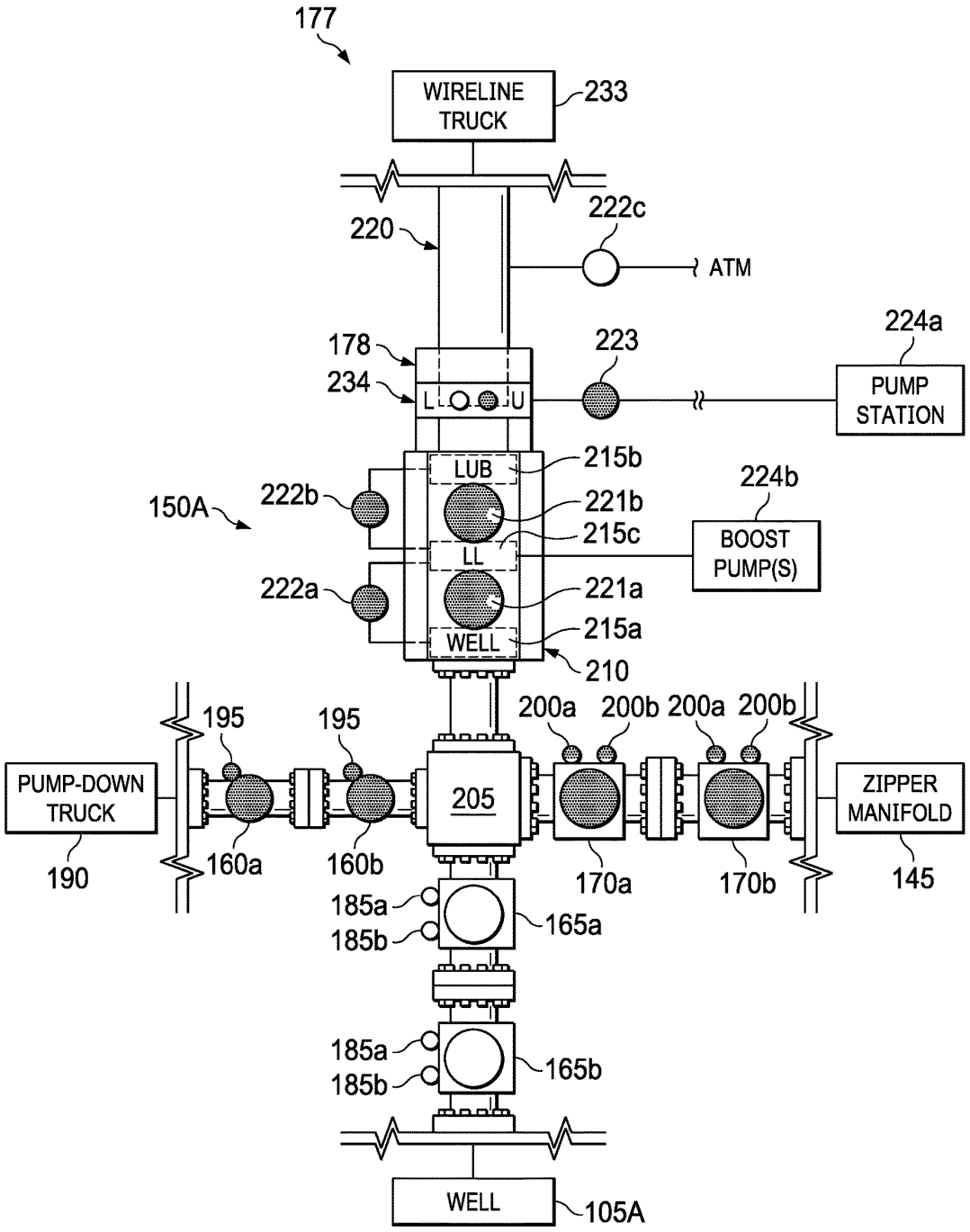

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150A
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7G

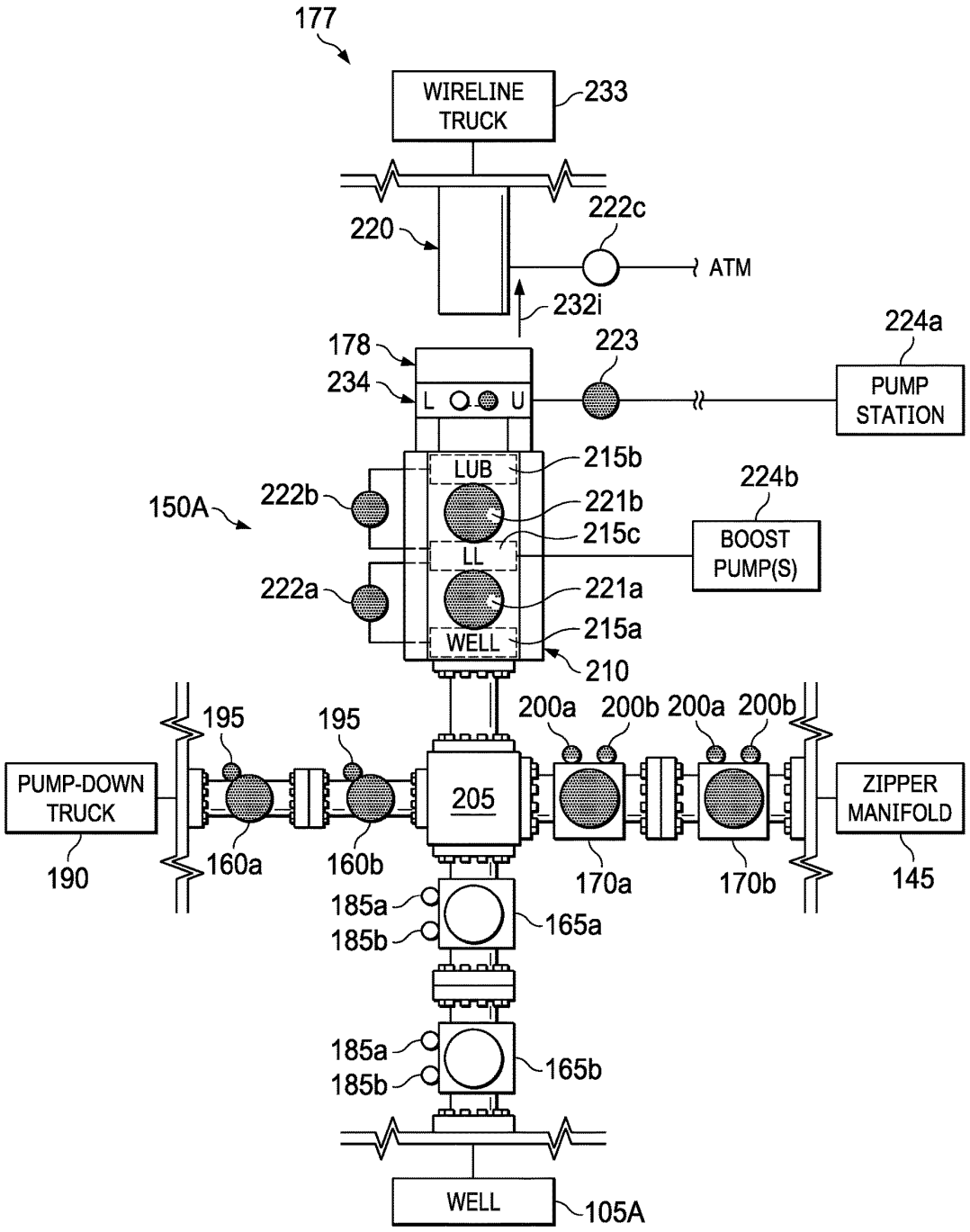

177
WIRELINE TRUCK
233
220
222c
ATM
232i
178
234
223
224a
PUMP STATION
L
U
LUB
215b
150A
222b
221b
224b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7H

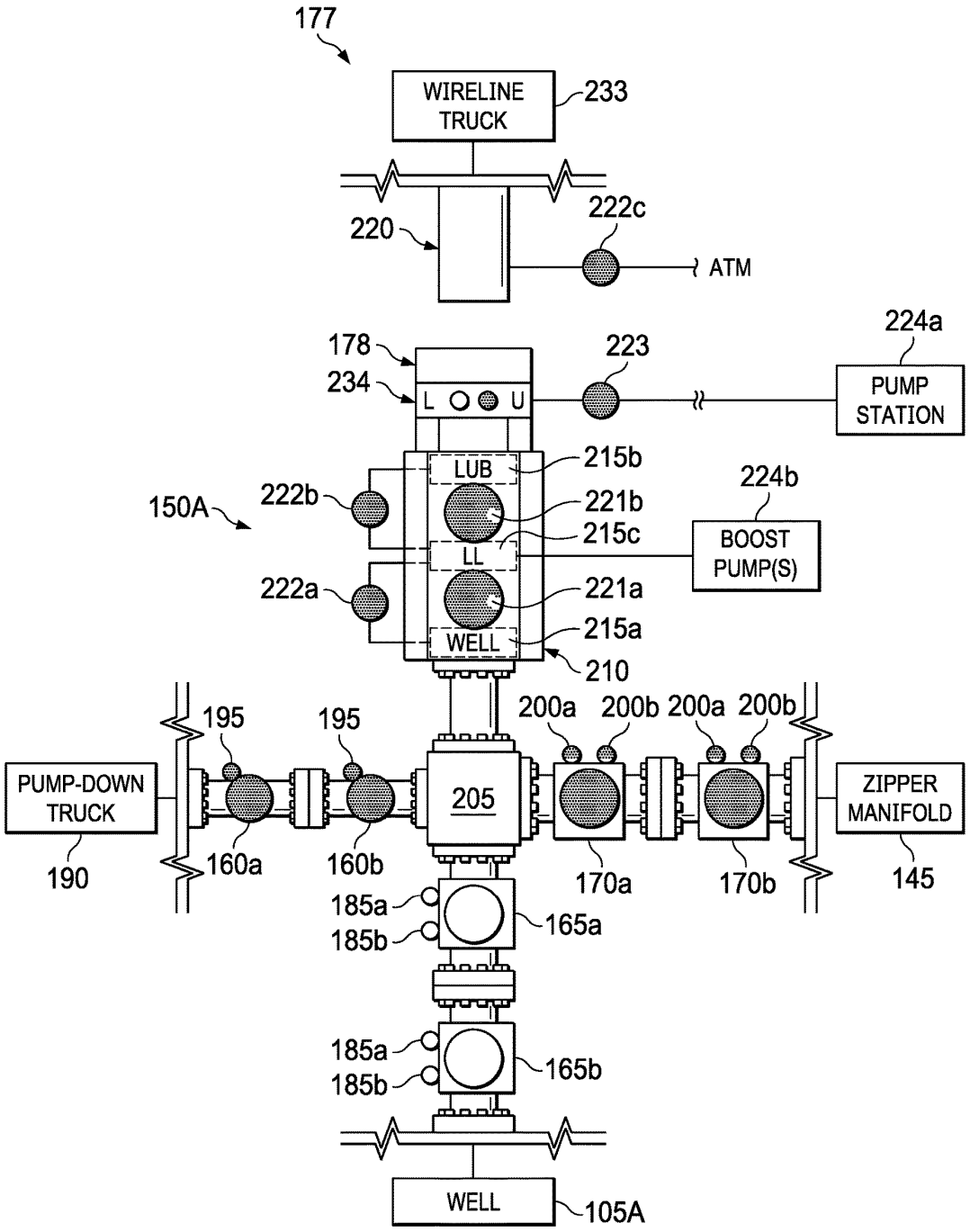

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7I

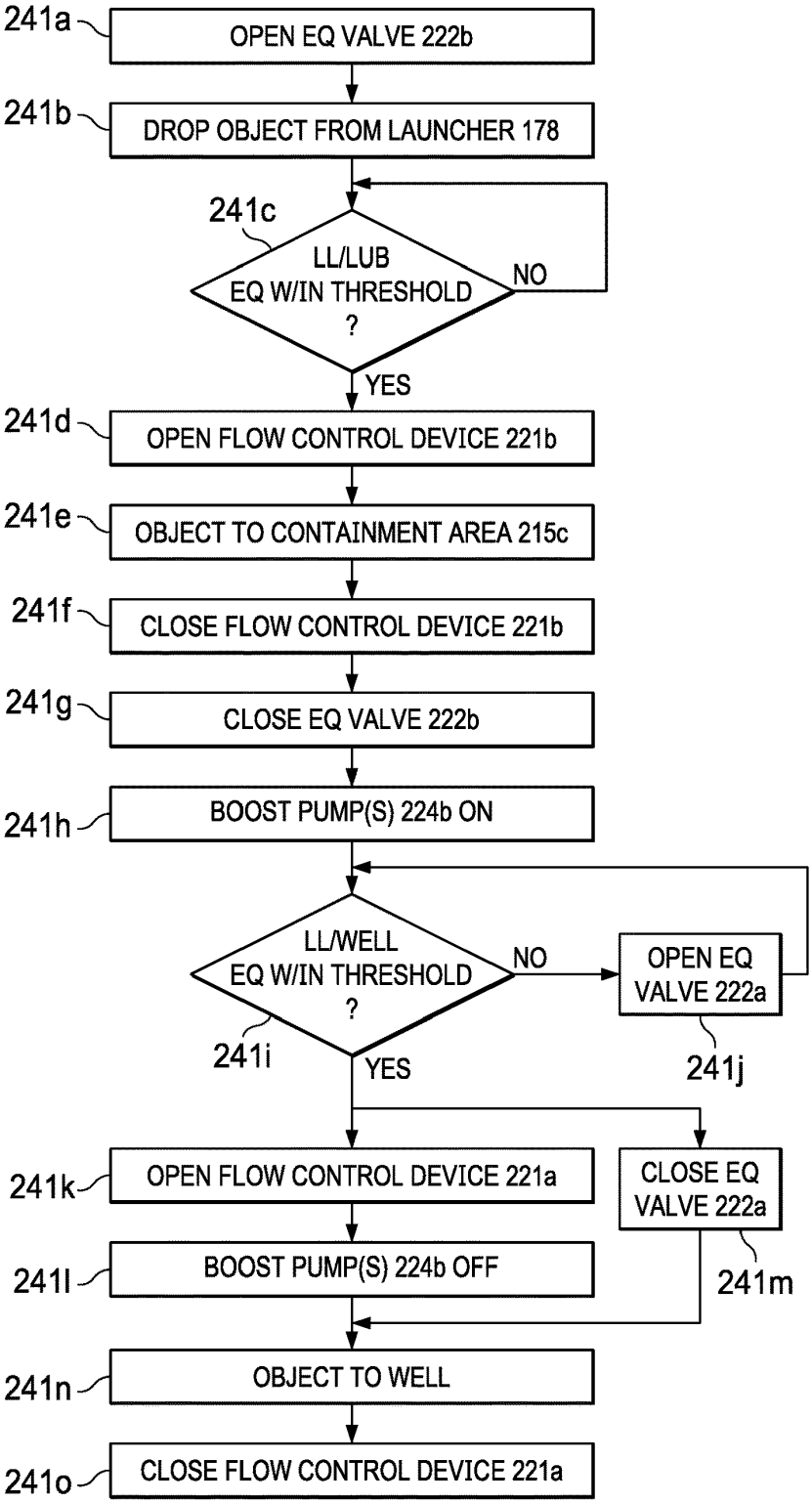

241a
OPEN EQ VALVE 222b
241b
DROP OBJECT FROM LAUNCHER 178
241c
LL/LUB EQ W/IN THRESHOLD ?
NO
YES
241d
OPEN FLOW CONTROL DEVICE 221b
241e
OBJECT TO CONTAINMENT AREA 215c
241f
CLOSE FLOW CONTROL DEVICE 221b
241g
CLOSE EQ VALVE 222b
241h
BOOST PUMP(S) 224b ON
LL/WELL EQ W/IN THRESHOLD ?
NO
OPEN EQ VALVE 222a
241i
YES
241j
241k
OPEN FLOW CONTROL DEVICE 221a
CLOSE EQ VALVE 222a
241l
BOOST PUMP(S) 224b OFF
241m
241n
OBJECT TO WELL
241o
CLOSE FLOW CONTROL DEVICE 221a

FIG. 8

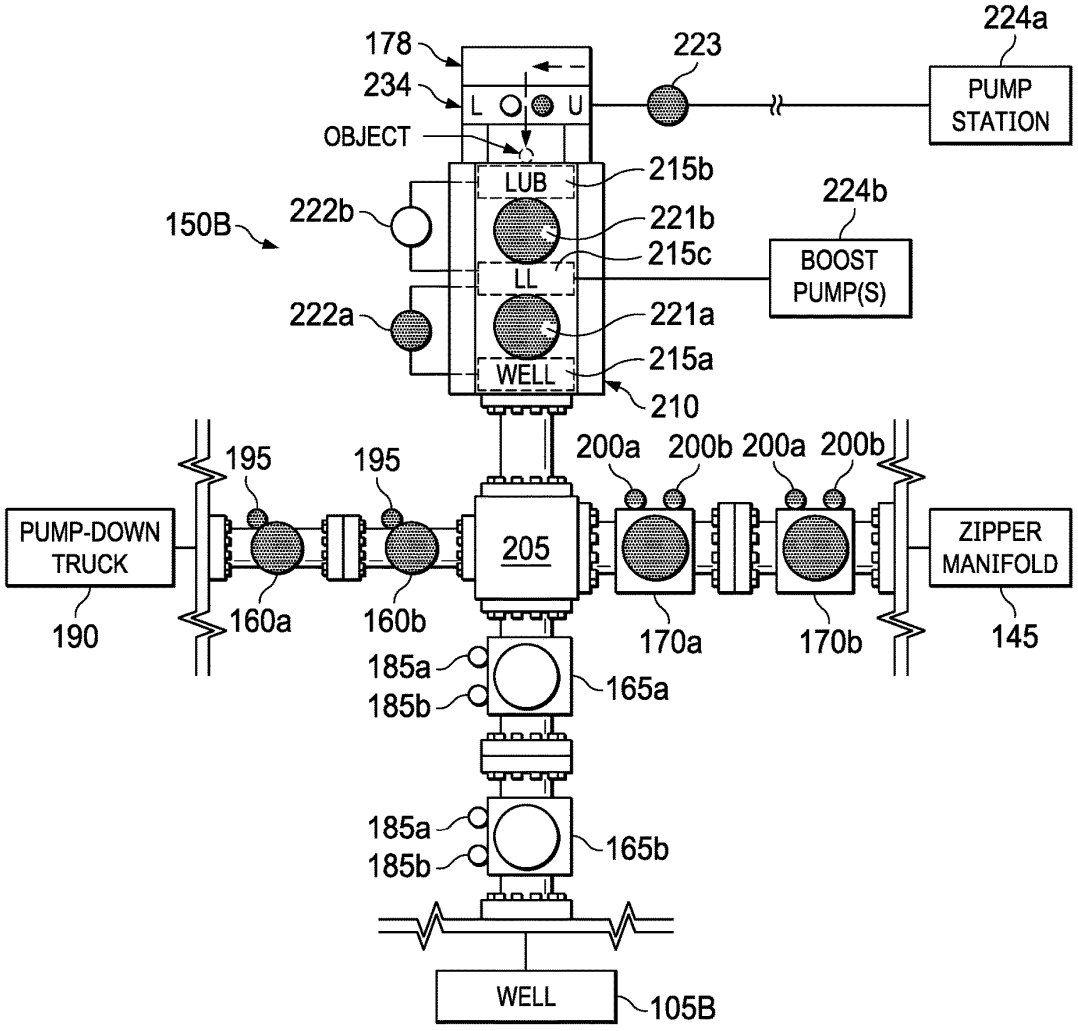

178
234
L
U
OBJECT
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9A

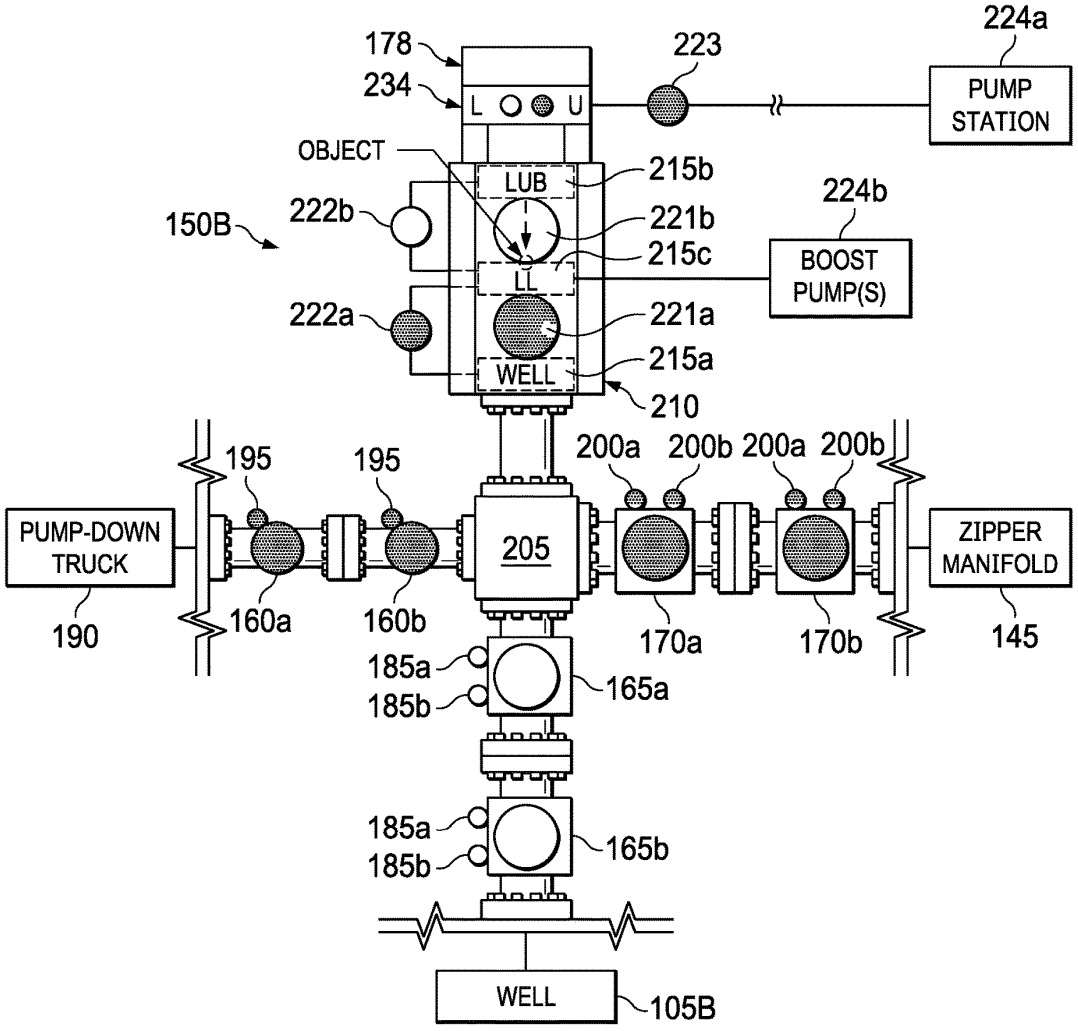

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9B

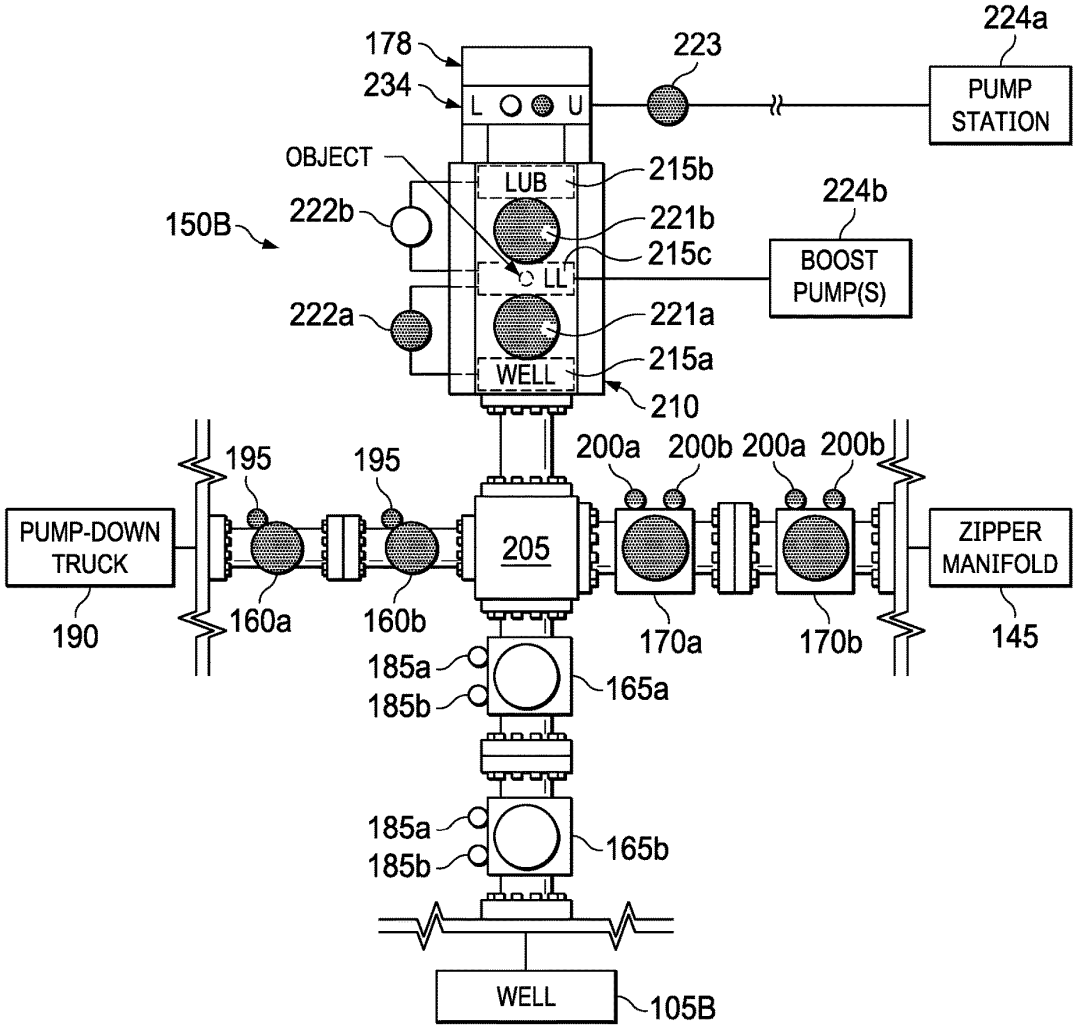

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9C

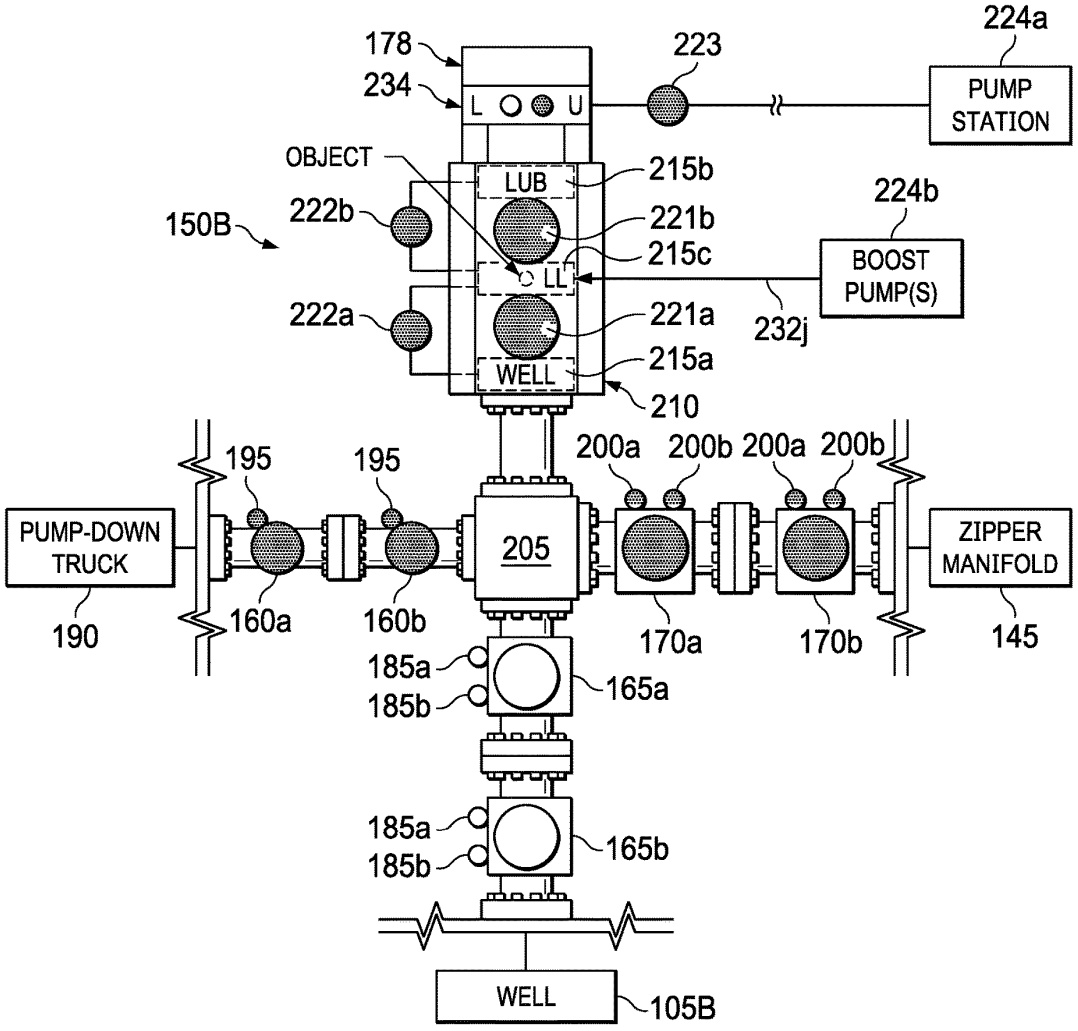

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
232j
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9D

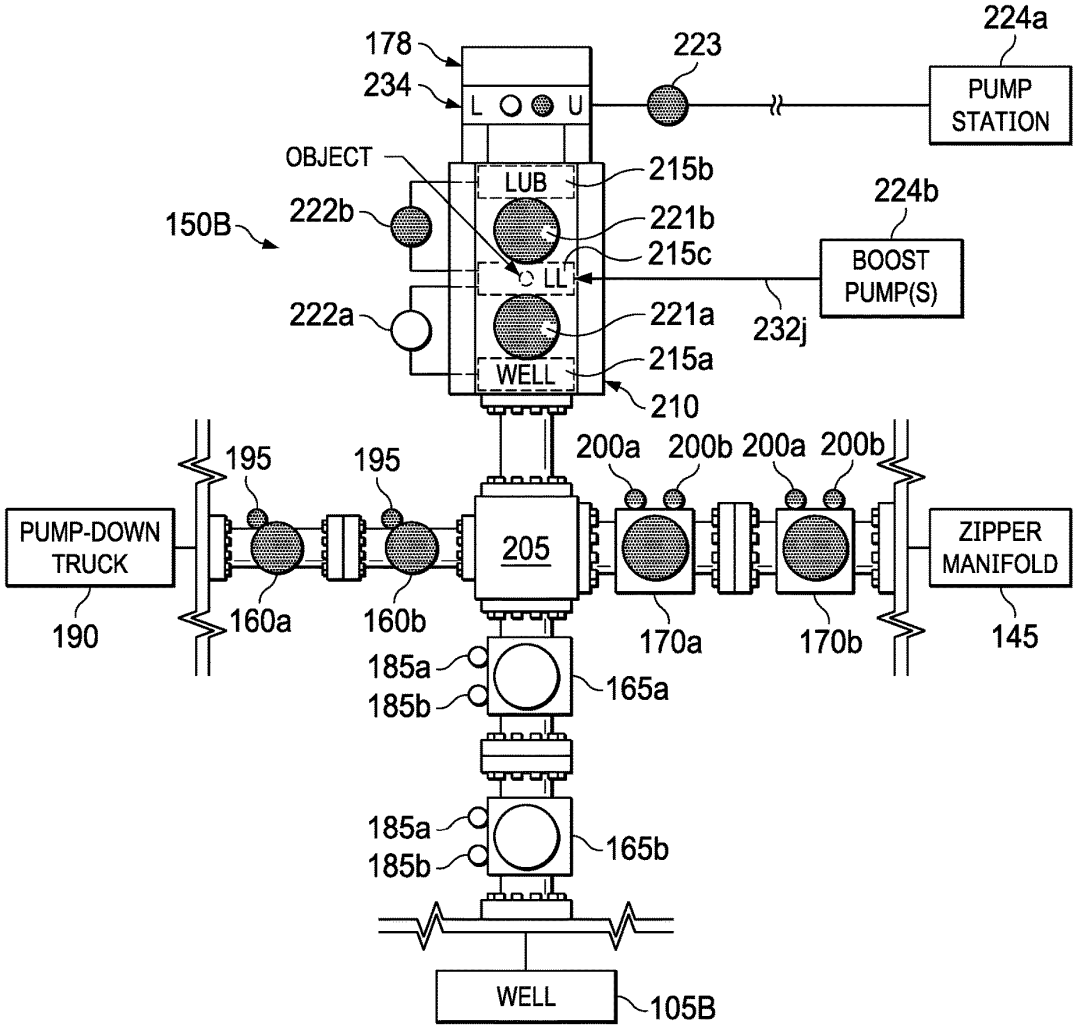

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
232j
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9E

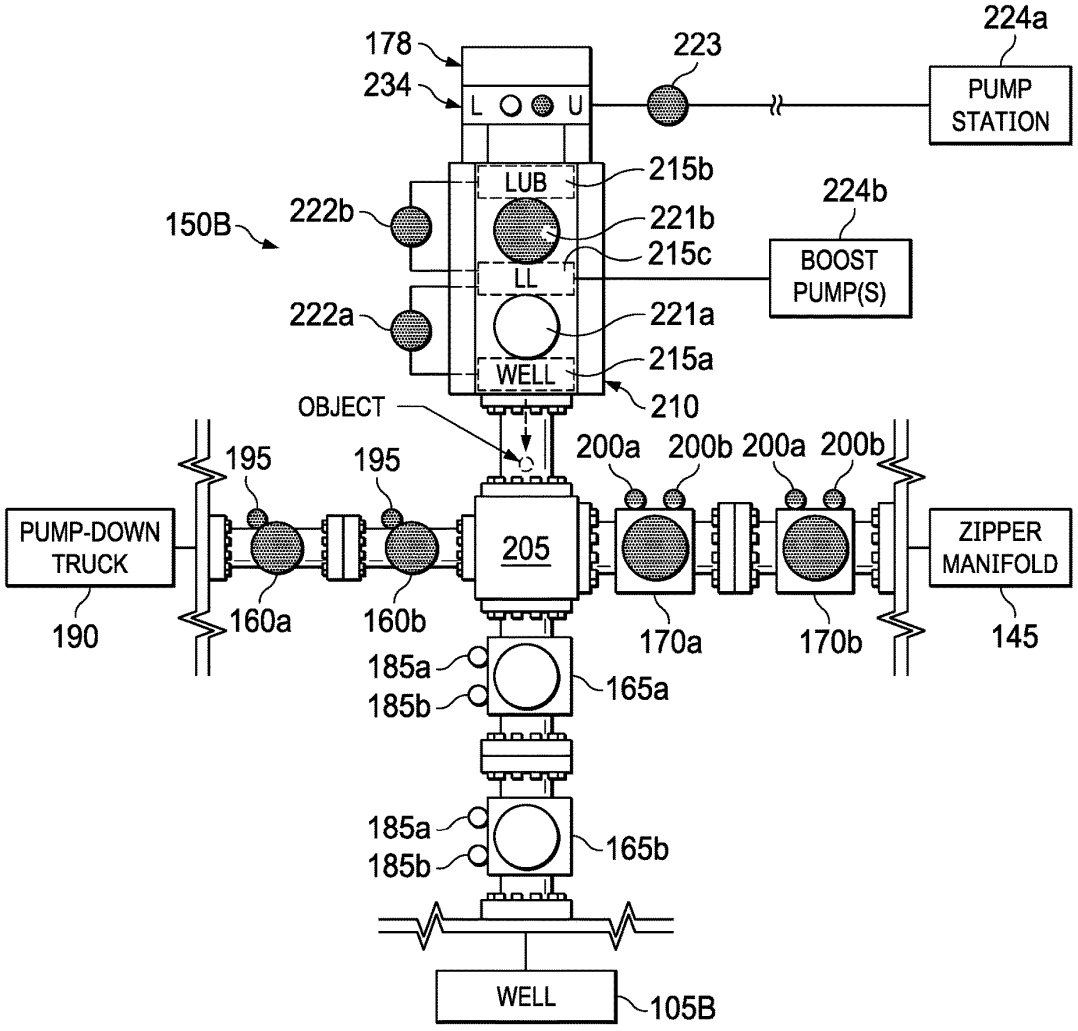

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
OBJECT
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9F

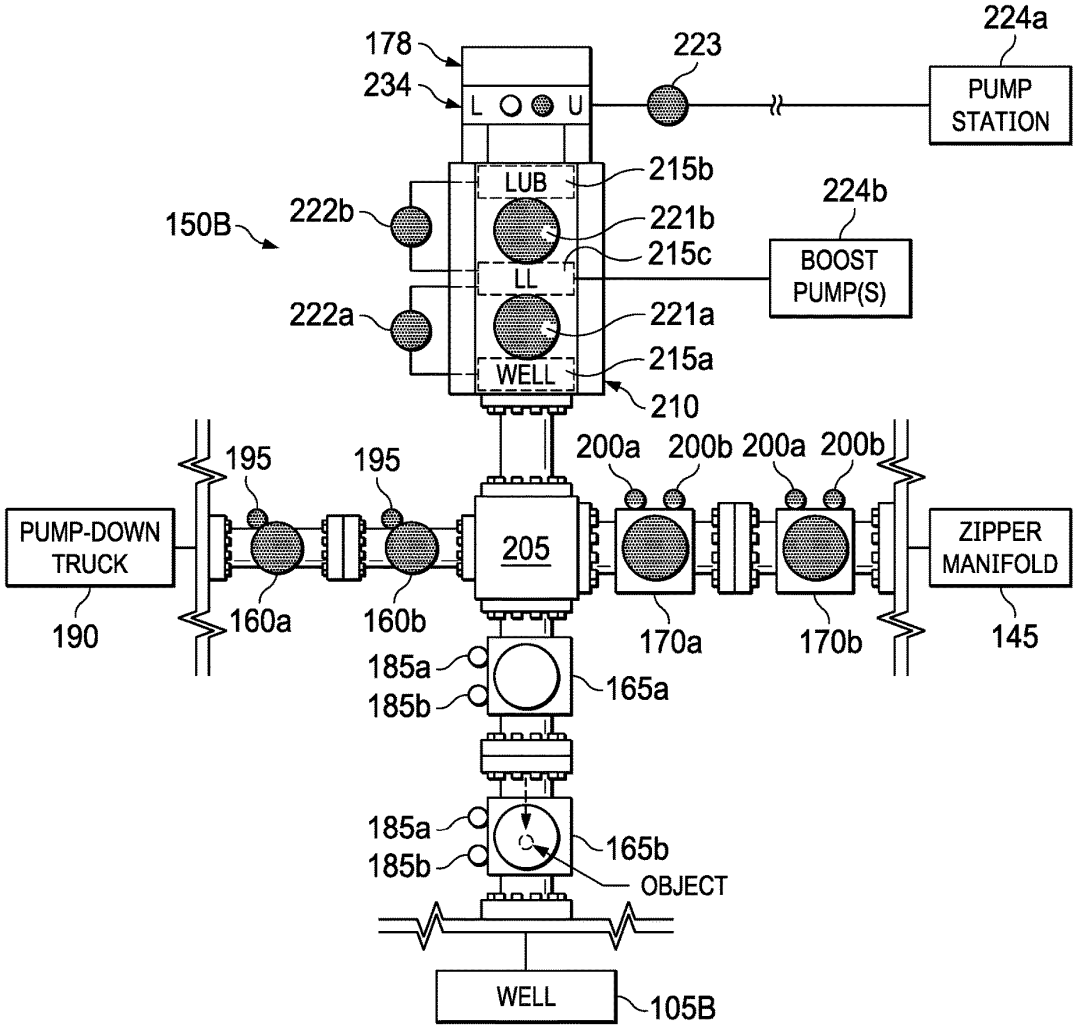

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
OBJECT
WELL
105B

FIG. 9G

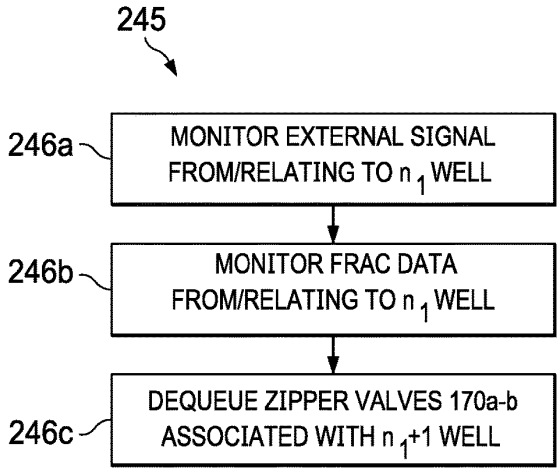


FIG. 10

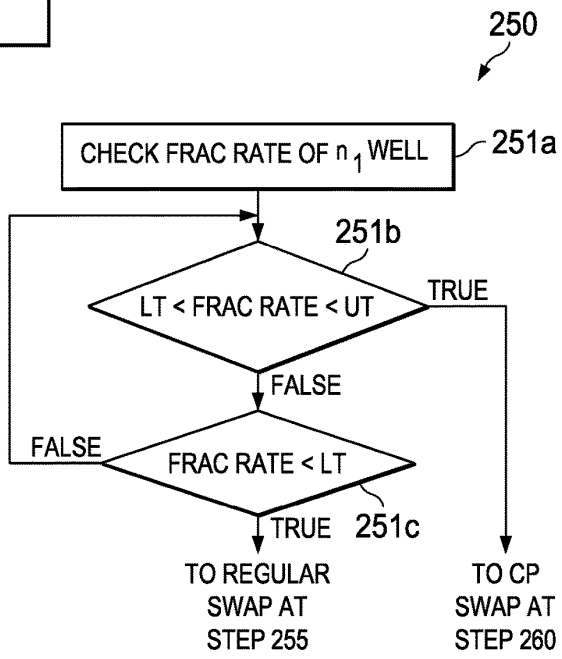


FIG. 12

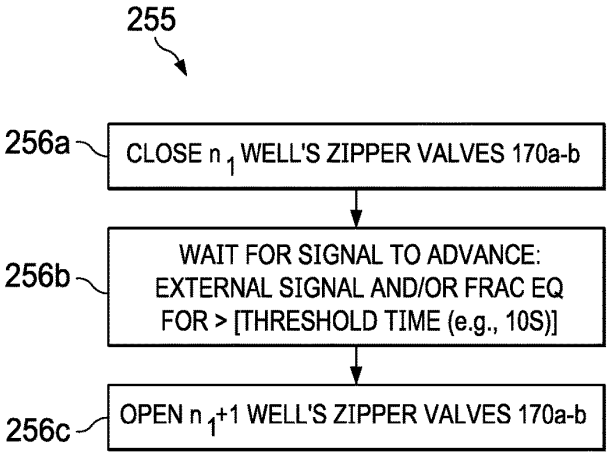


FIG. 13

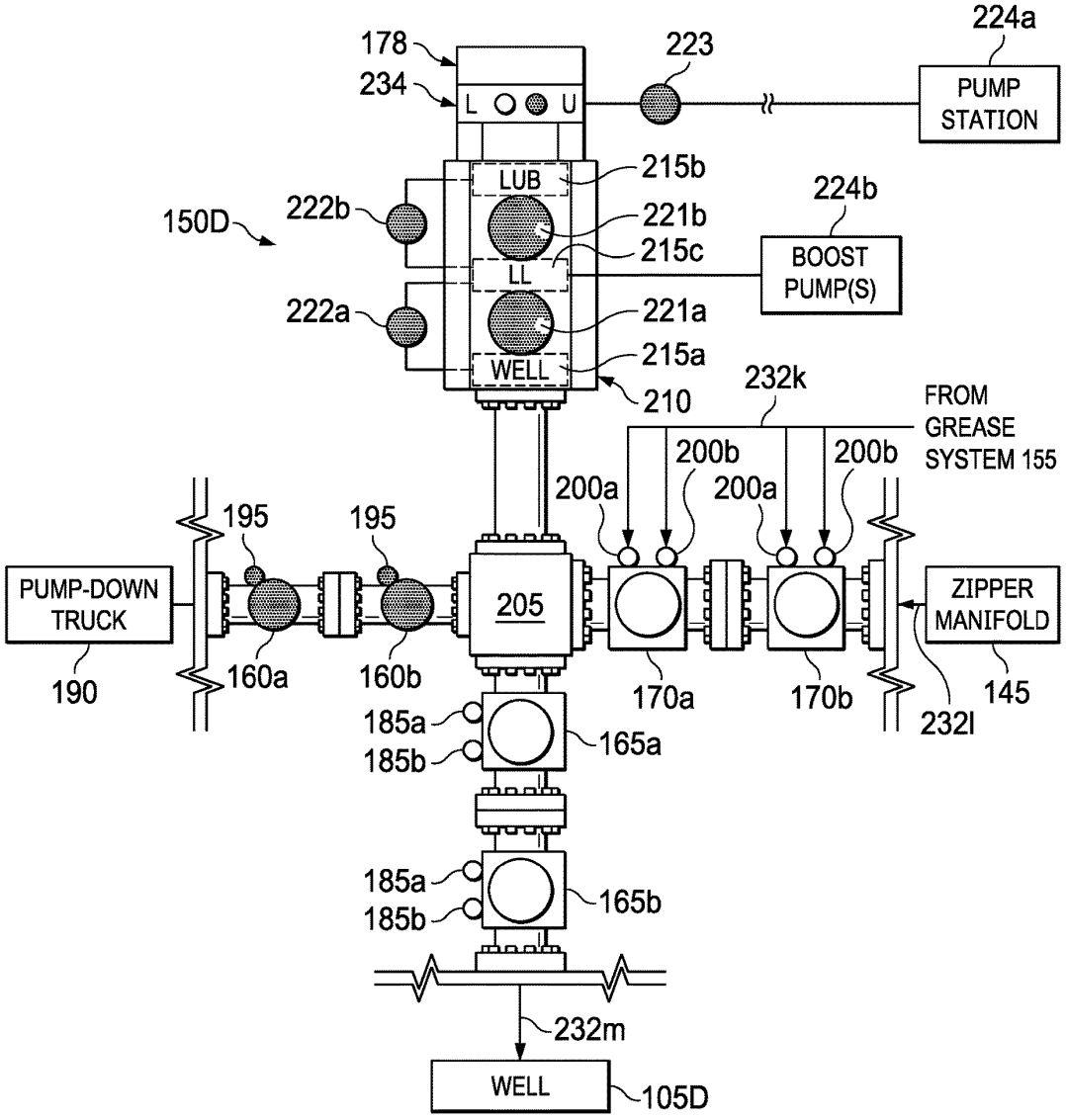

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
232k
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232l
185a
185b
165a
185a
185b
165b
232m
WELL
105D

FIG. 11

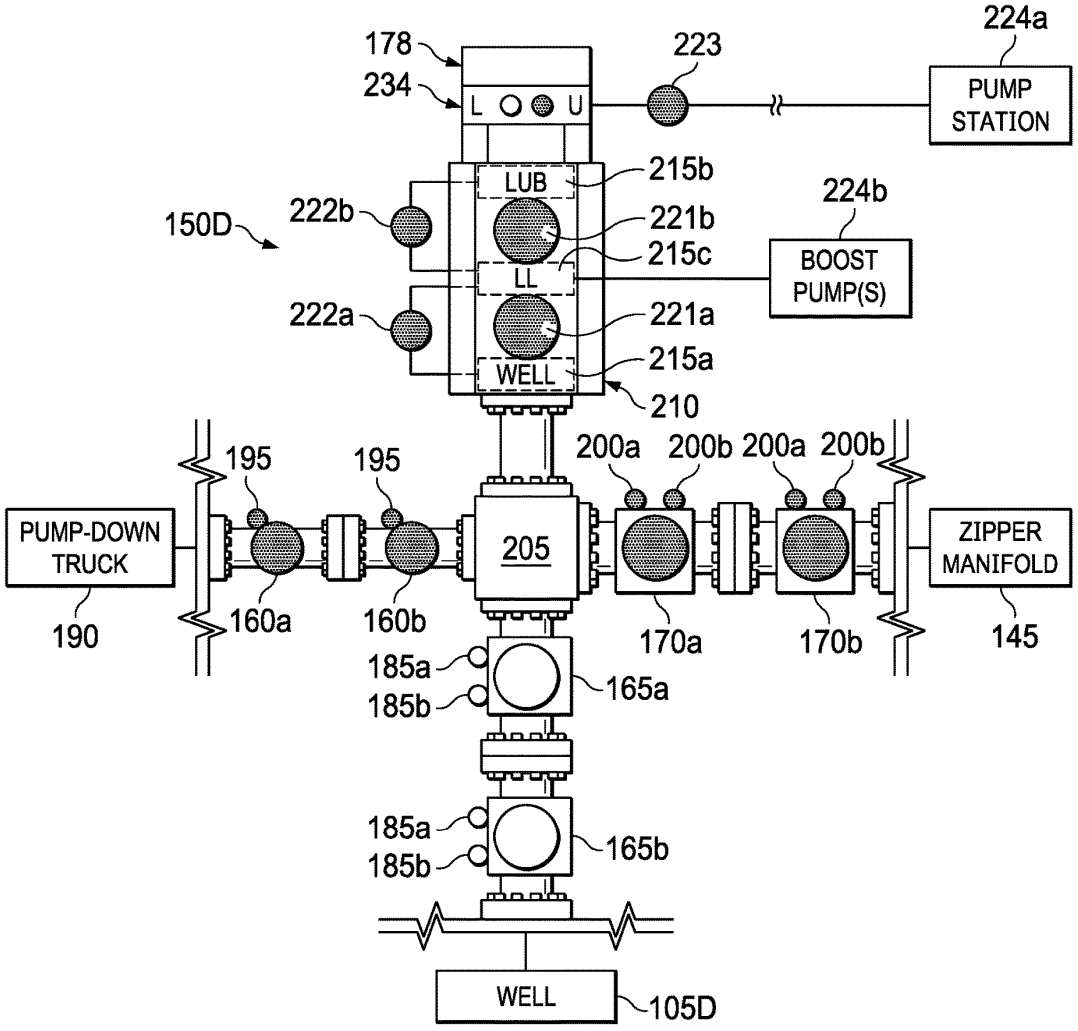

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105D

FIG. 14A

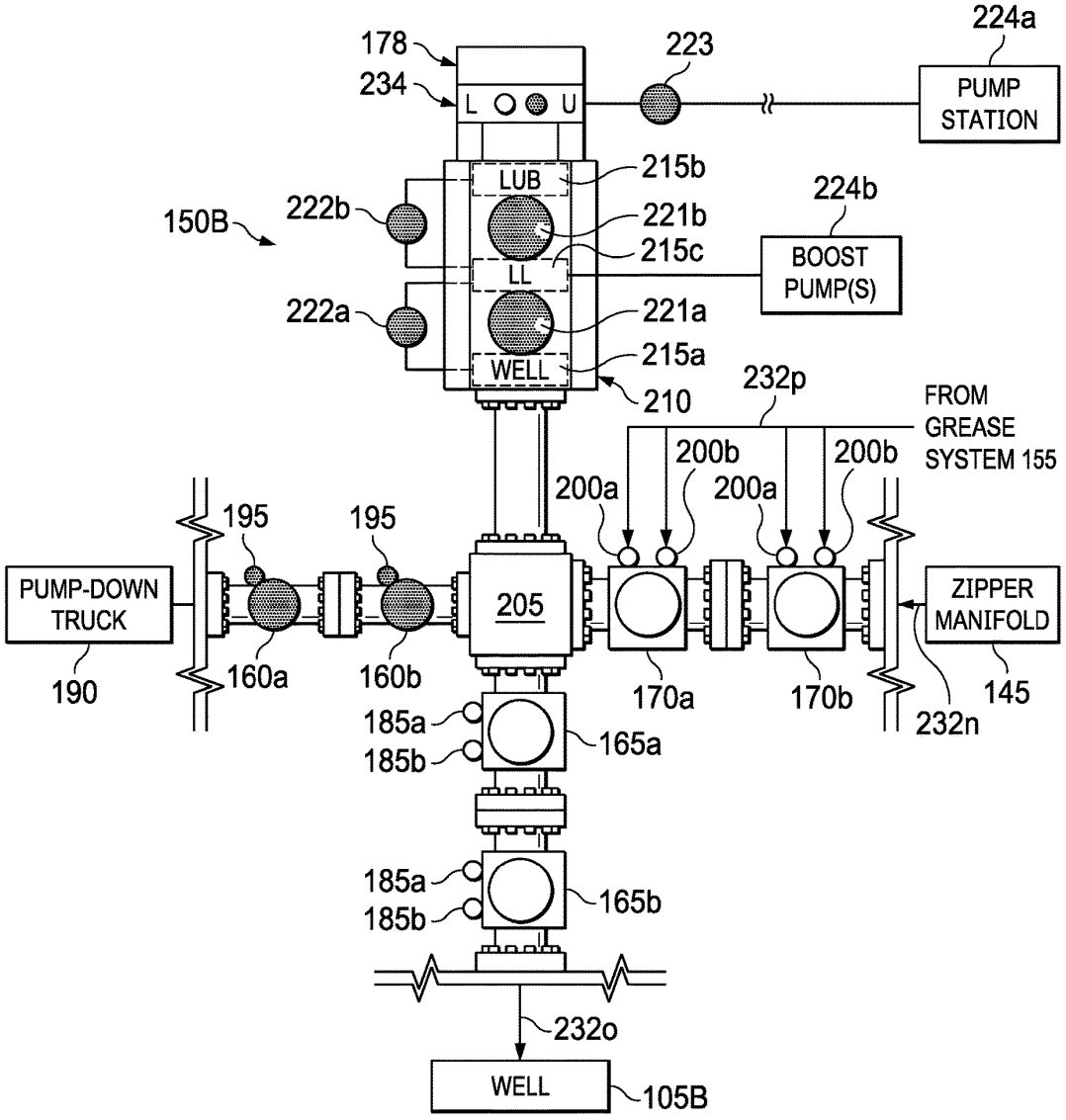

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
232p
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232n
185a
185b
165a
185a
185b
165b
232o
WELL
105B

FIG. 14B

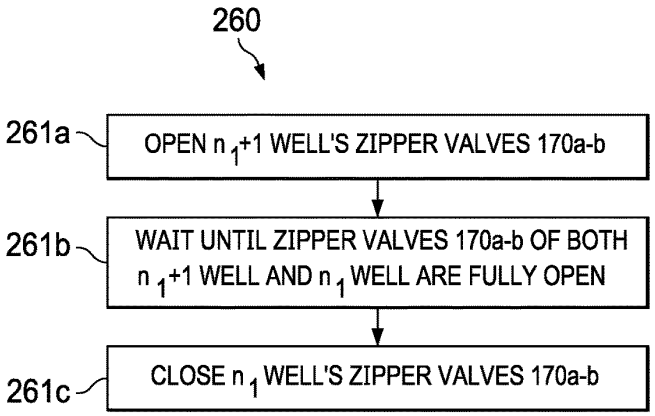


FIG. 15

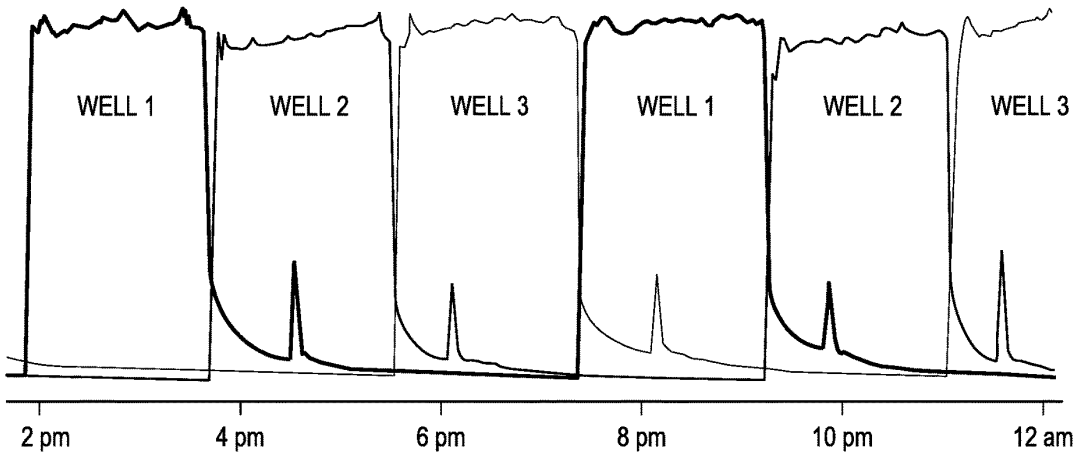


FIG. 16D

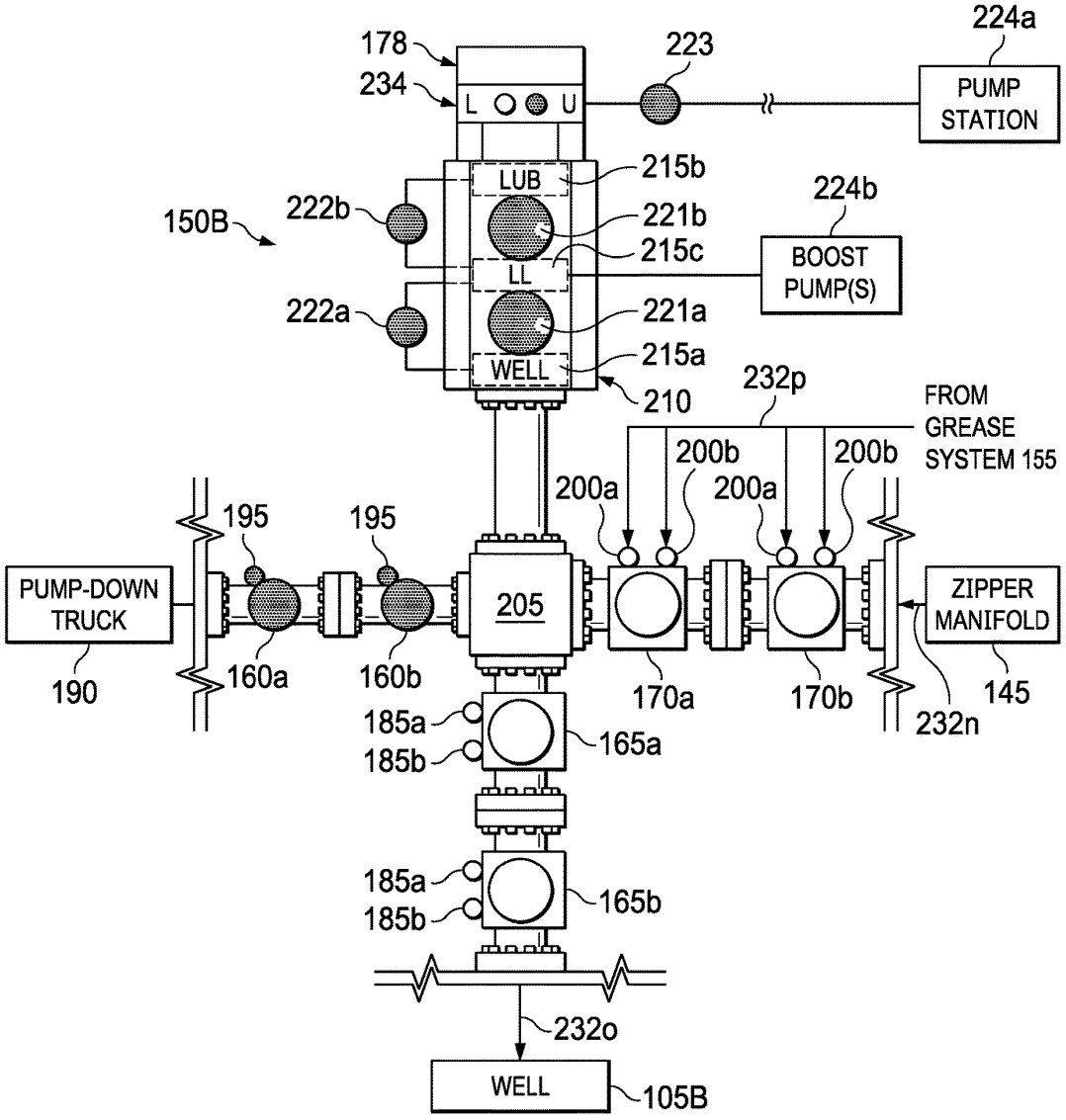

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
232p
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232n
185a
185b
165a
185a
185b
165b
232o
WELL
105B

FIG. 16A

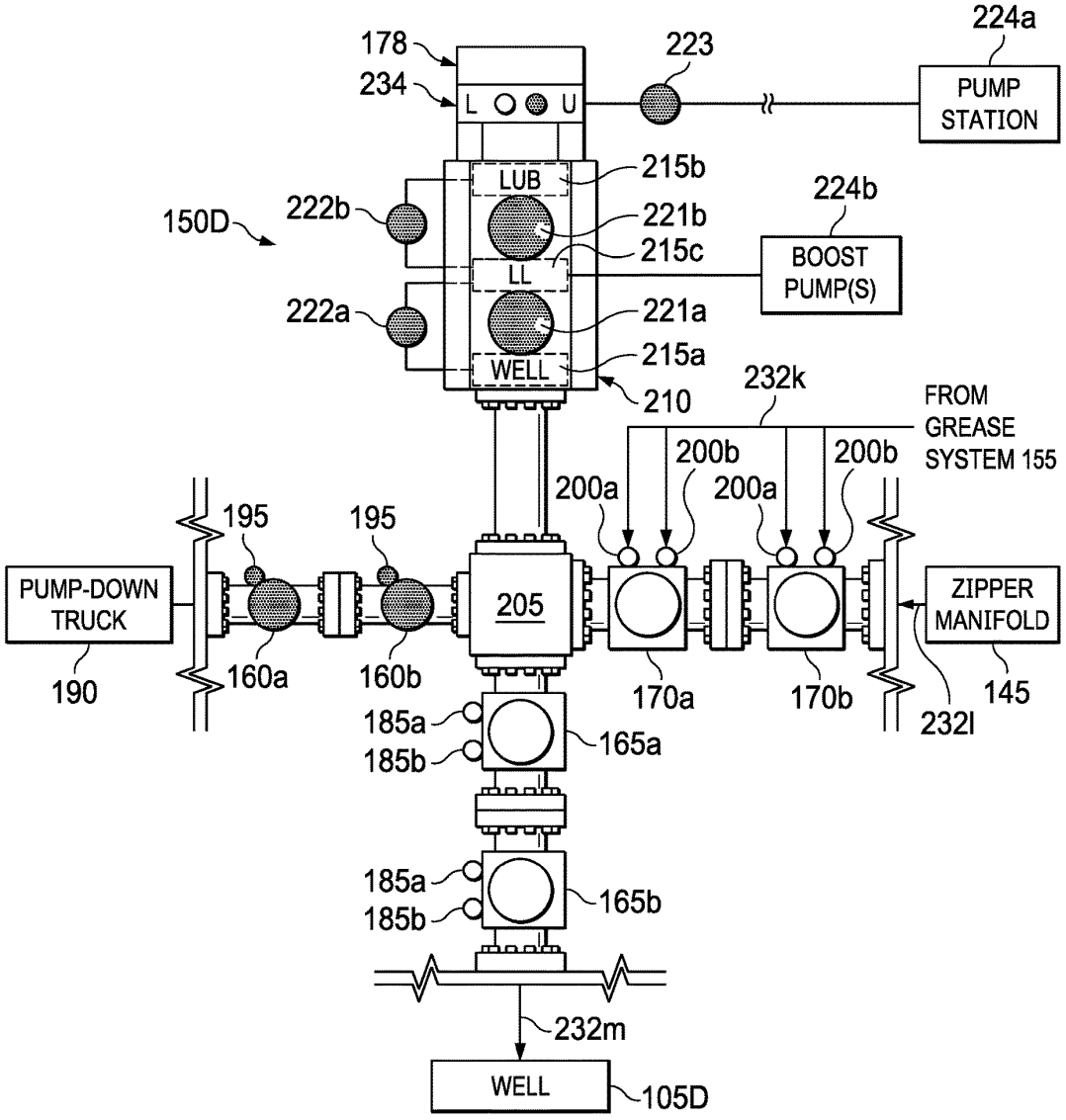

178
234
L
U
223
224a
PUMP STATION
LUB
215b
224b
150D
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
232k
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232l
185a
185b
165a
185a
185b
165b
232m
WELL
105D

FIG. 16B

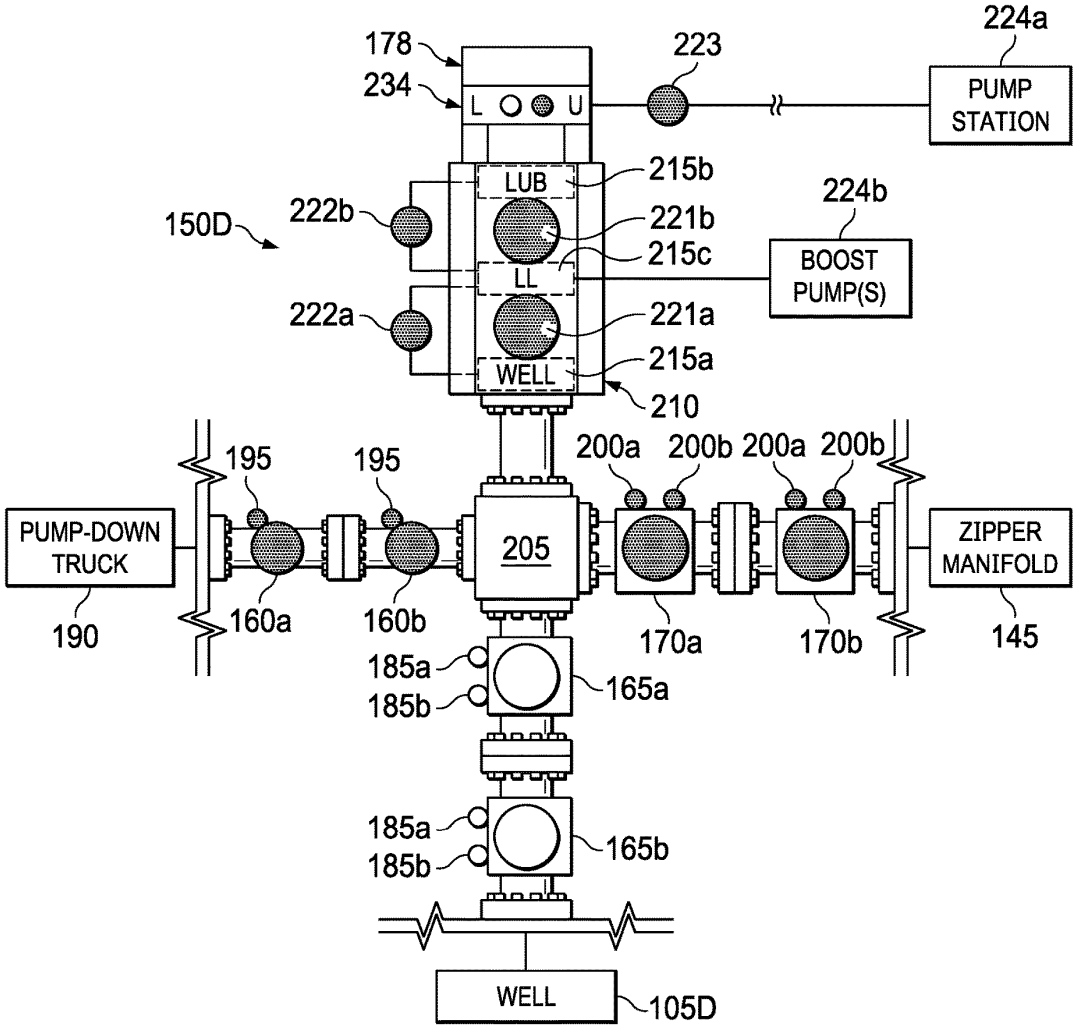

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105D

FIG. 16C

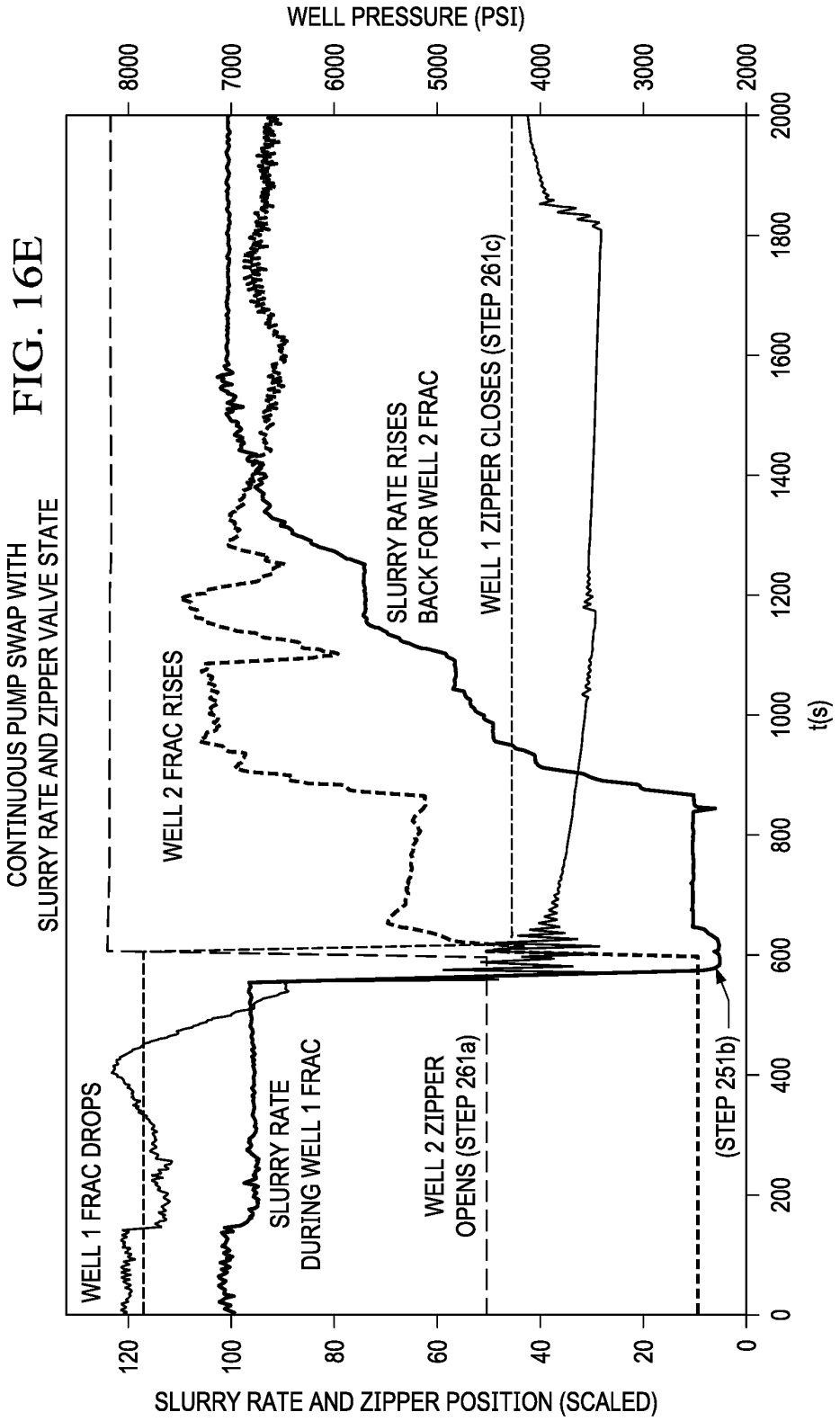

WELL PRESSURE (PSI)
8000
7000
6000
5000
4000
3000
2000
CONTINUOUS PUMP SWAP WITH
SLURRY RATE AND ZIPPER VALVE STATE
WELL 2 FRAC RISES
SLURRY RATE RISES
BACK FOR WELL 2 FRAC
WELL 1 ZIPPER CLOSES (STEP 261c)
WELL 1 FRAC DROPS
SLURRY RATE
DURING WELL 1 FRAC
WELL 2 ZIPPER
OPENS (STEP 261a)
(STEP 251b)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
t(s)
120
100
80
60
40
20
0
SLURRY RATE AND ZIPPER POSITION (SCALED)

FIG. 16E

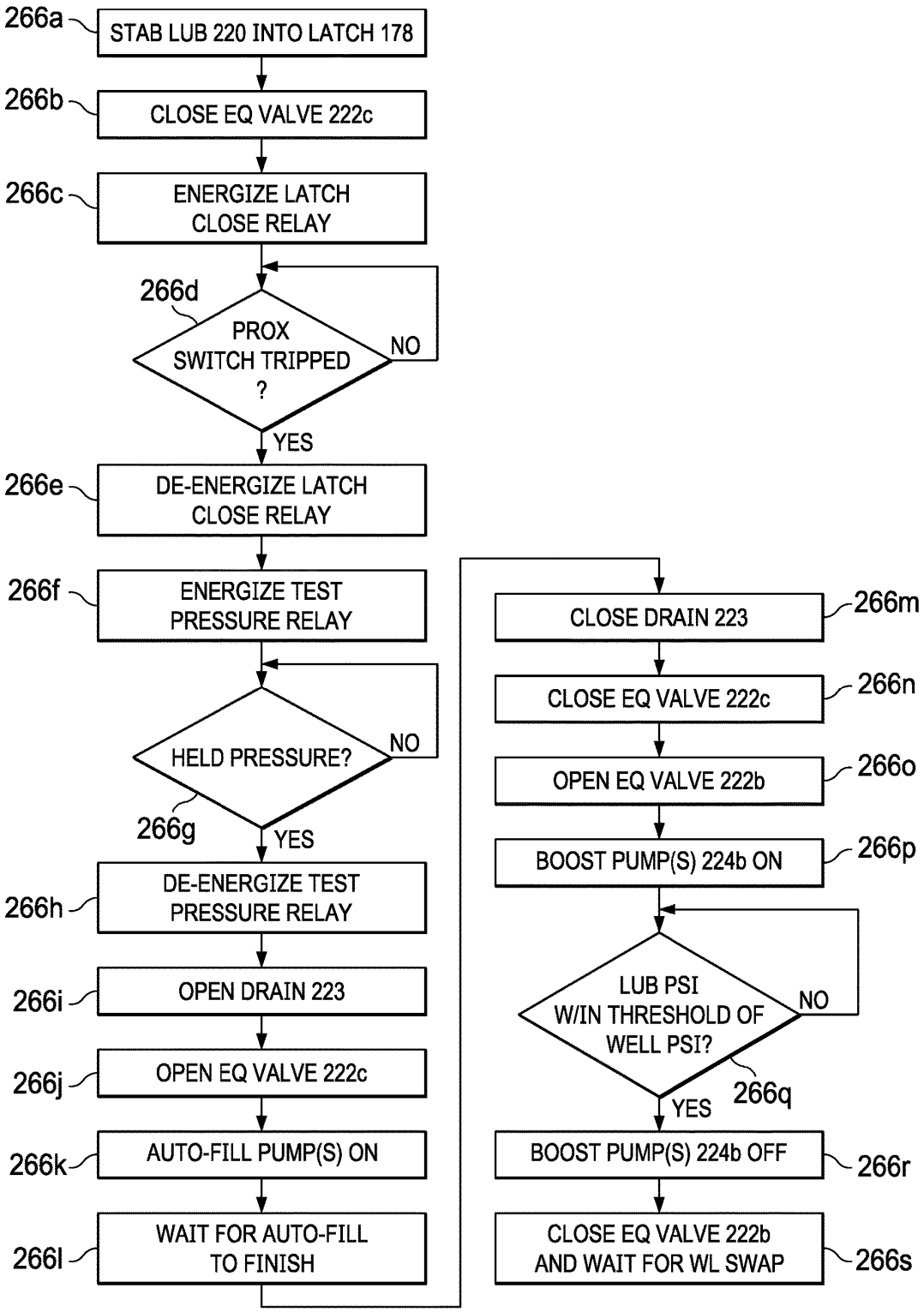

266a
STAB LUB 220 INTO LATCH 178
266b
CLOSE EQ VALVE 222c
266c
ENERGIZE LATCH CLOSE RELAY
266d
PROX SWITCH TRIPPED ?
NO
YES
266e
DE-ENERGIZE LATCH CLOSE RELAY
266f
ENERGIZE TEST PRESSURE RELAY
HELD PRESSURE?
NO
266g
YES
266h
DE-ENERGIZE TEST PRESSURE RELAY
266i
OPEN DRAIN 223
266j
OPEN EQ VALVE 222c
266k
AUTO-FILL PUMP(S) ON
266l
WAIT FOR AUTO-FILL TO FINISH
266m
CLOSE DRAIN 223
266n
CLOSE EQ VALVE 222c
266o
OPEN EQ VALVE 222b
266p
BOOST PUMP(S) 224b ON
LUB PSI W/IN THRESHOLD OF WELL PSI?
NO
YES
266q
BOOST PUMP(S) 224b OFF
266r
CLOSE EQ VALVE 222b AND WAIT FOR WL SWAP
266s

FIG. 17

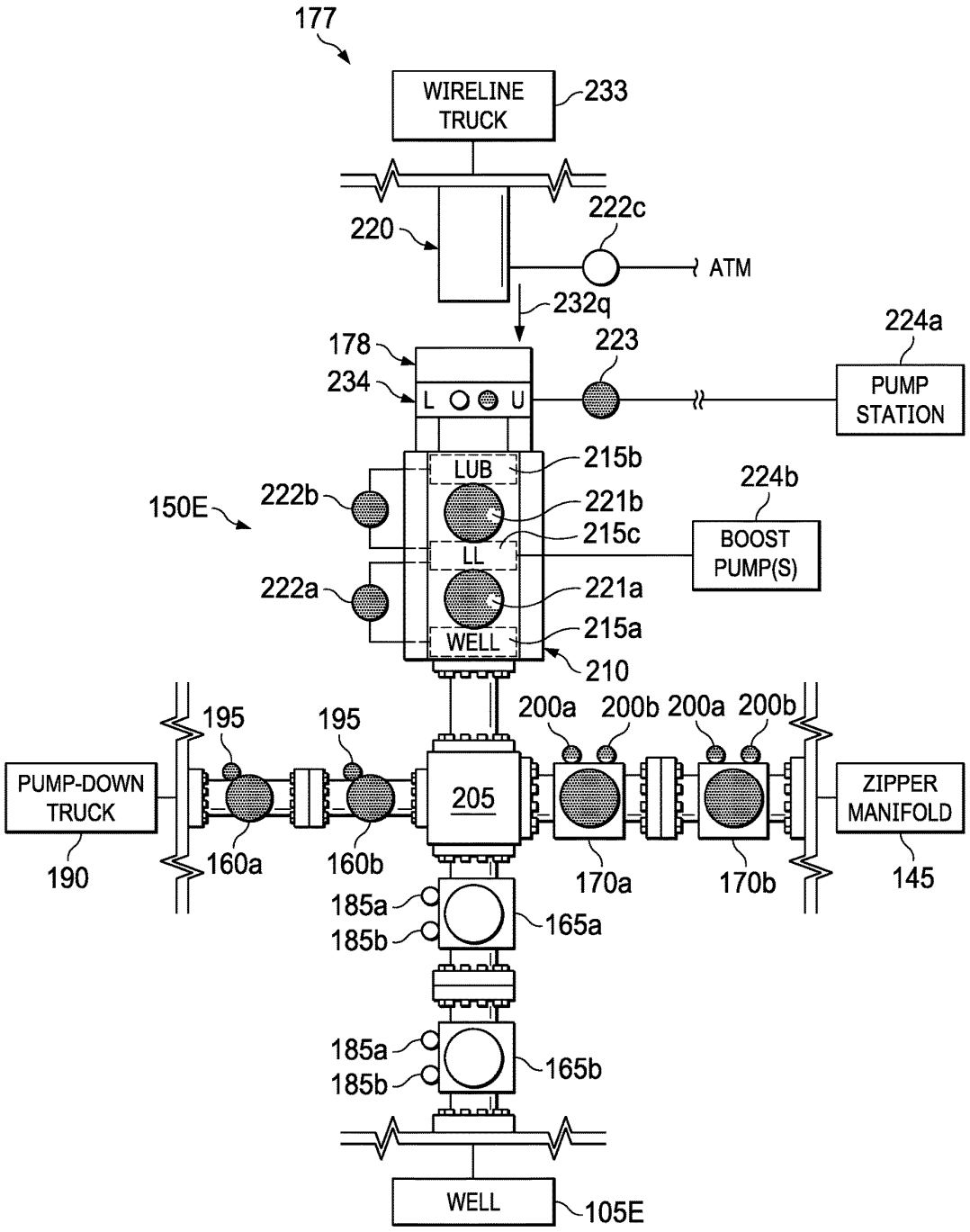

177
WIRELINE TRUCK
233
220
222c
ATM
232q
178
234
L
U
223
224a
PUMP STATION
LUB
215b
150E
222b
221b
224b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18A

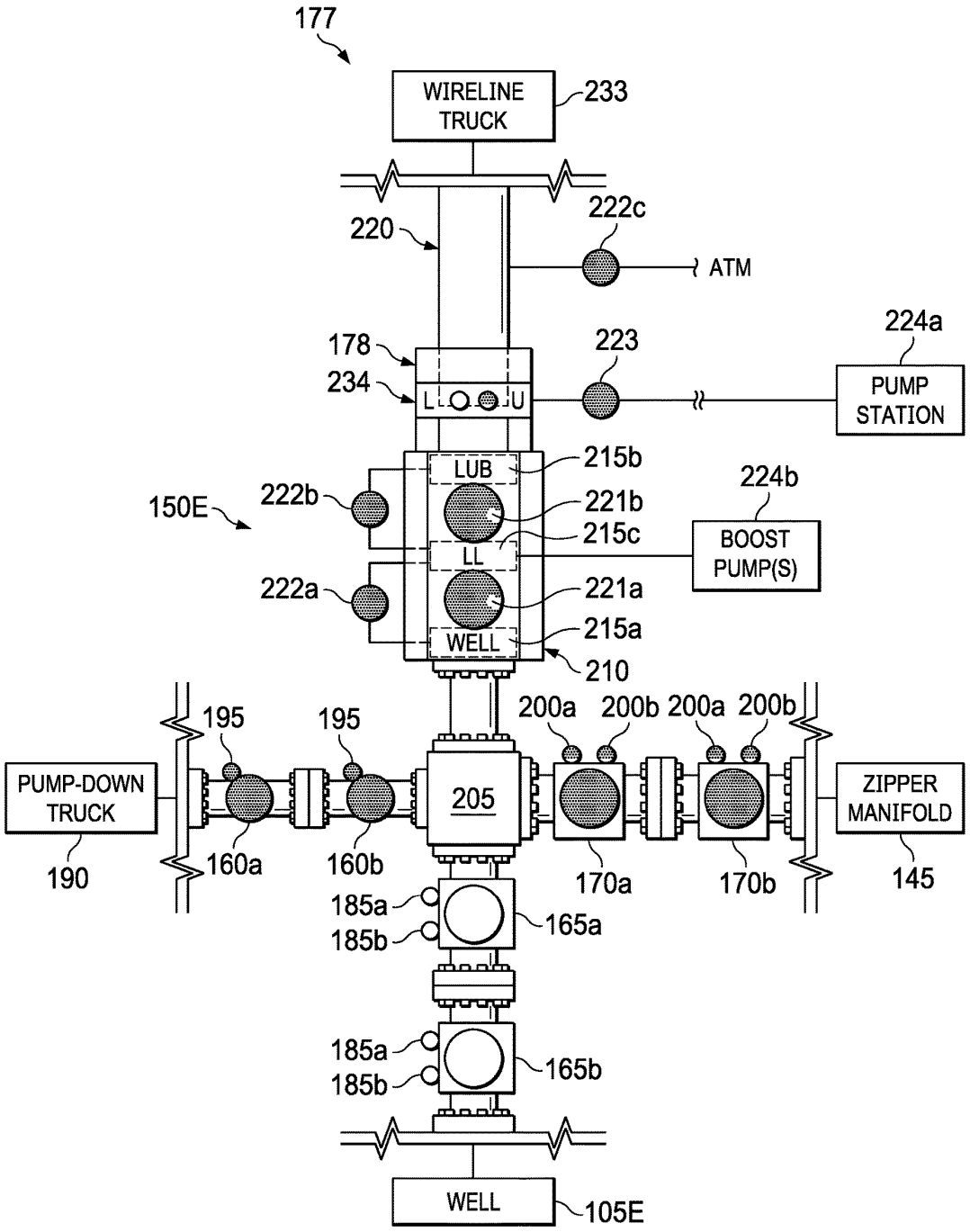

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
223
234
PUMP STATION
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18B

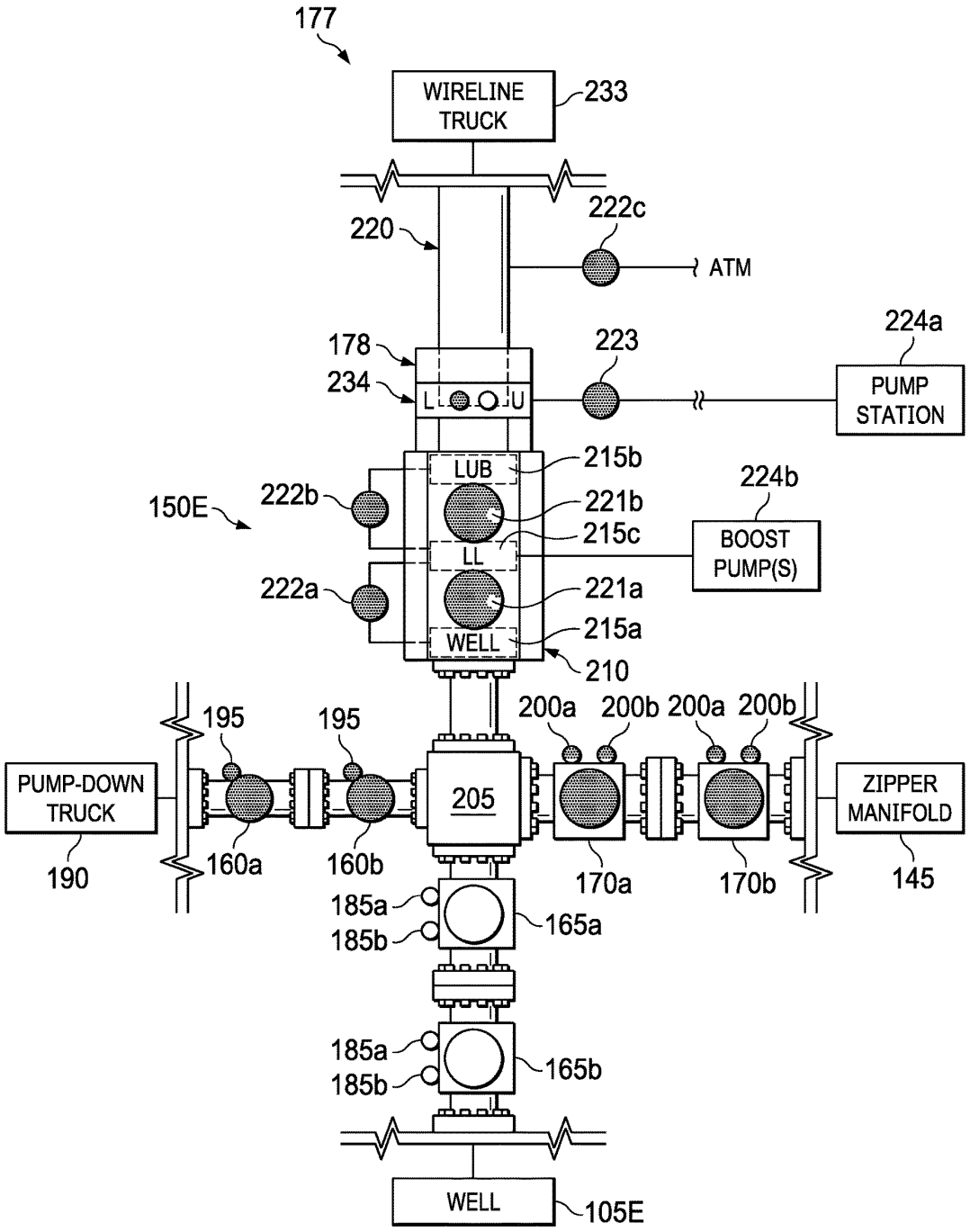

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150E
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18C

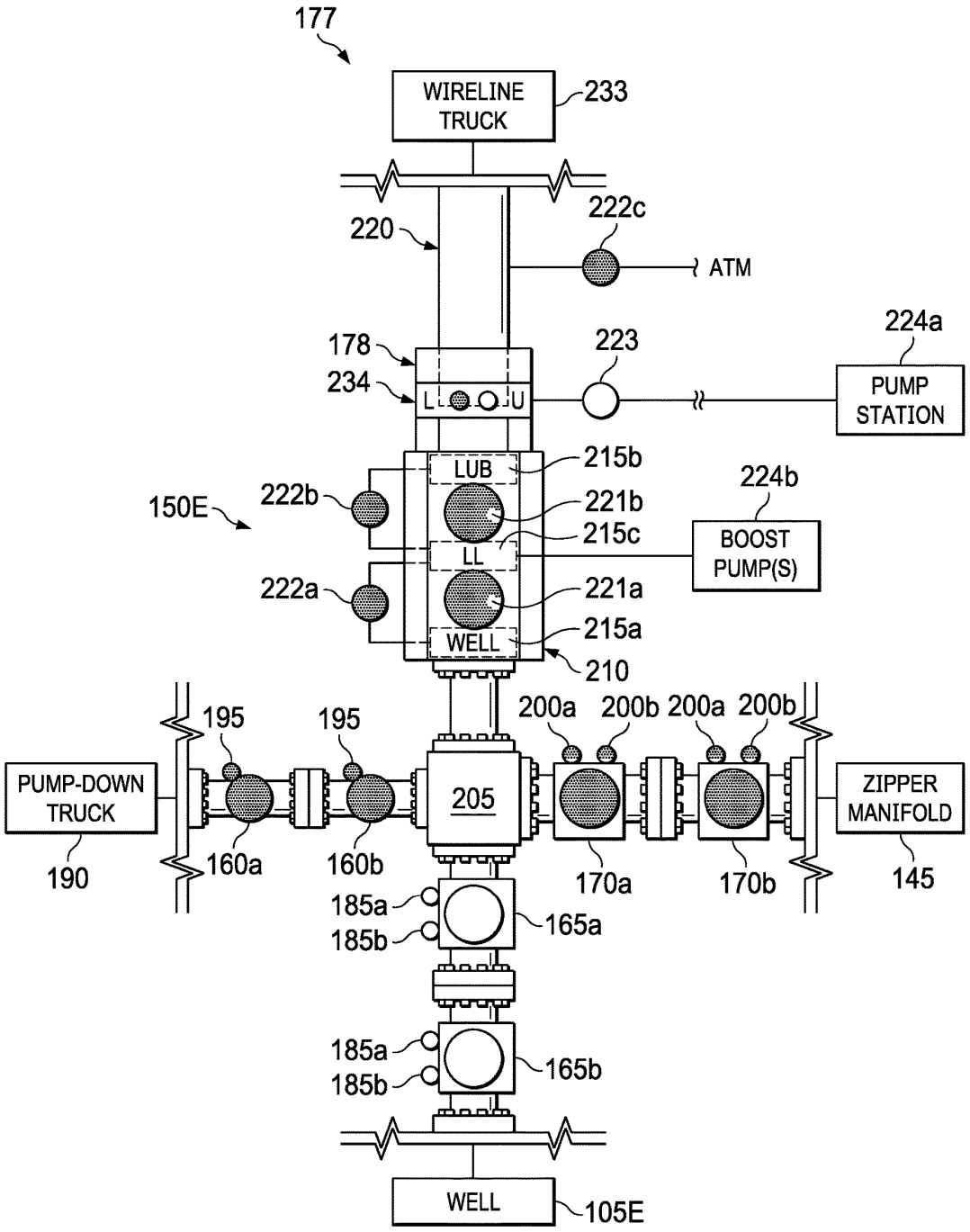

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
221b
150E
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
160a
160b
170a
170b
190
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18D

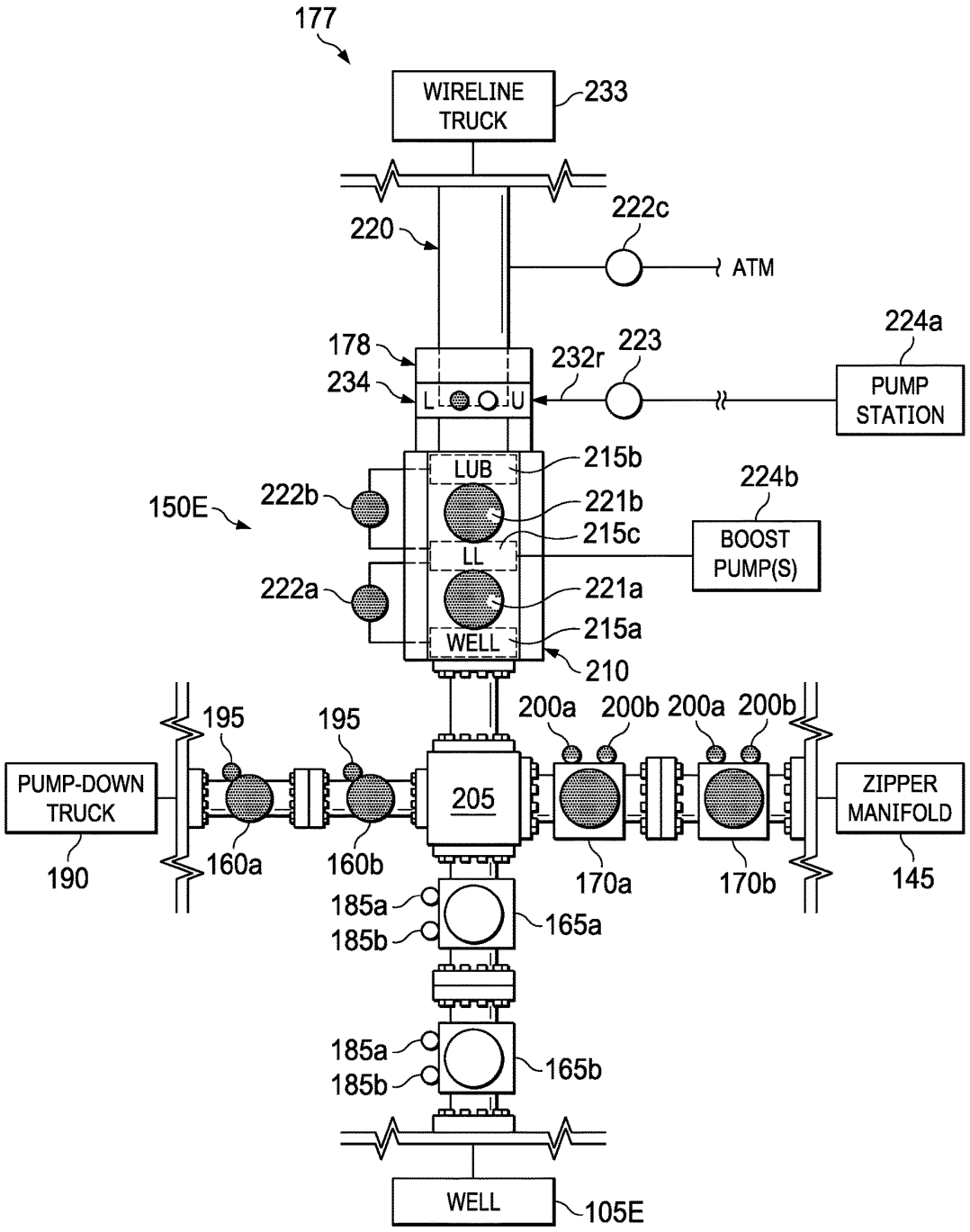

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
232r
223
234
PUMP STATION
LUB
215b
224b
222b
221b
150E
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18E

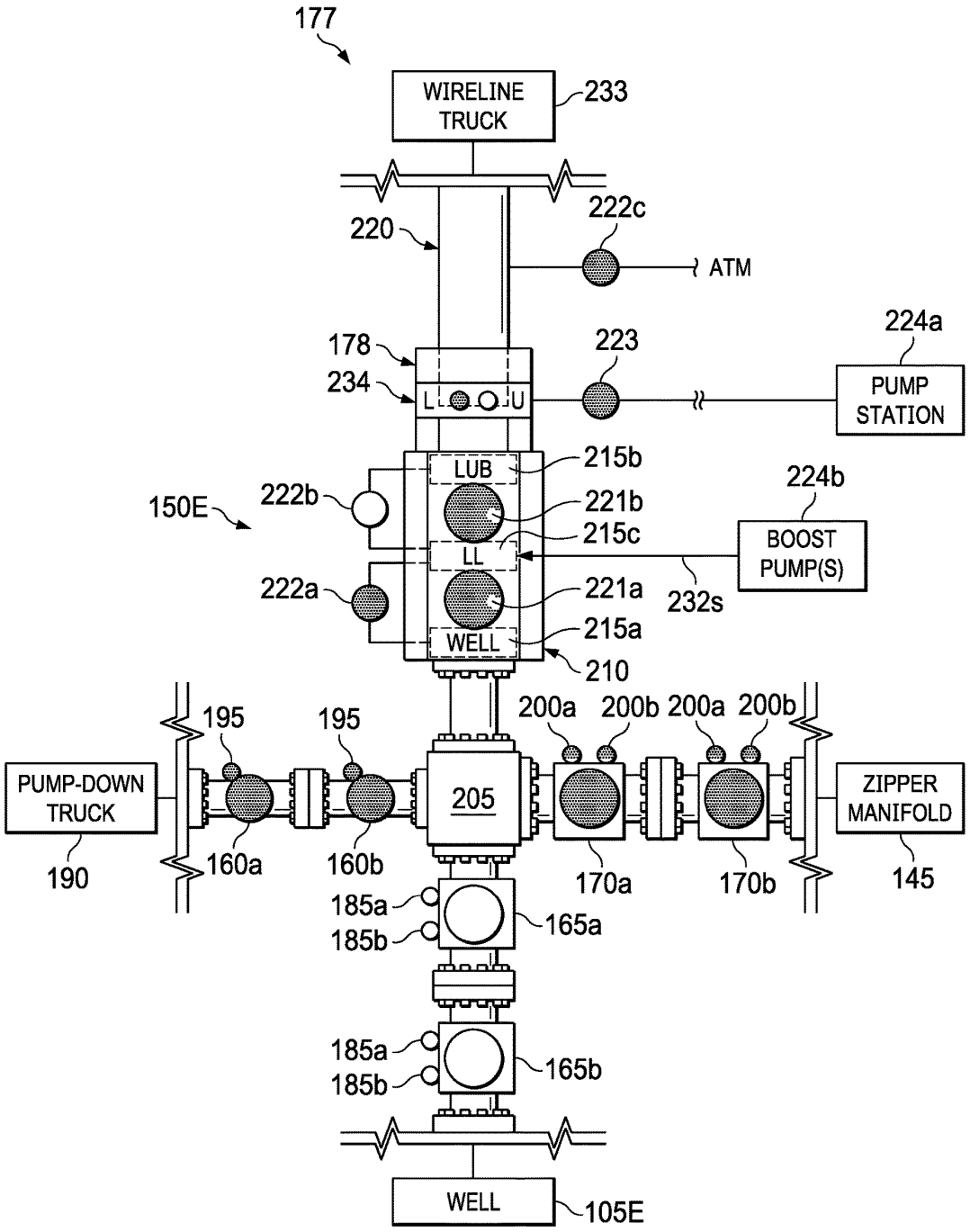

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150E
221b
215c
BOOST PUMP(S)
LL
222a
221a
232s
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18F

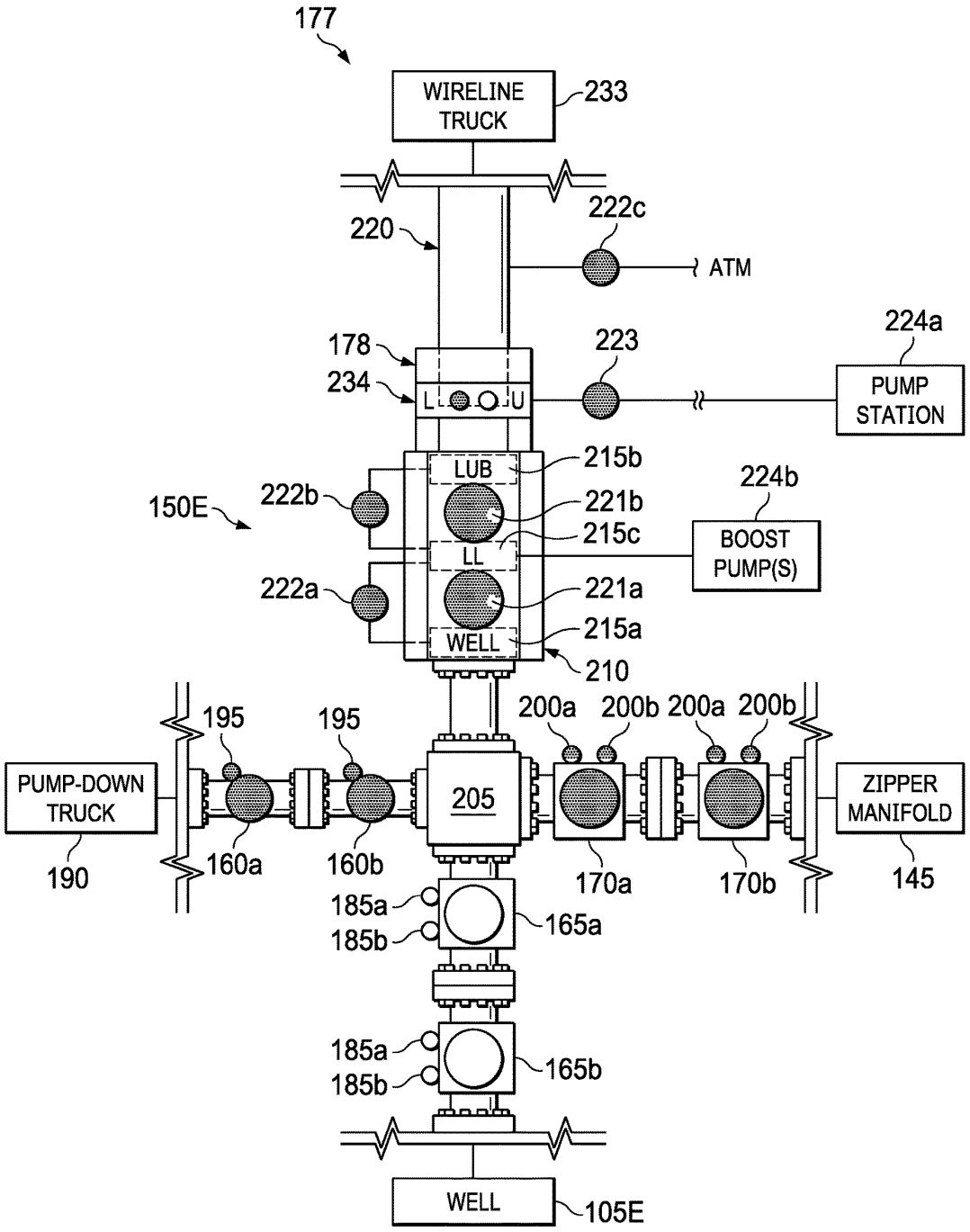

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
223
234
PUMP STATION
215b
LUB
224b
222b
150E
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
165a
185b
185a
165b
185b
WELL
105E

FIG. 18G

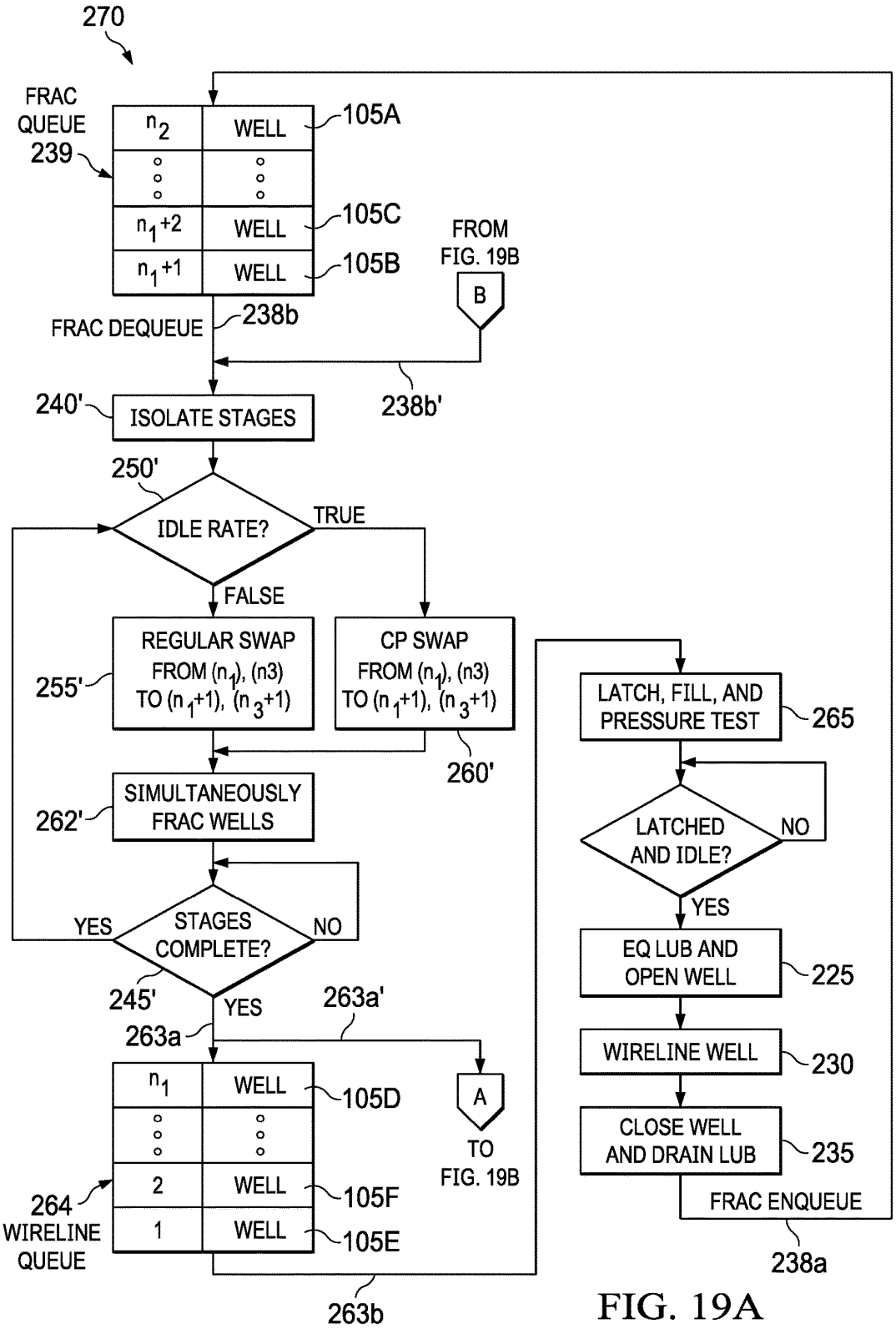

270
FRAC QUEUE 239
n_2 WELL 105A
n_1+2 WELL 105C
n_1+1 WELL 105B
FROM FIG. 19B
B
FRAC DEQUEUE 238b
238b'
240' ISOLATE STAGES
250' IDLE RATE?
TRUE
FALSE
255' REGULAR SWAP FROM (n_1), (n3) TO (n_1+1), (n_3+1)
CP SWAP FROM (n_1), (n3) TO (n_1+1), (n_3+1)
260'
262' SIMULTANEOUSLY FRAC WELLS
YES STAGES COMPLETE? NO
245'
YES
263a
263a'
n_1 WELL 105D
2 WELL 105F
1 WELL 105E
264 WIRELINE QUEUE
A
TO FIG. 19B
263b
LATCH, FILL, AND PRESSURE TEST 265
LATCHED AND IDLE? NO
YES
EQ LUB AND OPEN WELL 225
WIRELINE WELL 230
CLOSE WELL AND DRAIN LUB 235
FRAC ENQUEUE
238a

FIG. 19A

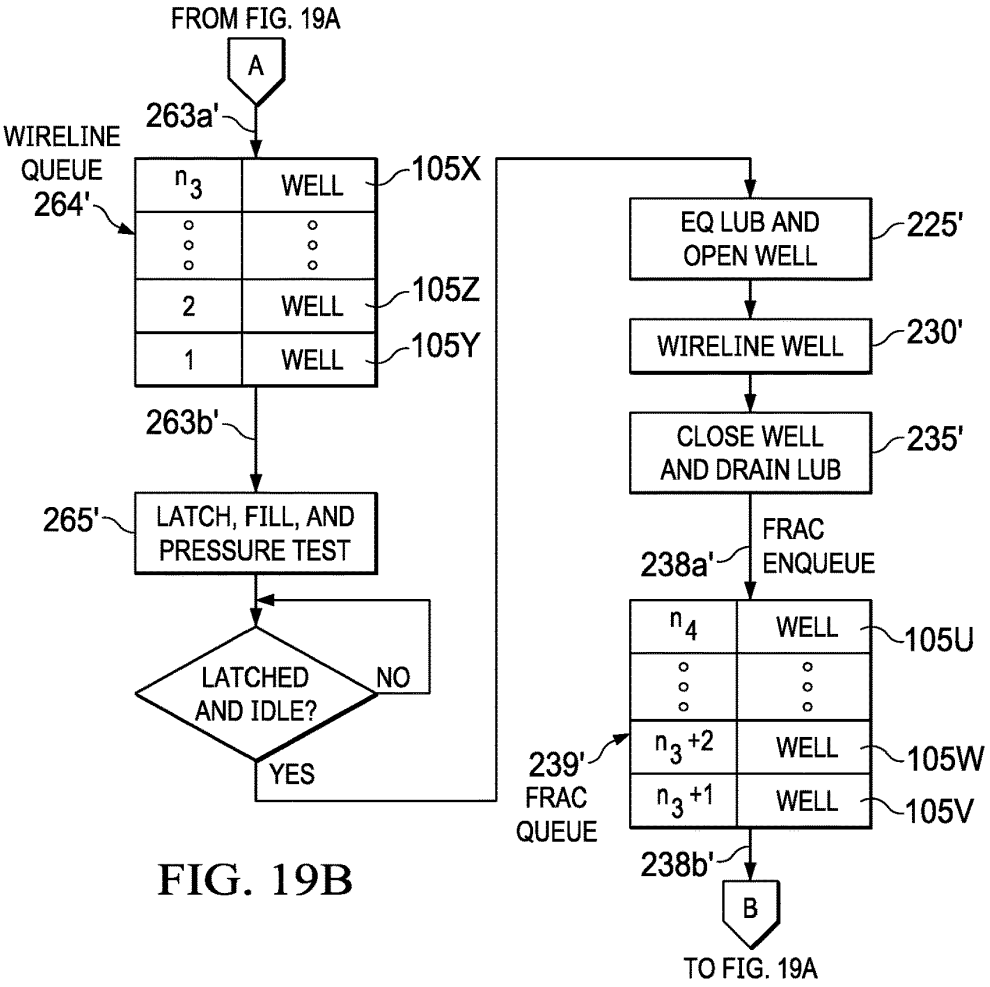


FIG. 19B

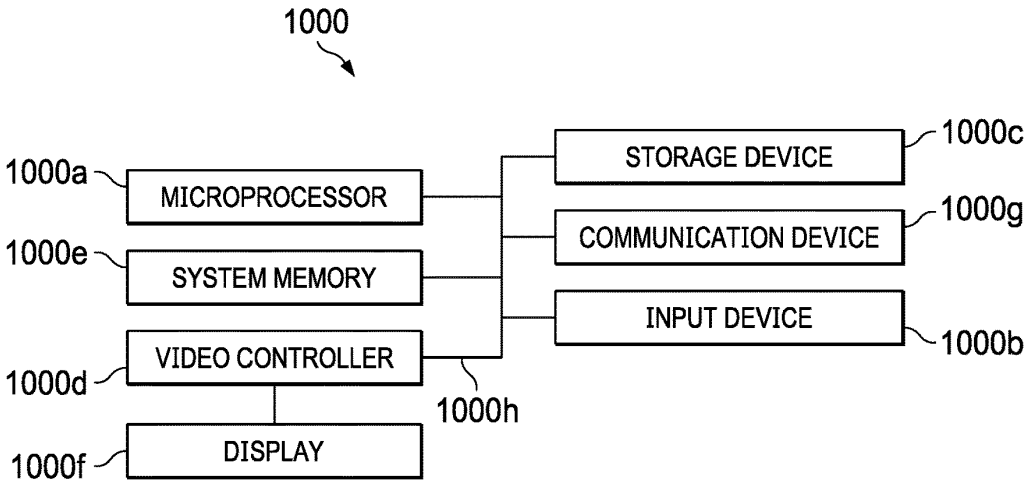


FIG. 20

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of the filing date of, and priority to, U.S. application No. 63/189,663, filed May 17, 2021, the entire disclosure of which is hereby incorporated herein by reference.

This application is also a continuation-in-part (CIP) of U.S. patent application Ser. No. 17/319,854 (the "'854 application"), filed May 13, 2021, the entire disclosure of which is hereby incorporated herein by reference.

The '854 application is a continuation-in-part (CIP) of U.S. patent application Ser. No. 16/855,749 (the "'749 application"), filed Apr. 22, 2020, the entire disclosure of which is hereby incorporated herein by reference. The '749 application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/836,761, filed Apr. 22, 2019, the entire disclosure of which is hereby incorporated herein by reference.

The '749 application is a continuation-in-part (CIP) of U.S. patent application Ser. No. 16/248,648 (the "'648 application"), filed Jan. 15, 2019, now issued as U.S. Pat. No. 10,724,682, the entire disclosure of which is hereby incorporated herein by reference. The '648 application claims the benefit of the filing date of, and priority to, U.S. Application No. 62/617,443, filed Jan. 15, 2018, the entire disclosure of which is hereby incorporated herein by reference.

The '749 application is also a CIP of U.S. patent application Ser. No. 16/803,156 (the "'156 application"), filed Feb. 27, 2020, the entire disclosure of which is hereby incorporated herein by reference. The '156 application is a CIP of U.S. patent application Ser. No. 16/248,633 (the "'633 application"), filed Jan. 15, 2019, now issued as U.S. Pat. No. 10,584,552, the entire disclosure of which is hereby incorporated herein by reference. The '633 application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/617,438 (the "'438 application"), filed Jan. 15, 2018, the entire disclosure of which is hereby incorporated herein by reference.

The '156 application is also a CIP of U.S. patent application Ser. No. 16/436,623 (the "'623 application"), filed Jun. 10, 2019, the entire disclosure of which is hereby incorporated herein by reference. The '623 application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/755,170, filed Nov. 2, 2018, the entire disclosure of which is hereby incorporated herein by reference.

The '156 application is also a CIP of U.S. patent application Ser. No. 16/100,741 (the "'741 application"), filed Aug. 10, 2018, now issued as U.S. Pat. No. 10,689,938, the entire disclosure of which is hereby incorporated herein by reference. The '741 Application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/638,688, filed Mar. 5, 2018, U.S. Patent Application No. 62/638,681, filed Mar. 5, 2018, U.S. Patent Application No. 62/637,220, filed Mar. 1, 2018, U.S. Patent Application No. 62/637,215, filed Mar. 1, 2018, and U.S. Patent Application No. 62/598,914, filed Dec. 14, 2017, the entire disclosures of which are hereby incorporated herein by reference.

The '749 application is related to U.S. patent application Ser. No. 16/801,911, filed Feb. 26, 2020, the entire disclosure of which is hereby incorporated herein by reference.

This application is also related to U.S. patent application Ser. No. 17/360,336, filed Jun. 28, 2021, the entire disclosure of which is hereby incorporated herein by reference.

BACKGROUND

This application relates generally to oil and gas hydraulic fracturing operations and, more particularly, to a hydraulic fracturing plan executable by a hydraulic fracturing system to hydraulically fracture a plurality of oil and gas wells.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a diagrammatic illustration of a hydraulic fracturing system operably to execute a hydraulic fracturing plan to hydraulically fracture a plurality of oil and gas wells, according to one or more embodiments.

FIG. **1**B is a flow diagram illustrating a method for hydraulically fracturing a plurality of wells by executing a hydraulic fracturing plan using the hydraulic fracturing system of FIG. **1**A, according to one or more embodiments.

FIG. **2**A schematically illustrates execution of one or more sub-step(s) of a first step of the method illustrated in FIG. **1**B, which first step is or includes equalizing a lubricator of a frac leg associated with a first well, and opening the first well, according to one or more embodiments.

FIG. **2**B schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **2**C schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **2**D schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **2**E schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **2**F schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **2**G schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **3** is a flow diagram illustrating the various sub-steps, illustrated schematically in FIGS. **2**A and **2**G, of the first step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **4** is a flow diagram illustrating various sub-steps of a second step of the method illustrated in FIG. **1**B, which second step is or includes perforating a stage of the first well using a wireline perforating system, according to one or more embodiments.

FIG. **5**A schematically illustrates execution of one or more sub-step(s) of the second step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **5**B schematically illustrates execution of one or more additional sub-step(s) of the second step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **5**C schematically illustrates execution of one or more additional sub-step(s) of the second step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **6** is a flow diagram illustrating various sub-steps of a third step of the method illustrated in FIG. **1**B, which third step is or includes closing the first well using a valve apparatus, and draining a lubricator, according to one or more embodiments.

FIG. **7**A schematically illustrates execution of one or more sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**B schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**C schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**D schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**E schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**F schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**G schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**H schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **7**I schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **8** is a flow diagram illustrating various sub-steps of a fourth step of the method illustrated in FIG. **1**B, which fourth step is or includes isolating a stage of a second well in preparation for a hydraulic fracturing operation, according to one or more embodiments.

FIG. **9**A schematically illustrates execution of one or more sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**B schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**C schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**D schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**E schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**F schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **9**G schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **10** is a flow diagram illustrating various sub-steps of a fifth step of the method illustrated in FIG. **1**B, which fifth step is or includes detecting or otherwise determining that a fracturing stage of a third well has ended, according to one or more embodiments.

FIG. **11** schematically illustrates execution of one or more subs-step(s) of the fifth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **12** is a flow diagram illustrating various sub-steps of a sixth step of the method illustrated in FIG. **1**B, which sixth step is or includes determining whether to permit a regular swap or a continuous pumping swap (or "CP swap"), according to one or more embodiments.

FIG. **13** is a flow diagram illustrating various sub-steps of a seventh step of the method illustrated in FIG. **1**B, which seventh step is or includes the regular swap from hydraulically fracturing the third well to hydraulically fracturing the second well, according to one or more embodiments.

FIG. **14**A schematically illustrates execution of one or more sub-step(s) of the seventh step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **14**B schematically illustrates execution of one or more additional sub-step(s) of the seventh step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **15** is a flow diagram illustrating various sub-steps of an eighth step of the method illustrated in FIG. **1**B, which eighth step is or includes the CP swap from hydraulically fracturing the third well to hydraulically fracturing the second well, according to one or more embodiments.

FIG. **16**A schematically illustrates execution of one or more sub-step(s) of the eighth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **16**B schematically illustrates execution of one or more additional sub-step(s) of the eighth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **16**C schematically illustrates execution of one or more additional sub-step(s) of the eighth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **16**D is a chart illustrating execution of one or more of the various sub-steps, schematically illustrated in FIGS. **16**A through **16**C, of the eighth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **16**E is another chart illustrating execution of one or more of the various sub-steps, schematically illustrated in FIGS. **16**A through **16**C, of the eighth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **17** is a flow diagram illustrating various sub-steps of a ninth step of the method illustrated in FIG. **1**B, which ninth step is or includes latching, filling, and pressure testing a frac leg associated with a fourth well in preparation for perforating a stage of the fourth well using the wireline perforating system, according to one or more embodiments.

FIG. **18**A schematically illustrates execution of one or more sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**B schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**C schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**D schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**E schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**F schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **18**G schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in FIG. **1**B, according to one or more embodiments.

FIG. **19**A is a flow diagram illustrating a portion of another method for fracturing wells using the fracturing system of FIG. **1**A, which another method includes swapping from simultaneously fracturing first and second wells to simultaneously fracturing third and fourth wells, according to one or more embodiments.

FIG. **19**B is a flow diagram illustrating another portion of the another method of FIG. **20**A, according to one or more embodiments.

FIG. **20** is a diagrammatic illustration of a computing node for implementing one or more embodiments of the present disclosure.

DETAILED DESCRIPTION

Referring to FIG. **1**A, in an embodiment, a hydraulic fracturing system **100** for executing a hydraulic fracturing plan to hydraulically fracture wells **105**A through **105**C+n is illustrated, which hydraulic fracturing system **100** includes: a blender **110** adapted to mix fluid from a fluid source **115** with sand from a sand source **120** to produce hydraulic fracturing fluid; a suction manifold **125** adapted to receive the hydraulic fracturing fluid from the blender **110**; a discharge manifold **130**; a plurality of swap stations **135**, each adapted to communicate the hydraulic fracturing fluid from the suction manifold **125** to a corresponding pump truck **140**, and, after pressurization by the corresponding pump truck **140**, to communicate the pressurized hydraulic fracturing fluid from the corresponding pump truck **140** to the discharge manifold **130**; and a zipper manifold **145** adapted to communicate the pressurized hydraulic fracturing fluid from the discharge manifold **130** to a plurality of hydraulic fracturing legs (or "frac legs") **150**A through **150**C+n, each of which is adapted to communicate the pressurized hydraulic fracturing fluid from the zipper manifold **145** to a corresponding one of the wells **105**A through **105**C+n. In one or more embodiments, each of the swap stations **135** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/436,189, filed Jun. 10, 2019, now published as U.S. Patent Application Publication No. 2020/0386359, the entire disclosure of which is hereby incorporated herein by reference.

A grease system **155** is adapted to communicate lubricating grease to various components of the frac legs **150**A through **150**C+n, including, for example, pump-down valves **160***a-b*, master valves **165***a-b*, and zipper valves **170***a-b* associated with each of the frac legs **150**A through **150**C+n (which components are shown in FIGS. **2**A-G, **5**A-C, **7**A-I, **9**A-G, **11**, **14**A-B, **16**A-C, and **18**A-G). In one or more embodiments, the grease system **155** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/248,648, filed Jan. 15, 2019, now issued as U.S. Pat. No. 10,724,682, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the grease system **155** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/938,341, filed Jul. 24, 2020, now published as U.S. Patent Application Publication No. 2020/0355322, the entire disclosure of which is hereby incorporated herein by reference in its entirety. In addition, or instead, in one or more embodiments, the grease system **155** is or includes one or more components shown and described in the '749 application, filed Apr. 22, 2020, now published as U.S. Patent Application Publication No. 2020/0248529, the entire disclosure of which is hereby incorporated herein by reference in its entirety. In addition, or instead, in one or more embodiments, the grease system **155** is or includes one or more components shown and described in the '854 application, filed May 13, 2021, the entire disclosure of which is hereby incorporated herein by reference in its entirety.

A controller **156** is adapted to control the grease system **155**, the frac legs **150**A through **150**C+n, or both. In one or more embodiments, the controller **156** is or includes a non-transitory computer readable medium and one or more processors adapted to execute instructions stored on the non-transitory computer readable medium. In one or more embodiments, the controller **156** is located on-site at the well site. Alternatively, the controller **156** may be located remotely from the well site. In one or more embodiments, the controller **156** includes a plurality of controllers. In one or more embodiments, the controller **156** includes a plurality of controllers, with one or more controllers located on-site at the well site and/or one or more other controllers located remotely from the well site.

Referring to FIG. **1**B, in an embodiment, a method **175** for hydraulically fracturing the wells **105**A through **105**C+n by executing a hydraulic fracturing plan using the hydraulic fracturing system **100** of FIG. **1**A is illustrated. The method **175** generally includes: at step(s) **176***a*, perforating a stage of each well using, for example, a wireline perforating system **177**; at step(s) **176***b*, isolating the perforated stage of each well using an object dropped, for example, from a launcher **178** of the wireline perforating system **177**; and, at step(s) **176***c*, hydraulically fracturing the isolated/perforated stage of each well. More particularly, as will be described in further detail below, the method **175** includes: at a step **225**, equalizing a lubricator **220** of the frac leg **150**A associated with the well **105**A, and opening the well **105**A; at a step **230**, perforating a stage of the well **105**A using the wireline perforating system **177**; at a step **235**, closing the well **105**A using the valve apparatus **210** and draining the lubricator **220**; at a step **238***a*, queuing the well **105**A (as indicated at queue position n_2) in a frac queue **239** in preparation for a hydraulic fracturing operation; at a step **238***b*, dequeuing the well **105**B (as indicated at queue position n_1+1) from the frac queue **239** in preparation for the hydraulic fracturing operation; at a step **240**, isolating a stage of the well **105**B in preparation for the hydraulic fracturing operation; at a

step **245**, detecting or otherwise determining that a fracturing stage of the well **105**D has ended; at a step **250**, determining whether to permit a regular swap or a CP swap from hydraulically fracturing (at a step **262**) the well **105**D to hydraulically fracturing (at the step **262**) the well **105**B; at a step **255**, executing the regular swap from hydraulically fracturing (at the step **262**) the well **105**D to hydraulically fracturing (at the step **262**) the well **105**B, or, at a step **260**, executing the CP swap from hydraulically fracturing (at the step **262**) the well **105**D to hydraulically fracturing (at the step **262**) the well **105**B; at the step **262**, hydraulically fracturing the well **105**B; optionally, at a step **263***a*, queuing the well **105**D (as indicated at queue position n_1) in a wireline queue **264** in preparation for perforating a next stage of the well **105**D; optionally, at a step **238***b*, dequeuing the well **105**E (as indicated at queue position 1) from the wireline queue **264** in preparation for perforating a next stage of the well **105**E; and, at a step **265**, latching, filling, and pressure testing the frac leg **150**E associated with the well **105**E.

In one or more embodiments, the controller **156** is adapted to control the grease system **155**, the frac legs **150**A through **150**C+n, or both, in order to execute the method **175** described herein. In one or more embodiments, the frac queue **239** and the wireline queue **264** are stored on a non-transitory computer readable medium that includes or is part of, for example, the controller **156**. In one or more embodiments, the frac queue **239** is or includes a list of data items, commands, etc., stored on the computer readable medium so as to be retrievable by one or more processors in a definite order (but not necessarily in the order stored), and the frac queue **239** is associated with the wells **105**A through **105**C+n, as shown in FIG. **1**B. In addition, or instead, the frac queue **239** can be at least partially populated by an external source, such as, for example, the frac operator. Likewise, in one or more embodiments, the wireline queue **264** is or includes a list of data items, commands, etc., stored on the computer readable medium so as to be retrievable by one or more processors in a definite order (but not necessarily in the order stored), and the wireline queue **264** is associated with the wells **105**A through **105**C+n, as shown in FIG. **1**B. In addition, or instead, the wireline queue **264** can be at least partially populated by an external source, such as, for example, the wireline operator.

Referring to FIGS. **2**A through **2**G, in an embodiment, the frac leg **150**A associated with the well **105**A is illustrated, which frac leg **150**A includes: a wellhead including the master valves **165***a-b* (such as, for example, gate valves) operably coupled to, and adapted to be in fluid communication with, the well **105**A, each of the master valves **165***a-b* including associated grease ports (or "GPs") **185***a-b*; the pump-down valves **160***a-b* (such as, for example, gate valves) operably coupled to, and adapted communicate fluid between, a pump-down truck **190** and the well **105**A, via the master valves **165***a-b*, each of the pump-down valves **160***a-b* including an associated GP **195**; and the zipper valves **170***a-b* (such as, for example, gate valves) operably coupled to, and adapted communicate fluid between, the zipper manifold **145** and the well **105**A, via the master valves **165***a-b*, each of the zipper valves **170***a-b* including associated GPs **200***a-b*. In one or more embodiments, one or both of the zipper valves **170***a-b* of each of the frac legs **150**A through **150**C+n include(s), or is/are part of, the zipper manifold **145**. In one or more embodiments, as in FIGS. **2**A through **2**G, the frac leg **150**A associated with the well **105**A also includes a flow block **205** to which the pump-down valves **160***a-b* and the zipper valves **170***a-b* are operably coupled.

The frac leg **150**A associated with the well **105**A further includes a valve apparatus **210** via which both the wireline perforating system **177** and the object launched from, for example, the launcher **178**, are permitted entry to the well **105**A. The valve apparatus **210** includes: a containment area **215***a* (labeled "WELL") adapted to be in fluid communication with the well **105**A via the master valves **165***a-b*; a containment area **215***b* (labeled "LUB") adapted to be in fluid communication with the lubricator **220** of the wireline perforating system **177**; and a containment area **215***c* (labeled "LL") adapted to be in fluid communication with the containment area **215***a* via a flow control device **221***a* (e.g., a flapper-type flow control device), and adapted to be in fluid communication with the containment area **215***b* via a flow control device **221***b* (e.g., a flapper-type flow control device).

An equalization ("EQ") valve **222***a* is connected between the containment areas **215***a* and **215***c*, which EQ valve **222***a* is openable to permit pressure equalization between the containment areas **215***a* and **215***c* when the flow control device **221***a* is closed. Likewise, an equalization valve **222***b* is connected between the containment areas **215***b* and **215***c*, which EQ valve **222***b* is openable to permit pressure equalization between the containment areas **215***b* and **215***c* when the flow control device **221***b* is closed. Additionally, an EQ valve **222***c* is connected between the lubricator **220** and atmosphere (labeled "ATM"), which EQ valve **222***c* permits pressure equalization between the lubricator **220** and atmosphere. A drain **223** is connected between a latch **234** (via which the lubricator **220** is detachably couplable to the valve apparatus **210**) and a pump station **224***a*, via which drain **223** fluid is communicable to and/or from the lubricator **220**, using, for example, an auto-fill/auto-drain pump of the pump station **224***a*, when the lubricator **220** is connected to the valve apparatus **210** via the latch **234**. Finally, when the lubricator **220** is connected to the valve apparatus **210** via the latch **234**, fluid can also be communicated to the lubricator **220** (via, for example, the containment area **215***c* and the EQ valve **222***b*) using one or more boost pump(s) **224***b* in order to increase a fluid pressure in the lubricator **220**, aiding in pressure equalization between the lubricator **220** and the associated wellhead. For example, the boost pump(s) **224***b* may include: a first boost pump capable of pumping at relatively higher volumes and relatively lower pressures; and a second boost pump capable of pumping at relatively lower volumes and relatively higher pressures. The first and second boost pumps are used in combination to achieve combined pumping at relatively higher volumes and relatively higher pressures. In addition, or instead, a third boost pump capable of pumping at relatively higher volumes and relatively higher pressures may be used. Moreover, although shown as being connected to, and in fluid communication with, the containment area **215***c*, one or more of the boost pump(s) **224***b* may instead be, include, or be part of the pump station **224***a*.

In one or more embodiments, the valve apparatus **210** is or includes one or more components shown and described in U.S. patent application Ser. No. 15/487,785, filed Apr. 14, 2017, now issued as U.S. Pat. No. 10,662,740, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the valve apparatus **210** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/721,203, filed Dec. 19, 2019, now published as U.S.

Patent Application Publication No. 2020/0123876, the entire disclosure of which is hereby incorporated herein by reference.

In one or more embodiments, the launcher **178** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/248,633, filed Jan. 15, 2019, now issued as U.S. Pat. No. 10,584,552, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the launcher **178** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/801,911, filed Feb. 26, 2020, now published as U.S. Patent Application Publication No. 2020/0190933, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the launcher **178** is or includes one or more components shown and described in U.S. patent application Ser. No. 16/803,156, filed Feb. 27, 2020, now published as U.S. Patent Application Publication No. 2020/0190934, the entire disclosure of which is hereby incorporated herein by reference.

In one or more embodiments, the frac legs **150**B through **150**C+n associated with each of the wells **105**B through **105**C+n, respectively, are substantially identical to the frac leg **150**A associated with the well **105**A; therefore, the frac legs **150**B through **150**C+n associated with each of the wells **105**B through **105**C+n will not be described in further detail. Accordingly, each of the frac legs **150**B through **150**C+n associated with the wells **105**B through **105**C+n includes features/components substantially identical to corresponding features/components of the frac leg **150**A associated with the well **105**A, which substantially identical features/components are given the same reference numerals and will also not be described in further detail.

Referring to FIG. **3**, with continuing reference to FIGS. **2**A through **2**G, in an embodiment, various sub-steps **226***a-h* of the step **225** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **225** is or includes equalizing the lubricator **220** of the frac leg **150**A associated with the well **105**A, and opening the well **105**A. In one or more embodiments, the lubricator **220** is or includes one or more components shown and described in the '749 application. In addition, or instead, in one or more embodiments, the lubricator **220** is or includes one or more components shown and described in the '854 application.

At the sub-step **226***a*, the boost pump(s) **224***b* is/are turned on to increase a fluid pressure in the lubricator **220** of the frac leg **150**A, thereby aiding in pressure equalization between said lubricator **220** and the well **105**A, as shown in FIGS. **2**A and **3** (indicated by arrow **232***a* in FIG. **2**A). As shown in FIG. **1**B, the step **265** of latching, filling, and pressure testing the frac leg **150**A associated with the well **105**A is executed on the frac leg **150**A just prior to the execution of the sub-step **226***a* on the frac leg **150**A. The step **265** will be described in further detail below as executed on the frac leg **150**E; however, the description below also applies to the execution of the step **265** on the frac leg **150**A. As a result, in one or more embodiments, just prior to execution of the sub-step **226***a* on the frac leg **150**A: the EQ valve **222***c* is closed; the drain **223** is closed; the lubricator **220** extends within, and is latched to, the latch **234**; the flow control device **221***b* is closed; the EQ valve **222***b* is open; the flow control device **221***a* is closed; the EQ valve **222***a* is closed; the pump-down valves **160***a-b* closed, and grease from the grease system **155** is withheld from the corresponding GPs **195**; the zipper valves **170***a-b* are closed, and grease from the grease system **155** is withheld from the corresponding GPs **200***a-b*; and the master valves **165***a-b* are open, and grease from the grease system **155** is communicated to the corresponding GPs **185***a-b*. The communication of grease from the grease system **155** to the corresponding GPs **185***a-b* is not indicated by arrows in FIG. **2**A but is instead indicated by a lack of shading of the GPs **185***a-b* as shown in FIG. **2**A; the same lack of shading indication applies to the GPs **185***a-b* as shown in FIGS. **2**B-G, **5**A-C, **7**A-I, **9**A-G, **11**, **14**A-B, **16**A-C, and **18**A-G.

At the sub-step **226***b*, respective fluid pressures within the containment areas **215***a* and **215***c* are compared to determine whether the fluid pressure in the lubricator **220** of the frac leg **150**A has been equalized to within a threshold amount of the fluid pressure in the well **105**A. If it is determined that the fluid pressure in the lubricator **220** of the frac leg **150**A has not been equalized to within the threshold amount of the fluid pressure in the well **105**A, the EQ valve **222***a* is opened at the sub-step **226***c* to further encourage such pressure equalization between said lubricator **220** and the well **105**A, as shown in FIGS. **2**B and **3**. Alternatively, the order in which the sub-steps **226***a* and **226***c* are executed may be reversed, or one of the sub-steps **226***a* and **226***c* may be omitted altogether.

At the sub-step **226***d*, once it is determined that the fluid pressure in the lubricator **220** of the frac leg **150**A has been equalized to within the threshold amount of the fluid pressure in the well **105**A, the flow control device **221***a* is opened, as shown in FIGS. **2**C and **3**. At the sub-step **226***e*, the EQ valve **222***a* is closed, as shown in FIGS. **2**D and **3**. However, in those embodiments in which the sub-step **226***c* of opening the EQ valve **222***a* is omitted, the sub-step **226***e* of closing the EQ valve **222***a* is also omitted. Additionally, the sub-step **226***e* may be executed to close the EQ valve **222***a* at any time before, during, or after, execution of the sub-steps **226***d*, **226***f*, or **226***g*. At the sub-step **226***f*, the flow control device **221***b* is opened, as shown in FIGS. **2**E and **3**. At the sub-step **226***g*, the boost pump(s) **224***b* is/are turned off, as shown in FIGS. **2**F and **3**. At the sub-step **226***h*, the EQ valve **222***b* is closed, as shown in FIGS. **2**G and **3**. Once the sub-steps **226***a-h* are executed, the well **105**A is ready for execution of the step **230**, namely perforating a stage of the well **105**A using the wireline perforating system **177**, as will be described in detail below in connection with FIGS. **4** and **5**A through **5**C.

Referring to FIGS. **4** and **5**A through **5**C, in an embodiment, various sub-steps **231***a-h* of the step **230** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **230** is or includes perforating a stage of the well **105**A using the wireline perforating system **177**. In one or more embodiments, the wireline perforating system **177** is or includes the pump-down truck **190**, a wireline truck **233**, the lubricator **220**, the launcher **178**, the latch **234** (via which the lubricator **220** is detachably couplable to the valve apparatus **210**), or any combination thereof. In addition, or instead, the wireline perforating system **177** may be or include one or more components shown and described in the '749 application. In addition, or instead, in one or more embodiments, the wireline perforating system **177** may be or include one or more components shown and described in the '854 application.

At the sub-step **231***a*, a plug and perforating gun(s) are deployed from the lubricator **220**, as shown in FIGS. **4** and **5**A (indicated by arrow **232***b* in FIG. **5**A). At the sub-step **231***b*, the pump-down valves **160***a-b* are opened, as shown in FIGS. **4** and **5**B. At the sub-step **231***c*, grease from the grease system **155** is communicated to the corresponding GPs **195** of the pump-down valves **160***a-b*, respectively, as

shown in FIGS. **4** and **5**B (indicated by arrows **232***c* in FIG. **5**B). At the sub-step **231***d*, the plug and perforating gun(s) are pumped down into the well **105**A using the pump-down truck **190**, as shown in FIGS. **4** and **5**B (indicated by arrows **232***d* and **232***e* in FIG. **5**B). At the sub-step **231***e*, the pump-down valves **160***a-b* are closed, and grease from the grease system **155** is withheld from the corresponding GPs **195**, as shown in FIGS. **4** and **5**C. Additionally, the sub-step **231***e* may be executed to close the pump-down valves **160***a-b* at any time before, during, or after, execution of the sub-steps **231***f*, **231***g*, or **231***h*. At the sub-step **231***f*, the plug is set in the well **105**A, as shown in FIG. **4**. At the sub-step **231***g*, the perforating gun(s) are detonated in the well **105**A, as shown in FIG. **4**. Finally, at the sub-step **231***h*, the spent perforating gun(s) are retrieved from the well **105**A, as shown in FIGS. **4** and **5**C (indicated by arrows **232***f* and **232***g* in FIG. **5**C). Once the sub-steps **231***a-h* are executed, the well **105**A is ready for execution of the step **235**, namely closing the well **105**A using the valve apparatus **210** and draining the lubricator **220**, as will be described in detail below in connection with FIGS. **6** and **7**A through **7**I.

Referring to FIGS. **6** and **7**A through **7**I, in an embodiment, various sub-steps **236***a-n* of the step **235** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **235** is or includes closing the well **105**A using the valve apparatus **210** and draining the lubricator **220**. At the sub-step **236***a*, bump up of the retrieved spent perforating gun(s) within the lubricator **220** is determined and/or confirmed. The sub-step **236***a* can be achieved in several ways, including, but not limited to: prompting the wireline operation for bump up; checking with the wireline operator to determine whether bump up has occurred; detecting bump up using a switch (e.g., a proximity switch) and/or another sensor (e.g., an accelerometer, a wireline speed sensor, a wireline tension sensor, a wireline length sensor, a wireline direction sensor, the like, or any combination thereof) associated with the lubricator **220**; receiving verbal confirmation that bump up has occurred; or any combination thereof.

At the sub-step **236***b*, once the bump up of the retrieved spent perforating gun(s) within the lubricator **220** is determined and/or confirmed, the flow control device **221***b* is closed, as shown in FIGS. **6** and **7**A. At the sub-step **236***c*, the flow control device **221***a* is closed, as shown in FIGS. **6** and **7**B. At the sub-step **236***d*, the EQ valve **222***c* is opened, as shown in FIGS. **6** and **7**C, to bleed down a fluid pressure in the lubricator **220** (indicated by arrow **232***g* in FIG. **7**C). At the sub-step **236***e*, the EQ valve **222***b* is opened, as shown in FIGS. **6** and **7**D. At the sub-step **236***f*, the lubricator **220** is checked to determine whether the fluid pressure in the lubricator **220** has dropped (or "bled down") to below a threshold value (e.g., a bleed PSI limit), as shown in FIG. **6**. At the sub-step **236***g*, once it has been determined that the fluid pressure in the lubricator **220** has dropped to below the threshold value, the EQ valve **222***b* is closed, as shown in FIGS. **6** and **7**E.

At the sub-step **236***h*, the drain **223** is opened, as shown in FIGS. **6** and **7**F. At the sub-step **236***i*, the auto-drain pump of the pump station **224***a* is turned on to drain fluid from the lubricator **220** via the drain **223**, as shown in FIGS. **6** and **7**F (indicated by arrow **232***h* in FIG. **7**F). At the sub-step **236***j*, the auto-drain pump is allowed to finish auto-draining the lubricator **220** before the drain **223** is closed, as shown in FIGS. **6** and **7**G. At the sub-step **236***k*, the latch **234** is unlatched, as shown in FIGS. **6** and **7**G. At the sub-step **236***i*, the lubricator **220** is removed, as shown in FIGS. **6** and **7**H (indicated by arrow **232***i* in FIG. **7**H). At the sub-step **236***m*, the EQ valve **222***c* is closed, as shown in FIG. **7**I. Finally, at the sub-step **236***n*, an object drop (e.g., from the launcher **178**) and/or a pressure test is/are enabled, as shown in FIG. **6**. More particularly, once the sub-steps **236***a-n* are executed, the well **105**A is ready for execution of the step **240**, namely isolating a stage of the well **105**A in preparation for a hydraulic fracturing operation. The step **240** will be described in further detail below (in connection with FIGS. **8** and **9**A through **9**G) as executed on the frac leg **150**B to isolate a stage of the well **105**B; however, the description below also applies to the execution of the step **240** on the frac leg **150**A to isolate a stage of the well **105**A.

Referring to FIGS. **8** and **9**A through **9**G, in an embodiment, various sub-steps **241***a-o* of the step **240** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **240** is or includes isolating a stage of the well **105**B in preparation for a hydraulic fracturing operation. In one or more embodiments, the step **240** that is or includes isolating the stage of the well **105**B includes or is part of a hydraulic fracturing operation. At the sub-step **241***a*, the EQ valve **222***b* is opened to facilitate pressure equalization between the containment areas **215***b* and **215***c*, as shown in FIGS. **8** and **9**A. At the sub-step **241***b*, an object is dropped from the launcher **178**, as shown in FIGS. **8** and **9**A. At the sub-step **241***c*, respective fluid pressures within the containment areas **215***b* and **215***c* are checked to determine whether the containment areas **215***b* and **215***c* have been pressure equalized to within a threshold amount, as shown in FIG. **8**. At the sub-step **241***d*, once it is determined that the containment areas **215***b* and **215***c* have been pressure equalized to within the threshold amount, the flow control device **221***b* is opened, as shown in FIGS. **8** and **9**B. At the sub-step **241***e*, the object passes into the containment area **215***c*, as shown in FIGS. **8** and **9**C. At the sub-step **241***f*, the flow control device **221***b* is closed, as shown in FIGS. **8** and **9**C. At the sub-step **241***g*, the EQ valve **222***b* is closed, as shown in FIGS. **8** and **9**D.

At the sub-step **241***h*, the boost pump(s) **224***b* is/are turned on to increase a fluid pressure in the containment area **215***c*, thereby aiding in pressure equalization between the containment areas **215***a* and **215***c*, as shown in FIGS. **8** and **9**D (indicated by arrow **232***j* in FIG. **9**D). At the sub-step **241***i*, respective fluid pressures within the containment areas **215***a* and **215***c* are compared to determine whether the fluid pressure in the containment area **215***c* has been equalized to within a threshold amount of the fluid pressure in the well **105**B. If it is determined that the fluid pressure in the containment area **215***c* has not been equalized to within the threshold amount of the fluid pressure in the well **105**B, the EQ valve **222***a* is opened at the sub-step **241***j* to further encourage such pressure equalization between said containment area **215***c* and the well **105**B, as shown in FIGS. **8** and **9**E. Alternatively, the order in which the sub-steps **241***h* and **241***j* are executed may be reversed, or one of the sub-steps **241***h* and **241***j* may be omitted altogether.

At the sub-step **241***k*, once it is determined that the fluid pressure in the containment area **215***c* has been equalized to within the threshold amount of the fluid pressure in the well **105**B, the flow control device **221***a* is opened, as shown in FIGS. **8** and **9**F. At the sub-step **241***l*, the boost pump(s) **224***b* is/are turned off, as shown in FIGS. **8** and **9**F. At the sub-step **241***m*, the EQ valve **222***a* is closed, as shown in FIGS. **8** and **9**F. However, in those embodiments in which the sub-step **241***j* of opening the EQ valve **222***a* is omitted, the sub-step **241***m* of closing the EQ valve **222***a* is also omitted. Additionally, the sub-step **241***m* may be executed to close the EQ valve **222***a* at any time before, during, or after, execution of the sub-steps **241***k* or **241***l*. At the sub-step

241*n*, the object is permitted passage to the well **105**B, as shown in FIGS. **8** and **9**G. Finally, at the sub-step **241***o*, the flow control device **221***a* is closed, as shown in FIGS. **8** and **9**G. Once the sub-steps **241***a-o* are executed, the well **105**B is ready for execution of the step **245**, namely detecting or otherwise determining that a fracturing stage of the well **105**D has ended, as will be described in detail below in connection with FIGS. **10** and **11**.

Referring to FIGS. **10** and **11**, in an embodiment, various sub-steps **246***a-c* of the step **245** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **245** is or includes detecting or otherwise determining that a fracturing stage of the well **105**D has ended. At the sub-step **246***a*, the n_1 well (e.g., well **105**D) is monitored for an external signal indicating the fracturing stage has ended, as shown in FIG. **10**. At the sub-step **246***b*, the n_1 well's frac data is monitored to determine whether the fracturing stage has ended, as shown in FIG. **10**. Finally, at the sub-step **246***c*, the zipper valves **170***a-b* associated with the n_1+1 well (e.g., well **105**B) are dequeued and compared against the frac order (if available). During execution of the sub-steps **246***a-c*: grease from the grease system **155** is communicated to the corresponding GPs **200***a-b* of the zipper valves **170***a-b*, respectively, as shown in FIG. **11** (indicated by arrows **232***k* in FIG. **5**B); and hydraulic fracturing fluid is communicated from the zipper manifold **145** to the well **105**D, as shown in FIG. **11** (indicated by arrows **232***l* and **232***m* in FIG. **11**).

Referring to FIG. **12**, in an embodiment, various sub-steps **251***a-c* of the step **250** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **250** is or includes determining whether to permit a regular swap or a CP swap from hydraulically fracturing (at a step **262**) the well **105**D to hydraulically fracturing (at the step **262**) the well **105**B, by, for example: checking an idle rate of the hydraulic fracturing system **100** at the sub-step **251***a*; and detecting or otherwise determining that an idle rate of the hydraulic fracturing system **100** is below an upper threshold and above a lower threshold at the sub-step **251***b*, or, at the sub-step **251***c*, detecting or otherwise determining that the idle rate of the hydraulic fracturing system **100** is below the lower threshold. More particularly, as shown in FIG. **12**: at the sub-step **251***a*, a frac rate of the n_1 well (e.g., well **105**D) is checked; and, at the sub-step **251***b*, if the frac rate of the n_1 well is below the upper threshold rate (e.g., 10 bbl) and above the lower threshold rate (e.g., 0 bbl) for a threshold amount of time (e.g., 10 s), a CP swap from hydraulically fracturing the n_1 well to hydraulically fracturing the n_1+1 well is permitted at step **260**, but, at the sub-step **251***c*, if the frac rate of the n_1 well is below the lower threshold rate for a threshold amount of time, only a regular swap from hydraulically fracturing the n_1 well to hydraulically fracturing the n_1+1 well is permitted at step **255**.

Referring to FIGS. **13** and **14**A through **14**B, in an embodiment, various sub-steps **256***a-c* of the step **255** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **255** is or includes executing the regular swap from hydraulically fracturing (at the step **262**) the n_1 well (e.g., well **105**D) to hydraulically fracturing (at the step **262**) the n_1+1 well (e.g., well **105**B). At the sub-step **256***a*, the n_1 well's (e.g., well **105**D) zipper valves **170***a-b* are closed, and grease from the grease system **155** is withheld from the corresponding GPs **200***a-b*, as shown in FIGS. **13** and **14**A. At the sub-step **256***b*, a signal to advance is received, as shown in FIG. **13**. For example, a user input such as a screen click may be received at the sub-step **256***b*. In addition, or instead, an external signal, such as an external signal from the frac operator, may be received at the sub-step **256***b*. In addition, or instead, a signal to advance may be generated by detecting or otherwise determining that pressure equalization has been achieved to within a threshold amount between the hydraulic fracturing pressure in the zipper manifold **145** and the fluid pressure in the n_1+1 well (e.g., well **105**B) for a threshold amount of time. At the sub-step **256***c*, the n_1+1 well's zipper valves **170***a-b* are opened, as shown in FIGS. **13** and **14**B, so that hydraulic fracturing fluid is communicated from the zipper manifold **145** to the n_1+1 well (indicated by arrows **232***n* and **232***o* in FIG. **14**B), and grease from the grease system **155** is communicated to the corresponding GPs **200***a-b* (indicated by arrow **232***p* in FIG. **14**B).

Referring to FIGS. **15** and **16**A through **16**E, in an embodiment, various sub-steps **261***a-c* of the step **260** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **260** is or includes executing the CP swap from hydraulically fracturing (at the step **262**) the n_1 well (e.g., well **105**D) to hydraulically fracturing (at the step **262**) the n_1+1 well (e.g., well **105**B). At the sub-step **261***a*, the n_1+1 well's (e.g., well **105**B) zipper valves **170***a-b* are opened, as shown in FIGS. **15** and **16**A, hydraulic fracturing fluid is communicated from the zipper manifold **145** to the n_{1+1} well (indicated by arrows **232***n* and **232***o* in FIG. **16**A), and grease from the grease system **155** is communicated to the corresponding GPs **200***a-b* (indicated by arrow **232***p* in FIG. **16**A). At the sub-step **261***b*, both the n_1+1 well's (e.g., well **105**B) zipper valves **170***a-b* and the n_1 well's (e.g., well D) zipper valves **170***a-b* are allowed to fully open, as shown in FIGS. **15**, **16**A and **16**B, so that: hydraulic fracturing fluid is communicated from the zipper manifold **145** to the n_1 well (indicated by arrows **232***l* and **232***m* in FIG. **16**B) and the n_1+1 well (indicated by arrows **232***n* and **232***o* in FIG. **14**A); and grease from the grease system **155** is communicated to the corresponding GPs **200***a-b* (indicated by arrows **232***p* and **232***k* in FIGS. **16**A and **16**B, respectively). Finally, at the sub-step **261***c*, the n_1 well's (e.g., well **105**D) zipper valves **170***a-b* are closed, as shown in FIGS. **15** and **16**C, and grease from the grease system **155** is withheld from the corresponding GPs **200***a-b*.

As shown in FIGS. **16**D and **16**E, executing the CP swap from hydraulically fracturing (at the step **262**) the n_1 well (e.g., well **105**D) to hydraulically fracturing (at the step **262**) the n_1+1 well (e.g., well **105**B) transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous and the total time between stages measured at treatment pressure is less than 20 seconds (as fast as 19 seconds in some instances).

Referring to FIGS. **17** and **18**A through **18**G, in an embodiment, various sub-steps **266***a-s* of the step **265** of the method **175** illustrated in FIG. **1**B are shown in detail, which step **265** is or includes latching, filling, and pressure testing the frac leg **150**E associated with the well **105**E in preparation for perforating a stage of the well **105**E using the wireline perforating system **177** (in a manner similar to that described above in connection with the well **105**A and shown in FIGS. **5**A through **5**C). At the sub-step **266***a*, the lubricator **220** is stabbed into the latch **234**, as shown in FIGS. **17** and **18**A (indicated by arrow **232***q* in FIG. **18**A). At the sub-step **266***b*, the EQ valve **222***c* is closed, as shown in FIGS. **17** and **18**B. At the sub-step **266***c*, the latch close relay is energized to close the latch **234**, thereby connecting the lubricator **220** to the valve apparatus **210**, as shown in FIGS. **17** and **18**C. At the sub-step **266***d*, a latch close proximity switch is checked to determine whether the latch **234** has successfully latched the lubricator **220** to the valve

apparatus **210**. At the sub-step **266***e*, once it is determined that the latch **234** has successfully latched the lubricator **220** to the valve apparatus **210**, the latch close relay is de-energized, as shown in FIG. **17**. At the sub-step **266***f*, a test pressure relay is energized, as shown in FIG. **17**. At the sub-step **266***g*, a determination is made as to whether the connection of the lubricator **220** to the valve apparatus **210** via the latch **234** is or is not capable of holding pressure, as shown in FIG. **17**. At the sub-step **266***h*, once the determination is made that the connection of the lubricator **220** to the valve apparatus **210** via the latch **234** is capable of holding pressure, the test pressure relay is de-energized, as shown in FIG. **17**.

At the sub-step **266***i*, the drain **223** is opened, as shown in FIGS. **17** and **18**D. At the sub-step **266***j*, the EQ valve **222***c* is opened, as shown in FIGS. **17** and **18**E. At the sub-step **266***k*, the auto-fill pump of the pump station **224***a* is turned on to fill the lubricator **220** via the open drain **223**, as shown in FIGS. **17** and **18**E (indicated by arrow **232***r* in FIG. **18**E). At the sub-step **266***l*, the auto-fill pump is allowed to finish auto-filling the lubricator **220**, as shown in FIG. **17**. At the sub-step **266***m*, the drain **223** is closed, as shown in FIGS. **17** and **18**F. At the sub-step **266***n*, the EQ valve **222***c* is closed, as shown in FIGS. **17** and **18**F. At the sub-step **266***o*, the EQ valve **222***b* is opened, as shown in FIGS. **17** and **18**F. At the sub-step **266***p*, the boost pump(s) **224***b* is/are turned on to increase the fluid pressure within the lubricator **220**, as shown in FIGS. **17** and **18**F (indicated by arrow **232***s* in FIG. **18**F). At the sub-step **266***q*, a determination is made as to whether the pressure in the lubricator **220** comes to within the pressure in the well **105**E by a threshold amount (e.g., 500 PSI), as shown in FIG. **17**. Once the determination is made that the pressure in the lubricator **220** comes to within the pressure in the well **105**E by the threshold amount, the boost pump(s) **224***b* is/are turned off at the sub-step **266***r*, and the EQ valve **222***b* is closed at the sub-step **266***s* in preparation for the next wireline swap (e.g., to the well **105**E), as shown in FIGS. **17** and **18**G.

Referring to FIGS. **19**A and **19**B, in an embodiment, a method **270** for fracturing the wells **105**A through **105**C+n using the hydraulic fracturing system **100** of FIG. **1**A is illustrated, which method **270** includes swapping from simultaneously fracturing the wells n_1 and n_3 (e.g., wells **105**D and **105**X) to simultaneously fracturing the wells n_1+1 and n_3+1 (e.g., wells **105**B and **105**V). More particularly, the method **270** includes steps substantially identical to corresponding steps of the method **175** described above, which steps are given the same reference numerals. In addition, the method **270** includes additional steps executable to simultaneously fracture the n_1 and n_3 wells (e.g., wells **105**D and **105**X), and to swap from simultaneously fracturing the n_1 and n_3 wells to simultaneously fracturing the n_1+1 and n_3+1 wells (e.g., wells **105**B and **105**V), which additional steps are given the same reference numerals, except that the suffix "" is added. Specifically, in some instances the suffix "" signifies that the referenced step of the method **270** is substantially identical to the corresponding step of the method **175**, except that the referenced step is instead performed on a different one of the wells than that on which the corresponding step of the method **175** is performed (i.e., the steps **225'**, **230'**, **235'**, **238***a*', **239'**, **238***b*', **263***a*', **264'**, **263***b*', **265'**, and **268'** fall into this category), while, in other instances, the suffix "" signifies that the referenced step of the method **270** is substantially similar to the corresponding step of the method **175**, except that the referenced step is simultaneously performed on another one of the wells other than that on which the corresponding step of the method **175** is performed (i.e., the steps **240'**, **245'**, **250'**, **255'**, **260'**, and **262'** fall into this category). In one or more embodiments, the controller **156** is adapted to control the grease system **155**, the frac legs **150**A through **150**C+n, or both, in order to execute the method **270** described herein.

Referring to FIG. **20**, with continuing reference to FIGS. **1**A through **19**B, an illustrative node **1000** for implementing one or more of the embodiments of one or more of the controller(s) (e.g., the controller **156**), element(s), apparatus, system(s) (e.g., the hydraulic fracturing system **100**), method(s) (e.g., the method **175**, the method **270**, or both), step(s), and/or sub-step(s), or any combination thereof, described above and/or illustrated in FIGS. **1**A through **19**B is depicted. The node **1000** includes a microprocessor **1000***a*, an input device **1000***b*, a storage device **1000***c*, a video controller **1000***d*, a system memory **1000***e*, a display **1000***f*, and a communication device **1000***g* all interconnected by one or more buses **1000***h*. In one or more embodiments, the storage device **1000***c* may include a hard drive, CD-ROM, optical drive, any other form of storage device and/or any combination thereof. In one or more embodiments, the storage device **1000***c* may include, and/or be capable of receiving, a CD-ROM, DVD-ROM, or any other form of non-transitory computer-readable medium that may contain executable instructions. In one or more embodiments, the communication device **1000***g* may include a modem, network card, or any other device to enable the node **1000** to communicate with other node(s). In one or more embodiments, the node and the other node(s) represent a plurality of interconnected (whether by intranet or Internet) computer systems, including without limitation, personal computers, mainframes, PDAs, smartphones and cell phones.

In one or more embodiments, one or more of the embodiments described above and/or illustrated in FIGS. **1**A through **19**B include at least the node **1000** and/or components thereof, and/or one or more nodes that are substantially similar to the node **1000** and/or components thereof. In one or more embodiments, one or more of the above-described components of the node **1000** and/or the embodiments described above and/or illustrated in FIGS. **1**A through **19**B include respective pluralities of same components.

In one or more embodiments, one or more of the embodiments described above and/or illustrated in FIGS. **1**A through **19**B include a computer program that includes a plurality of instructions, data, and/or any combination thereof; an application written in, for example, Arena, HyperText Markup Language (HTML), Cascading Style Sheets (CSS), JavaScript, Extensible Markup Language (XML), asynchronous JavaScript and XML (Ajax), and/or any combination thereof; a web-based application written in, for example, Java or Adobe Flex, which in one or more embodiments pulls real-time information from one or more servers, automatically refreshing with latest information at a predetermined time increment; or any combination thereof.

In one or more embodiments, a computer system typically includes at least hardware capable of executing machine readable instructions, as well as the software for executing acts (typically machine-readable instructions) that produce a desired result. In one or more embodiments, a computer system may include hybrids of hardware and software, as well as computer sub-systems.

In one or more embodiments, hardware generally includes at least processor-capable platforms, such as client-machines (also known as personal computers or servers), and hand-held processing devices (such as smart phones, tablet computers, or personal computing devices (PCDs), for

example). In one or more embodiments, hardware may include any physical device that is capable of storing machine-readable instructions, such as memory or other data storage devices. In one or more embodiments, other forms of hardware include hardware sub-systems, including transfer devices such as modems, modem cards, ports, and port cards, for example.

In one or more embodiments, software includes any machine code stored in any memory medium, such as RAM or ROM, and machine code stored on other devices (such as floppy disks, flash memory, or a CD-ROM, for example). In one or more embodiments, software may include source or object code. In one or more embodiments, software encompasses any set of instructions capable of being executed on a node such as, for example, on a client machine or server.

In one or more embodiments, combinations of software and hardware could also be used for providing enhanced functionality and performance for certain embodiments of the present disclosure. In an embodiment, software functions may be directly manufactured into a silicon chip. Accordingly, it should be understood that combinations of hardware and software are also included within the definition of a computer system and are thus envisioned by the present disclosure as possible equivalent structures and equivalent methods.

In one or more embodiments, computer readable mediums include, for example, passive data storage, such as a random-access memory (RAM) as well as semi-permanent data storage such as a compact disk read only memory (CD-ROM). One or more embodiments of the present disclosure may be embodied in the RAM of a computer to transform a standard computer into a new specific computing machine. In one or more embodiments, data structures are defined organizations of data that may enable an embodiment of the present disclosure. In an embodiment, a data structure may provide an organization of data, or an organization of executable code.

In one or more embodiments, any networks and/or one or more portions thereof may be designed to work on any specific architecture. In an embodiment, one or more portions of any networks may be executed on a single computer, local area networks, client-server networks, wide area networks, internets, hand-held and other portable and wireless devices and networks.

In one or more embodiments, a database may be any standard or proprietary database software. In one or more embodiments, the database may have fields, records, data, and other database elements that may be associated through database specific software. In one or more embodiments, data may be mapped. In one or more embodiments, mapping is the process of associating one data entry with another data entry. In an embodiment, the data contained in the location of a character file can be mapped to a field in a second table. In one or more embodiments, the physical location of the database is not limiting, and the database may be distributed. In an embodiment, the database may exist remotely from the server, and run on a separate platform. In an embodiment, the database may be accessible across the Internet. In one or more embodiments, more than one database may be implemented.

In one or more embodiments, a plurality of instructions stored on a computer readable medium may be executed by one or more processors to cause the one or more processors to carry out or implement in whole or in part one or more of the embodiments of one or more of the controller(s) (e.g., the controller **156**), element(s), apparatus, system(s) (e.g., the hydraulic fracturing system **100**), method(s) (e.g., the method **175**, the method **270**, or both), step(s), and/or sub-step(s), or any combination thereof, described above and/or illustrated in FIGS. **1**A through **19**B. In one or more embodiments, such a processor may include one or more of the microprocessor **1000***a*, any processor(s) that are part of the components of the hydraulic fracturing system **100**, such as, for example, the controller **156**, and/or any combination thereof, and such a computer readable medium may be distributed among one or more components of the system. In one or more embodiments, such a processor may execute the plurality of instructions in connection with a virtual computer system. In one or more embodiments, such a plurality of instructions may communicate directly with the one or more processors, and/or ay interact with one or more operating systems, middleware, firmware, other applications, and/or any combination thereof, to cause the one or more processors to execute the instructions.

A first method has been disclosed. The first method generally includes: (a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation includes pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well; (b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time; (c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well; (d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation includes pumping fluid into the second well via the second valve; and (e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well; wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, the second valve is opened after step (b). In one or more embodiments, the first valve includes a grease port; and the method further includes withholding grease from the grease port after step (e). In one or more embodiments, the second valve includes a grease port; and the method further includes: during and/or after opening the second valve, communicating grease to the grease port of the second valve. In one or more embodiments, each of the first and second valves is a zipper valve. In one or more embodiments, step (d): further includes measuring a flow rate of the fluid being pumped into the second well; and is, or is part of, a hydraulic fracturing stage of the second well; and the method further includes: determining that the hydraulic fracturing stage of the second well has ended; determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold; closing the second valve associated with the second well; withholding grease from a grease port of the second valve; receiving a signal to advance; opening a third valve associated with a third well; and during and/or after opening the third valve, communicating grease to a grease port of the third valve.

A first apparatus has also been disclosed. The first apparatus generally includes: a non-transitory computer readable

medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed: (a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation includes pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well; (b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time; (c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well; (d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation includes pumping fluid into the second well via the second valve; and (e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well; wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, the second valve is opened after step (b). In one or more embodiments, the first valve includes a grease port; and, when the instructions are executed by the one or more processors, the following step is also executed: withholding grease from the grease port after step (e). In one or more embodiments, the second valve includes a grease port; and, when the instructions are executed by the one or more processors, the following step is also executed: during and/or after opening the second valve, communicating grease to the grease port of the second valve. In one or more embodiments, each of the first and second valves is a zipper valve. In one or more embodiments, step (d): further includes measuring a flow rate of the fluid being pumped into the second well; and is, or is part of, a hydraulic fracturing stage of the second well; and, when the instructions are executed by the one or more processors, the following steps are also executed: determining that the hydraulic fracturing stage of the second well has ended; determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold; closing the second valve associated with the second well; withholding grease from a grease port of the second valve; receiving a signal to advance; opening a third valve associated with a third well; and during and/or after opening the third valve, communicating grease to a grease port of the third valve.

A second method has also been disclosed. The second method generally includes: (a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well; (b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue; (c) permitting hydraulic fracturing of the second well; (d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and (e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well. In one or more embodiments, step (c) further includes measuring a flow rate of the fluid being pumped into the second well. In one or more embodiments, step (e) further includes, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e). In one or more embodiments, the step (e) further includes, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e). In one or more embodiments, the method further includes: (f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well; (g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue; (h) permitting hydraulic fracturing of the fourth well; (i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue; and (j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well. In one or more embodiments, steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; step (h) includes opening a fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and step (j) includes: opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and closing the fourth valve associated with the fourth well.

A second apparatus has also been disclosed. The second apparatus generally includes: a non-transitory computer readable medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed: (a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well; (b) dequeuing the second well from the first hydraulic fracturing queue; (c) permitting hydraulic fracturing of the second well; (d) dequeuing the first well from the first hydraulic fracturing queue; and (e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and step (e)

includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well. In one or more embodiments, step (c) further includes measuring a flow rate of the fluid being pumped into the second well. In one or more embodiments, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e). In one or more embodiments, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e). In one or more embodiments, when the instructions are executed by the one or more processors, the following steps are also executed: (f) queuing a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue includes a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well; (g) dequeuing the fourth well from the second hydraulic fracturing queue; (h) permitting hydraulic fracturing of the fourth well; (i) dequeuing the third well from the second hydraulic fracturing queue; and (j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well. In one or more embodiments, steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; step (h) includes opening a fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and step (j) includes: opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and closing the fourth valve associated with the fourth well.

It is understood that variations may be made in the foregoing without departing from the scope of the present disclosure.

In several embodiments, the elements and teachings of the various embodiments may be combined in whole or in part in some (or all) of the embodiments. In addition, one or more of the elements and teachings of the various embodiments may be omitted, at least in part, and/or combined, at least in part, with one or more of the other elements and teachings of the various embodiments.

Any spatial references, such as, for example, "upper," "lower," "above," "below," "between," "bottom," "vertical," "horizontal," "angular," "upwards," "downwards," "side-to-side," "left-to-right," "right-to-left," "top-to-bottom," "bottom-to-top," "top," "bottom," "bottom-up," "top-down," etc., are for the purpose of illustration only and do not limit the specific orientation or location of the structure described above.

In several embodiments, while different steps, processes, and procedures are described as appearing as distinct acts, one or more of the steps, one or more of the processes, and/or one or more of the procedures may also be performed in different orders, simultaneously and/or sequentially. In several embodiments, the steps, processes, and/or procedures may be merged into one or more steps, processes and/or procedures.

In several embodiments, one or more of the operational steps in each embodiment may be omitted. Moreover, in some instances, some features of the present disclosure may be employed without a corresponding use of the other features. Moreover, one or more of the above-described embodiments and/or variations may be combined in whole or in part with any one or more of the other above-described embodiments and/or variations.

Although several embodiments have been described in detail above, the embodiments described are illustrative only and are not limiting, and those skilled in the art will readily appreciate that many other modifications, changes and/or substitutions are possible in the embodiments without materially departing from the novel teachings and advantages of the present disclosure. Accordingly, all such modifications, changes, and/or substitutions are intended to be included within the scope of this disclosure as defined in the following claims. In the claims, any means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents, but also equivalent structures. Moreover, it is the express intention of the applicant not to invoke 35 U.S.C. § 112(f) for any limitations of any of the claims herein, except for those in which the claim expressly uses the word "means" together with an associated function.

What is claimed is:

1. A method, comprising:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

2. The method of claim **1**,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

3. The method of claim **1**, wherein the second valve is opened after step (b).

4. The method of claim 1,
wherein the first valve comprises a grease port; and
wherein the method further comprises:
communicating grease to the grease port of the first valve; and
withholding grease from the grease port of the first valve after step (e).

5. The method of claim 1,
wherein the second valve comprises a grease port; and
wherein the method further comprises:
during and/or after opening the second valve, communicating grease to the grease port of the second valve.

6. The method of claim 1, wherein each of the first and second valves is a zipper valve.

7. The method of claim 1,
wherein step (d):
further comprises measuring a flow rate of the fluid being pumped into the second well; and
is, or is part of, a hydraulic fracturing stage of the second well; and
wherein the method further comprises:
determining that the hydraulic fracturing stage of the second well has ended;
determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;
communicating grease to a grease port of the second valve associated with the second well;
closing the second valve associated with the second well;
after closing the second valve associated with the second well, withholding grease from the grease port of the second valve;
receiving a signal to advance;
opening a third valve associated with a third well; and
during and/or after opening the third valve, communicating grease to a grease port of the third valve.

8. An apparatus, comprising:
a non-transitory computer readable medium; and
a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:
(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;
(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;
(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;
(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and
(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;
wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

9. The apparatus of claim 8,
wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve;
wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

10. The apparatus of claim 8, wherein the second valve is opened after step (b).

11. The apparatus of claim 8,
wherein the first valve comprises a grease port; and
wherein, when the instructions are executed by the one or more processors, the following steps are also executed:
communicating grease to the grease port of the first valve; and
withholding grease from the grease port of the first valve after step (e).

12. The apparatus of claim 8,
wherein the second valve comprises a grease port; and
wherein, when the instructions are executed by the one or more processors, the following step is also executed:
during and/or after opening the second valve, communicating grease to the grease port of the second valve.

13. The apparatus of claim 8, wherein each of the first and second valves is a zipper valve.

14. The apparatus of claim 8,
wherein step (d):
further comprises measuring a flow rate of the fluid being pumped into the second well; and
is, or is part of, a hydraulic fracturing stage of the second well; and
wherein, when the instructions are executed by the one or more processors, the following steps are also executed:
determining that the hydraulic fracturing stage of the second well has ended;
determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;
communicating grease to a grease port of the second valve associated with the second well;
closing the second valve associated with the second well;
after closing the second valve associated with the second well, withholding grease from the grease port of the second valve;
receiving a signal to advance;
opening a third valve associated with a third well; and
during and/or after opening the third valve, communicating grease to a grease port of the third valve.

15. A method of hydraulically fracturing at least first and second wells of a plurality of wells, the first and second wells being associated with first and second valves, respectively, the method comprising:
(a) permitting hydraulic fracturing of the second well, comprising: opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and measuring a flow rate of the fluid being pumped into the second well;
(b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising: opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; wherein, during

step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold; and

wherein: in response to determining that the flow rate measured at step (a) has satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b); or in response to determining that the flow rate measured at step (a) has not satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

16. The method of claim **15**,

wherein the plurality of wells further comprises third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein the method further comprises:

(c) permitting hydraulic fracturing of the fourth well; and

(d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

17. The method of claim **16**,

wherein steps (a) and (c) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold; and

wherein steps (b) and (d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

18. The method of claim **16**,

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step (c) comprises opening the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step (d) comprises:

opening the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

19. The method of claim **16**,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue; and

wherein step (c) further comprises:

dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

20. The method of claim **19**,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

21. The method of claim **15**,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

22. The method of claim **21**,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

23. A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

24. A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

25. An apparatus adapted to hydraulically fracture first and second wells, the first and second wells being associated with first and second valves, respectively, the apparatus

comprising: a non-transitory computer readable medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) permitting hydraulic fracturing of the second well, comprising: opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and measuring a flow rate of the fluid being pumped into the second well;

(b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising: opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold; and wherein: in response to determining that the flow rate measured at step (a) has satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b); or in response to determining that the flow rate measured at step (a) has not satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

26. The apparatus of claim **25**,

wherein the apparatus is further adapted to hydraulically fracture third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

(c) permitting hydraulic fracturing of the fourth well;

(d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

27. The apparatus of claim **26**,

wherein steps (a) and (c) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold; and

wherein steps (b) and (d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

28. The apparatus of claim **26**,

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step (c) comprises opening the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step (d) comprises:

opening the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

29. The apparatus of claim **26**,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue; and

wherein step (c) further comprises:

dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

30. The apparatus of claim **29**,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

31. The method of claim **25**,

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

32. The apparatus of claim **25**,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

33. The apparatus of claim **32**,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

34. An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened

at step (e) before the second valve associated with the second well is closed at step (e).

35. An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

36. The method of claim **15**,

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

* * * * *

AO 120 (Rev. 08/10)

TO:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the District of Colorado on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
1:23-cv-01180-RMR	5/10/2023	for the District of Colorado

PLAINTIFF	DEFENDANT
Downing Wellhead Equipment, LLC	Intelligent Wellhead Systems, Inc., Intelligent Wellhead Systems, Corp., and IWS USA Corp.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	11,401,779 B2	8/2/2022	Downing Wellhead Equipment, LLC
2	11,560,770 B2	1/24/2023	Downing Wellhead Equipment, LLC
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	08/02/2022	11401779	57959.12US01	9925

27683 7590 07/13/2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Jordan Kuehn, Forest Park, IL;
Austin Johnson, Edmond, OK;
Ronnie B. Beason, Lexington, OK;
Nicholas J. Cannon, Washington, OK;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Downing Wellhead Equipment, LLC, Oklahoma City, OK;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Doc Code: IFEE PTOL/85B-EFS

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
17388716	29-Jul-2021	Jordan Kuehn	57959.12US01	9925

TITLE OF INVENTION :

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	Utility under 35 USC 111(a)	3672	373000	

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$600	$0	$600	25-Jul-2022	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
27683 HAYNES AND BOONE, LLP IP Section 2323 Victory Avenue Suite 700 Dallas TX 75219 UNITED STATES 214-651-5000 ipdocketing@haynesboone.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

◉ Applicant asserting small entity status. See 37 CFR 1.27.
Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

○ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Doc Code: IFEE PTOL/85B-EFS

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☒ If i**n addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency or credit any overpayment, to Deposit Account Number 081394 . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. HAYNES AND BOONE, LLP
2.
3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
DOWNING WELLHEAD EQUIPMENT, LLC	OKLAHOMA CITY	OKLAHOMA	UNITED STATES	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Zachary A. Halbur/	**Date**	06-15-2022
Name	Zachary A. Halbur	**Registration Number**	68500

WEB IFEE 1.0

Electronic Patent Application Fee Transmittal

Application Number:	17388716
Filing Date:	29-Jul-2021
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Filer:	Zachary Arnold Halbur/Q Dismuke
Attorney Docket Number:	57959.12US01

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	2501	1	600	600
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**600**

Electronic Acknowledgement Receipt	
EFS ID:	45962301
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Zachary Arnold Halbur/Q Dismuke
Filer Authorized By:	Zachary Arnold Halbur
Attorney Docket Number:	57959.12US01
Receipt Date:	15-JUN-2022
Filing Date:	29-JUL-2021
Time Stamp:	16:58:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$600
RAM confirmation Number	E20226EG58452695
Deposit Account	081394
Authorized User	Q Dismuke
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.20 (Post Issuance fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	62783 a57208bfd6aa50df62086ea9b78afd3d0af4feb6	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40615 f02c4f53a387e5d45589a5a19f244458a8f0cc33b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	103398		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

27683 7590 05/19/2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

EXAMINER	
WRIGHT, GIOVANNA COLLINS	

ART UNIT	PAPER NUMBER
3672	

NOTIFICATION DATE	DELIVERY MODE
05/19/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipdocketing@haynesboone.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	17/388,716	Kuehn et al.	
	Examiner	Art Unit	AIA (FITF) Status
	GIOVANNA WRIGHT	3672	Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ The amendment filed on 27 April 2022 under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☑ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

f) ☐ not entered because the supplemental or corrected Application Data sheet (ADS)

☐ was not accompanied by a petition to accept an unintentionally delayed claim under 37 CFR 1.55 or 27 CFR 1.78;

☐ did not identify the information being changed in accordance with 37 CFR 1.76(c)(2);

☐ was not properly signed in accordance with 37 CFR 1.76(e) (or 37 CFR 1.33(b) for applications filed prior to September 16, 2012).

/Giovanna Wright/
Primary Examiner, Art Unit 3672

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Jordan Kuehn *et al.*	§	Group Art Unit: 3672
Application No.: 17/388,716	§	Examiner: Giovanna Collins Wright
Filing Date: July 29, 2021	§	Confirmation No.: 9925
For: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	§	Attorney Docket No.: 57959.12US01

AMENDMENT PURSUANT TO 37 C.F.R. § 1.312

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. Introductory Comments

The present document is submitted in response to the Notice of Allowance mailed April 25, 2022.

No fees, including extension-of-time fees, are believed necessary for consideration of this document. However, if any fees, including extension-of-time fees, are necessary, the extension of time is hereby requested, and the Commissioner is hereby authorized to charge any fees, including those for the extension of time, to Haynes and Boone, LLP's Deposit Account No. 08-1394.

Amendments to the Specification begin on page 2 of this document.

Remarks begin on page 3 of this document.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/388,716	07/29/2021	3672	2910	57959.12US01	30	4

CONFIRMATION NO. 9925

CORRECTED FILING RECEIPT

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

OC000000133499001

Date Mailed: 04/29/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Jordan Kuehn, Forest Park, IL;
Austin Johnson, Edmond, OK;
Ronnie B. Beason, Lexington, OK;
Nicholas J. Cannon, Washington, OK;

Applicant(s)

Downing Wellhead Equipment, LLC, Oklahoma City, OK;

Power of Attorney: The patent practitioners associated with Customer Number 27683

Domestic Priority data as claimed by applicant

This appln claims benefit of 63/189,663 05/17/2021
and is a CIP of 17/319,854 05/13/2021
which is a CIP of 16/855,749 04/22/2020
which claims benefit of 62/836,761 04/22/2019
and is a CIP of 16/248,648 01/15/2019 PAT 10724682
which claims benefit of 62/617,443 01/15/2018
and said 16/855,749 04/22/2020
is a CIP of 16/803,156 02/27/2020 PAT 11242724
which is a CIP of 16/248,633 01/15/2019 PAT 10584552
which claims benefit of 62/617,438 01/15/2018
and said 16/803,156 02/27/2020
is a CIP of 16/436,623 06/10/2019 PAT 11208856
which claims benefit of 62/755,170 11/02/2018

and said 16/803,156 02/27/2020
is a CIP of 16/100,741 08/10/2018 PAT 10689938
which claims benefit of 62/638,688 03/05/2018
and claims benefit of 62/638,681 03/05/2018
and claims benefit of 62/637,220 03/01/2018
and claims benefit of 62/637,215 03/01/2018
and claims benefit of 62/598,914 12/14/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/10/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/388,716**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Preliminary Class

166

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01

CONFIRMATION NO. 9925

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

POA ACCEPTANCE LETTER

OC000000133498963

Date Mailed: 04/29/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/27/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ldvan/

PTO/AIA/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 27683

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 27683

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Downing Wellhead Equipment, LLC
8628 S.W. 2nd Street
Oklahoma City, OK 73128

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date 9/27/21
Name Tyler Wheeler	Telephone (405) 947-2509
Title Corporate Counsel	Downing Wellhead Equipment, LLC

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Downing Wellhead Equipment, LLC

Application No./Patent No.: 17/388,716 Filed/Issue Date: July 29, 2021

Titled: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Downing Wellhead Equipment, LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 057692, Frame 0640, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Alan N. Herda/	April 27, 2022
Signature	Date
Alan N. Herda	50,426
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	45572518
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Alan Herda/Q Dismuke
Filer Authorized By:	Alan Herda
Attorney Docket Number:	57959.12US01
Receipt Date:	27-APR-2022
Filing Date:	29-JUL-2021
Time Stamp:	11:20:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	57959-12US01-POA.pdf	3427893 81d91fc170e11f14b9ff739b30015ee37c3b2e4f	no	1

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	57959-12US01-373c.pdf	134246 513e9c4258dd7f592363e526186e5f110d053787	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	3562139		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Jordan Kuehn *et al.*	§	Group Art Unit: 3672
Application No.: 17/388,716	§	Examiner: Giovanna Collins Wright
Filing Date: July 29, 2021	§	Confirmation No.: 9925
For: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	§	Attorney Docket No.: 57959.12US01

AMENDMENT PURSUANT TO 37 C.F.R. § 1.312

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. Introductory Comments

The present document is submitted in response to the Notice of Allowance mailed April 25, 2022.

No fees, including extension-of-time fees, are believed necessary for consideration of this document. However, if any fees, including extension-of-time fees, are necessary, the extension of time is hereby requested, and the Commissioner is hereby authorized to charge any fees, including those for the extension of time, to Haynes and Boone, LLP's Deposit Account No. 08-1394.

Amendments to the Specification begin on page 2 of this document.

Remarks begin on page 3 of this document.

II. Amendments to the Specification

In the specification, please replace paragraph [0002] under the "Cross-Reference to Related Applications" heading on page 2 of the originally filed specification with the following amended paragraph:

[0002] This application is also a continuation-in-part (CIP) of U.S. Patent Application No. 17/319,854 (the "'854 Application"), filed May 13, 2021, the entire disclosure of which is hereby incorporated herein by reference.

III. Remarks

Applicant has amended paragraph [0002] of the specification to correct a typographical error in which the present application, which is a **continuation-in-part** of U.S. Patent Application No. 17/319,854, was incorrectly identified as a **continuation** of U.S. Patent Application No. 17/319,854.

As such, the specification has been updated to replace "continuation" with "a continuation-in-part (CIP)" in paragraph [0002]. The replacement paragraph, with markings to show all changes, has been provided above in compliance with 37 C.F.R. 1.121.

Should the Examiner deem that an interview with the undersigned attorney would expedite entry of the amendments detailed above, the Examiner is invited to call the undersigned attorney at the telephone number indicated below.

No new subject matter has been added.

Respectfully submitted,

/Braden J. Davies/

Braden J. Davies
Registration No. 79,960

Date: April 27, 2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue, Suite 700
Dallas, Texas 75219
Direct Telephone: 214-651-5381
IP Facsimile: 214-200-0853

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/388,716	07/29/2021	2649	1650	57959.12US01	30	4

CONFIRMATION NO. 9925

FILING RECEIPT

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

OC000000127595745

Date Mailed: 08/11/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Jordan Kuehn, Forest Park, IL;
Austin Johnson, Edmond, OK;
Ronnie B. Beason, Lexington, OK;
Nicholas J. Cannon, Washington, OK;

Applicant(s)

Downing Wellhead Equipment, LLC, Oklahoma City, OK;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 63/189,663 05/17/2021
and is a CIP of ~~and is a CON of~~ 17/319,854 05/13/2021
which is a CIP of 16/855,749 04/22/2020
which claims benefit of 62/836,761 04/22/2019
and is a CIP of 16/248,648 01/15/2019 PAT 10724682
which claims benefit of 62/617,443 01/15/2018
and said 16/855,749 04/22/2020
is a CIP of 16/803,156 02/27/2020
which is a CIP of 16/248,633 01/15/2019 PAT 10584552
which claims benefit of 62/617,438 01/15/2018
and said 16/803,156 02/27/2020
is a CIP of 16/436,623 06/10/2019
which claims benefit of 62/755,170 11/02/2018

and said 16/803,156 02/27/2020
is a CIP of 16/100,741 08/10/2018 PAT 10689938
which claims benefit of 62/638,688 03/05/2018
and claims benefit of 62/638,681 03/05/2018
and claims benefit of 62/637,220 03/01/2018
and claims benefit of 62/637,215 03/01/2018
and claims benefit of 62/598,914 12/14/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/10/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/388,716**

Projected Publication Date: 11/18/2021

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Preliminary Class

455

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

SUPPLEMENTAL APPLICATION DATA SHEET

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jordan		Kuehn	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Forest Park	State/Province	IL	Country of Residence	US

Mailing Address of Inventor:

Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Austin		Johnson	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Edmond	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ronnie	B.	Beason	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

SUPPLEMENTAL APPLICATION DATA SHEET

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

City	Lexington	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Nicholas	J.	Cannon	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Washington	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	27683		
Email Address	ipdocketing@haynesboone.com	Add Email	Remove Email

Application Information:

Title of the Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME		
Attorney Docket Number	57959.12US01	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	50	Suggested Figure for Publication (if any)	1B

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

SUPPLEMENTAL APPLICATION DATA SHEET

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	27683		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	63/189663	2021-05-17

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

SUPPLEMENTAL APPLICATION DATA SHEET

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Prior Application Status	Pending		Remove
Application Number	Continuity Type Continuation-in-part of	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	~~Continuation of~~	17/319854	2021-05-13
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
17/319854	Continuation in part of	16/855749	2020-04-22
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/855749	Claims benefit of provisional	62/836761	2019-04-22
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/855749	Continuation in part of	16/248648	2019-01-15	10724682	2020-07-28

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12/248648	Claims benefit of provisional	62/617443	2018-01-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/855749	Continuation in part of	16/803156	2020-02-27
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/248633	2019-01-15	10584552	2020-03-10

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/248633	Claims benefit of provisional	62/617438	2018-01-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/436623	2019-06-10

SUPPLEMENTAL APPLICATION DATA SHEET

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/436623	Claims benefit of provisional	62/755170	2018-11-02
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/100741	2018-08-10	10689938	2020-06-23

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/638688	2018-03-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/638681	2018-03-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/637220	2018-03-01
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/637215	2018-03-01
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/598914	2017-12-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

SUPPLEMENTAL APPLICATION DATA SHEET

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

SUPPLEMENTAL APPLICATION DATA SHEET

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Downing Wellhead Equipment, LLC		
Mailing Address Information For Applicant:			
Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	**State/Province**	OK
Country	US	Postal Code	73128
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

SUPPLEMENTAL APPLICATION DATA SHEET

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Braden J. Davies/			Date (YYYY-MM-DD)	2022-04-27
First Name	Braden J.	Last Name	Davies	Registration Number	79,960

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

SUPPLEMENTAL APPLICATION DATA SHEET

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	17/388,716
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	45572318
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Braden James Davies/Q Dismuke
Filer Authorized By:	Braden James Davies
Attorney Docket Number:	57959.12US01
Receipt Date:	27-APR-2022
Filing Date:	29-JUL-2021
Time Stamp:	11:07:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		57959-12US01-Amendment-After-Allowance.pdf	28067 87834781e35b7afb94328e079e30c1e1614a59f4	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
2	Request for Corrected Filing Receipt	57959-12US01-Marked-up-FR.pdf	331114 d8aa2ea8d4853ac63900ba7fd0b0ed10f51909a5	no	4
Warnings:					
Information:					
3	Application Data Sheet	57959-12US01-Supp-ADS.pdf	1083880 3ccec086e9b8ecc4e4fe68641b408bcb216baa6a	no	11
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
		Total Files Size (in bytes):	1443061		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27683 7590 04/25/2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

EXAMINER
WRIGHT, GIOVANNA COLLINS

ART UNIT	PAPER NUMBER
3672	

DATE MAILED: 04/25/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

TITLE OF INVENTION: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	07/25/2022

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27683 7590 04/25/2022
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

TITLE OF INVENTION: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	07/25/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
WRIGHT, GIOVANNA COLLINS	3672	166-373000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

IWS EXHIBIT 1005 EX_1005_111

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

27683 7590 04/25/2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

EXAMINER	
WRIGHT, GIOVANNA COLLINS	
ART UNIT	**PAPER NUMBER**
3672	

DATE MAILED: 04/25/2022

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	**Application No.** 17/388,716	**Applicant(s)** Kuehn et al.	
	Examiner GIOVANNA WRIGHT	**Art Unit** 3672	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to Amendment filed 4/5/22.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-15,18-23 and 26-40 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Giovanna Wright/
Primary Examiner, Art Unit 3672

EXAMINER'S AMENDMENT

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Zachary Halbur on 4/15/2022.

The application has been amended as follows:

Amended Claim 15: A method of hydraulically fracturing at least first and second wells of a plurality of wells, the first and second wells being associated with first and second valves, respectively, the method comprising:

(a) permitting hydraulic fracturing of the second well, comprising: opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and measuring a flow rate of the fluid being pumped into the second well;

(b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising: opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold; and

wherein: in response to determining that the flow rate measured at step (a) has ~~**met a flow rate threshold**~~ **satisfied one or more flow rate conditions**, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b); or in response to determining that the flow rate measured at step (a) has not ~~**met the flow rate threshold**~~ **satisfied one or more flow rate conditions**, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

Amended claim 23: An apparatus adapted to hydraulically fracture first and second wells, the first and second wells being associated with first and second valves, respectively, the apparatus comprising: a non-transitory computer readable medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) permitting hydraulic fracturing of the second well, comprising: opening the second valve associated with the second well to permit pumping of fluid into the second

well via the second valve; and measuring a flow rate of the fluid being pumped into the second well;

(b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising: opening the first valve associated with the first well to permit ~~**pumpin**~~ **pumping** of fluid into the first well via the first valve; and closing the second valve associated with the second well; wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold; and wherein: in response to determining that the flow rate measured at step (a) has ~~**met a flow rate threshold**~~ **satisfied one or more flow rate conditions**, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b); or in response to determining that the flow rate measured at step (a) has not ~~**met the flow rate threshold**~~ **satisfied one or more flow rate conditions**, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

Claim 31 has been deleted and replaced with the following new claim 31.

New Claim 31: **The method of claim 15,**

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

Claim 36 has been deleted and replaced with the following new claim 36.

New Claim 36: **The method of claim 23,**

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GIOVANNA WRIGHT whose telephone number is (571)272-7027. The examiner can normally be reached M-F 8 am- 5 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Abby Flynn can be reached on 571- 272-9855. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center,

visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Giovanna Wright/
Primary Examiner, Art Unit 3672

Examiner-Initiated Interview Summary	**Application No.** 17/388,716	**Applicant(s)** Kuehn et al.		
	Examiner GIOVANNA WRIGHT	**Art Unit** 3672	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
GIOVANNA WRIGHT	Primary Examiner	Telephonic
Zachary Halbur	Attorney of Record	

Date of Interview: 13 April 2022

Issues Discussed:

35 U.S.C. 112

The examiner contacted the attorney to discuss claims 31 and 36. The examiner stated that these claim were unclear. It was agreed to amend claims 31 and 36 by examiner's amendment to better clarify the claims. It was also agreed to amend claims 15 and 23, by examiner's amendment to support the amendments made to claims 31 and 36.

☑ Attachment

/Giovanna Wright/ Primary Examiner, Art Unit 3672	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/388,716	Kuehn et al.
	Examiner	**Art Unit**
	GIOVANNA WRIGHT	3672

CPC						
Symbol					**Type**	**Version**
E21B	/	34	/	02	F	2013-01-01
E21B	/	43	/	2607	I	2020-05-01
E21B	/	33	/	068	I	2013-01-01
E21B	/	41	/	00	I	2013-01-01
E21B	/	43	/	11	I	2013-01-01
F16K	/	3	/	36	I	2013-01-01
F16N	/	11	/	00	I	2013-01-01
F16N	/	29	/	02	I	2013-01-01
E21B	/	43	/	26	I	2013-01-01
F16N	/	2210	/	00	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	36	
/Giovanna Wright/ Primary Examiner, Art Unit 3672	14 April 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20220414

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/388,716	Kuehn et al.
	Examiner	**Art Unit**
	GIOVANNA WRIGHT	3672

INTERNATIONAL CLASSIFICATION				
CLAIMED				
E21B	/	43	/	26

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 36	
/Giovanna Wright/ Primary Examiner, Art Unit 3672 (Primary Examiner)	14 April 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

U.S. Patent and Trademark Office — Part of Paper No.: 20220414

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/388,716	Kuehn et al.
	Examiner	**Art Unit**
	GIOVANNA WRIGHT	3672

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	24	19	26	28	32	37						
2	2	11	11	16	20	27	29	33	38						
3	3	12	12	17	21	28	30	29	39						
4	4	13	13	18	22	36	31	30	40						
5	5	14	14	25	23	21	32								
6	6	15	15		24	22	33								
7	7		16		25	19	34								
8	8		17	34	26	20	35								
9	9	23	18	35	27	31	36								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 36	
/Giovanna Wright/ Primary Examiner, Art Unit 3672 (Primary Examiner)	14 April 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

U.S. Patent and Trademark Office — Part of Paper No.: 20220414

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/388,716	Kuehn et al.
	Examiner	Art Unit
	GIOVANNA WRIGHT	3672

CPC - Searched*		
Symbol	Date	Examiner
E21B43/2607, 43/26	12/30/2021	gcw
updated	04/14/2022	gcw

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
search history notes	12/30/2021	gcw
updated	04/14/2022	gcw

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	interference search history	04/14/2022	gcw

Bibliographic Data

Application No: 17/388,716

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /Giovanna Wright/ (Examiner's Signature) | (Initials)

Title: HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/29/2021	166	3672	57959.12US01
RULE			

APPLICANTS

Downing Wellhead Equipment, LLC, Oklahoma City, OK,

INVENTORS

Jordan Kuehn, Forest Park, IL, UNITED STATES

Austin Johnson, Edmond, OK, UNITED STATES

Ronnie B. Beason, Lexington, OK, UNITED STATES

Nicholas J. Cannon, Washington, OK, UNITED STATES

CONTINUING DATA

This application has PRO of 63189663 05/17/2021

This application is a CON of 17319854 05/13/2021

17319854 is a CIP of 16855749 04/22/2020

16855749 is a CIP of 16803156 02/27/2020 PAT 11242724

16803156 is a CIP of 16436623 06/10/2019 PAT 11208856

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16803156 is a CIP of 16248633 01/15/2019 PAT 10584552

16855749 is a CIP of 16248648 01/15/2019 PAT 10724682

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16100741 has PRO of 62638688 03/05/2018

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16100741 has PRO of 62637220 03/01/2018

16100741 has PRO of 62637215 03/01/2018

16248633 has PRO of 62617438 01/15/2018

16248648 has PRO of 62617443 01/15/2018

16100741 has PRO of 62598914 12/14/2017

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/10/2021

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219
UNITED STATES

FILING FEE RECEIVED

$3,740

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L62	88	e21b43/2607.cpc. AND @pd>"20220101"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/14 09:40 AM
L63	184	e21b43/26.cpc. AND @pd>"20220101"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/14 09:42 AM
L64	33	first ADJ well SAME second ADJ well SAME fractur$5 SAME flow SAME valve	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/14 09:46 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N2	170	(first ADJ well SAME second ADJ well AND fractur$5 AND flow AND valve).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/14 09:49 AM

From: Halbur, Zachary
To: Wright, Giovanna
Subject: Proposed Claims for Examiner"s Amendment - 17/388,716
Date: Tuesday, April 12, 2022 2:28:49 PM
Attachments: image001.png
Proposed Claims for Examiner"s Amendment (our ref. 57959.12US01).docx

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Dear Examiner Wright,

Please find attached my proposed claims for an Examiner's Amendment. I look forward to discussing tomorrow at 11AM Eastern.

Thanks,
Zach

HAYNES BOONE

Zachary Halbur
Associate
zachary.halbur@haynesboone.com

Haynes and Boone, LLP
301 Commerce Street
Suite 2600
Fort Worth, TX 76102

(t) +1 817.347.6678
(f) +1 214.200.0932

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Proposed Amendments

1. (Original) A method, comprising:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

2. (Original) The method of claim 1,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

3. (Original) The method of claim 1, wherein the second valve is opened after step (b).

4. (Currently amended) The method of claim 1,

wherein the first valve comprises a grease port; and

wherein the method further comprises:

communicating grease to the grease port of the first valve; and

withholding grease from the grease port of the first valve after step (e).

5. (Original) The method of claim 1,

wherein the second valve comprises a grease port; and

wherein the method further comprises:

during and/or after opening the second valve, communicating grease to the grease port of the second valve.

6. (Original) The method of claim 1, wherein each of the first and second valves is a zipper valve.

7. (Currently amended) The method of claim 1,

wherein step (d):

further comprises measuring a flow rate of the fluid being pumped into the second well; and

is, or is part of, a hydraulic fracturing stage of the second well;

and

wherein the method further comprises:

determining that the hydraulic fracturing stage of the second well has ended;

determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;

communicating grease to a grease port of the second valve associated with the second well;

closing the second valve associated with the second well;

after closing the second valve associated with the second well,

withholding grease from[[a]] the grease port of the second valve;

receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

8. (Original) An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

9. (Original) The apparatus of claim 8,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

10. (Original) The apparatus of claim 8, wherein the second valve is opened after step (b).

11. (Currently amended) The apparatus of claim 8,

wherein the first valve comprises a grease port; and

wherein, when the instructions are executed by the one or more processors, the following steps[[is]] are also executed:

communicating grease to the grease port of the first valve; and

withholding grease from the grease port of the first valve after step (e).

12. (Original) The apparatus of claim 8,

wherein the second valve comprises a grease port; and

wherein, when the instructions are executed by the one or more processors, the following step is also executed:

during and/or after opening the second valve, communicating grease to the grease port of the second valve.

13. (Original) The apparatus of claim 8, wherein each of the first and second valves is a zipper valve.

14. (Currently amended) The apparatus of claim 8,

wherein step (d):

further comprises measuring a flow rate of the fluid being pumped into the second well; and

is, or is part of, a hydraulic fracturing stage of the second well;

and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

determining that the hydraulic fracturing stage of the second well has ended;

determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;

communicating grease to a grease port of the second valve associated with the second well;

closing the second valve associated with the second well;

after closing the second valve associated with the second well, withholding grease from[[a]] the grease port of the second valve;

receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

15. (Currently amended) A method of hydraulically fracturing at least first and second wells of a plurality of wells, the first and second wells being associated with first and second valves, respectively, the method comprising:

~~(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;~~

~~(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;~~

([[c]]a) permitting hydraulic fracturing of the second well, comprising:

opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

Proposed Amendments

~~(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue;~~

and

([[e]]b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold;

and

wherein:

in response to determining that the flow rate measured at step (a) has satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b);

or

in response to determining that the flow rate measured at step (a) has not satisfied the one or more flow rate conditions, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

16. (Cancelled)

17. (Cancelled)

18. (Currently amended) ~~The method of claim 17,~~ A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

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(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

19. (Currently amended) ~~The method of claim 17,~~ A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

20. (Currently amended) The method of claim 15,

wherein the plurality of wells further comprises third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein the method further ~~comprising~~ comprises:

~~(f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;~~

~~(g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue;~~

([[h]]c) permitting hydraulic fracturing of the fourth well; and

~~(i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue; and~~

([[j]]d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

21. (Currently amended) The method of claim 20,

wherein steps ([[c]]a) and ([[h]]c) are executed simultaneously using hydraulic fracturing fluid from[[a]] the hydraulic manifold; and

wherein steps ([[e]]b) and ([[j]]d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

22. (Currently amended) The method of claim 20,

~~wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;~~

~~wherein step (e) comprises:~~

~~opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and~~

~~closing the second valve associated with the second well;~~

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step ([[h]]c) comprises opening[[a]] the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step ([[j]]d) comprises:

opening[[a]] the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

23. (Currently amended) An apparatus adapted to hydraulically fracture first and second wells, the first and second wells being associated with first and second valves, respectively, the apparatus comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

Proposed Amendments

~~(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;~~

~~(b) dequeuing the second well from the first hydraulic fracturing queue;~~

([[c]]a) permitting hydraulic fracturing of the second well, comprising:

opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

~~(d) dequeuing the first well from the first hydraulic fracturing queue; and~~

([[e]]b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold;

and

wherein:

in response to determining that the flow rate measured at step (a) has satisfied one or more flow rate conditions, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b);

or

in response to determining that the flow rate measured at step (a) has not satisfied the one or more flow rate conditions, the first valve associated with the first well is opened at step (b)

during or after the second valve associated with the second well is closed at step (b).

24. (Cancelled)

25. (Cancelled)

26. (Currently amended) ~~The apparatus of claim 25,~~ An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

27. (Currently amended) ~~The apparatus of claim 25,~~ An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

28. (Currently amended) The apparatus of claim 23,

wherein the apparatus is further adapted to hydraulically fracture third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

~~(f) queuing a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue includes a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;~~

~~(g) dequeuing the fourth well from the second hydraulic fracturing queue;~~

([[h]]c) permitting hydraulic fracturing of the fourth well;

~~(i) dequeuing the third well from the second hydraulic fracturing queue; and~~

([[j]]d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

29. (Currently amended) The apparatus of claim 28,

wherein steps ([[c]]a) and ([[h]]c) are executed simultaneously using hydraulic fracturing fluid from[[a]] the hydraulic manifold; and

wherein steps ([[e]]b) and ([[j]]d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

30. (Currently amended) The apparatus of claim 28,

~~wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;~~

~~wherein step (e) comprises:~~

~~opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and~~

~~closing the second valve associated with the second well;~~

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step ([[h]]c) comprises opening[[a]] the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step ([[j]]d) comprises:

opening[[a]] the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

31. (New) The method of claim 15,

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

32. (New) The method of claim 15,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

33. (New) The method of claim 32,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

34. (New) The method of claim 20,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue;

and

wherein step (c) further comprises:

dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

35. (New) The method of claim 34,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue;

and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

36. (New) The apparatus of claim 23,

wherein the flow rate measured at step (a) has satisfied the one or more flow rate conditions when the flow rate measured at step (a) is below an upper flow rate threshold, above a lower flow rate threshold, or both; and

wherein the flow rate measured at step (a) has not satisfied the one or more flow rate conditions when the flow rate measured at step (a) is above the upper flow rate threshold or below the lower flow rate threshold.

37. (New) The apparatus of claim 23,
wherein step (a) further comprises:
dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

38. (New) The apparatus of claim 37,
wherein step (b) further comprises:
queuing, using a controller, the first well in the first hydraulic fracturing queue; and
dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

39. (New) The apparatus of claim 28,
wherein step (a) further comprises:
dequeuing, using a controller, the second well from a first hydraulic fracturing queue;
and
wherein step (c) further comprises:
dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

40. (New) The apparatus of claim 39,
wherein step (b) further comprises:
queuing, using a controller, the first well in the first hydraulic fracturing queue; and
dequeuing, using the controller, the first well from the first hydraulic fracturing queue;

and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/388,716	Filing Date 07/29/2021	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/05/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 36	Minus	** 36	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 8	Minus	*** 4	= 4		x $240 =	960
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	960

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/Theresa OKON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Jordan Kuehn *et al.*	§	Group Art Unit: 3672
Application No.: 17/388,716	§	Examiner: Giovanna Collins Wright
Filing Date: July 29, 2021	§	Confirmation No.: 9925
For: Hydraulic Fracturing Plan and Execution of Same	§	Attorney Docket No.: 57959.12US01

AMENDMENT IN RESPONSE TO OFFICE ACTION MAILED JANUARY 5, 2022

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. Introductory Comments

This document is submitted in response to the Office Action mailed January 5, 2022.

Estimated fees have been provided for by credit card separately but concurrently herewith for consideration of this document. If any additional fees, including any extension-of-time fees, are necessary, the Commissioner is hereby authorized to charge such fees, including any extension-of-time fees, to Haynes and Boone, LLP's Deposit Account No. 08-1394.

Amendments to the Claims begin on page 2 of this document.

Remarks begin on page 19 of this document.

II. Amendments to the Claims

This listing of claims will replace all prior version(s), and listing(s), of claims in the application:

1. (Original) A method, comprising:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

2. (Original) The method of claim 1,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

3. (Original) The method of claim 1, wherein the second valve is opened after step (b).

4. (Currently amended) The method of claim 1,
wherein the first valve comprises a grease port; and
wherein the method further comprises:
communicating grease to the grease port of the first valve; and
withholding grease from the grease port of the first valve after step (e).

5. (Original) The method of claim 1,
wherein the second valve comprises a grease port; and
wherein the method further comprises:
during and/or after opening the second valve, communicating grease to the grease port of the second valve.

6. (Original) The method of claim 1, wherein each of the first and second valves is a zipper valve.

7. (Currently amended) The method of claim 1,
wherein step (d):
further comprises measuring a flow rate of the fluid being pumped into the second well; and
is, or is part of, a hydraulic fracturing stage of the second well;
and
wherein the method further comprises:
determining that the hydraulic fracturing stage of the second well has ended;
determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;

communicating grease to a grease port of the second valve associated with the second well;

closing the second valve associated with the second well;

after closing the second valve associated with the second well, withholding grease from[[a]] the grease port of the second valve;

receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

8. (Original) An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

9. (Original) The apparatus of claim 8,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

10. (Original) The apparatus of claim 8, wherein the second valve is opened after step (b).

11. (Currently amended) The apparatus of claim 8,

wherein the first valve comprises a grease port; and

wherein, when the instructions are executed by the one or more processors, the following steps[[is]] are also executed:

communicating grease to the grease port of the first valve; and

withholding grease from the grease port of the first valve after step (e).

12. (Original) The apparatus of claim 8,

wherein the second valve comprises a grease port; and

wherein, when the instructions are executed by the one or more processors, the following step is also executed:

during and/or after opening the second valve, communicating grease to the grease port of the second valve.

13. (Original) The apparatus of claim 8, wherein each of the first and second valves is a zipper valve.

14. (Currently amended) The apparatus of claim 8,

wherein step (d):

further comprises measuring a flow rate of the fluid being pumped into the second well; and

is, or is part of, a hydraulic fracturing stage of the second well;

and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

determining that the hydraulic fracturing stage of the second well has ended;

determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;

communicating grease to a grease port of the second valve associated with the second well;

closing the second valve associated with the second well;

after closing the second valve associated with the second well,

withholding grease from[[a]] the grease port of the second valve;

receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

15. (Currently amended) A method of hydraulically fracturing at least first and second wells of a plurality of wells, the first and second wells being associated with first and second valves, respectively, the method comprising:

~~(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of~~

~~wells standing by for hydraulic fracturing, including at least the first well and a second well;~~

~~(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;~~

([[c]]a) permitting hydraulic fracturing of the second well, comprising:

opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

~~(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue;~~

and

([[e]]b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold;

and

wherein:

in response to determining that the flow rate measured at step (a) has met a flow rate threshold, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b);

or

in response to determining that the flow rate measured at step (a) has not met the flow rate threshold, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

16. (Cancelled)

17. (Cancelled)

18. (Currently amended) ~~The method of claim 17,~~ A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

19. (Currently amended) ~~The method of claim 17,~~ A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

20. (Currently amended) The method of claim 15,

wherein the plurality of wells further comprises third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein the method further ~~comprising~~ comprises:

~~(f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a~~

~~second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;~~

~~(g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue;~~

([[h]]c) permitting hydraulic fracturing of the fourth well; and

~~(i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue; and~~

([[j]]d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

21. (Currently amended) The method of claim 20,

wherein steps ([[c]]a) and ([[h]]c) are executed simultaneously using hydraulic fracturing fluid from[[a]] the hydraulic manifold; and

wherein steps ([[e]]b) and ([[j]]d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

22. (Currently amended) The method of claim 20,

~~wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;~~

~~wherein step (e) comprises:~~

~~opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and~~

~~closing the second valve associated with the second well;~~

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step ([[h]]c) comprises opening[[a]] the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step ([[j]]d) comprises:

opening[[a]] the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

23. (Currently amended) An apparatus adapted to hydraulically fracture first and second wells, the first and second wells being associated with first and second valves, respectively, the apparatus comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

~~(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;~~

~~(b) dequeuing the second well from the first hydraulic fracturing queue;~~

([[c]]a) permitting hydraulic fracturing of the second well, comprising:

opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

~~(d) dequeuing the first well from the first hydraulic fracturing queue; and~~

([[e]]b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold;

and

wherein:

in response to determining that the flow rate measured at step (a) has met a flow rate threshold, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b);

or

in response to determining that the flow rate measured at step (a) has not met the flow rate threshold, the first valve associated with the first well is opened at step (b) during or after the second valve associated with the second well is closed at step (b).

24. (Cancelled)

25. (Cancelled)

26. (Currently amended) ~~The apparatus of claim 25,~~ An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

27. (Currently amended) ~~The apparatus of claim 25,~~ An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well, comprising:

opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

measuring a flow rate of the fluid being pumped into the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

28. (Currently amended) The apparatus of claim 23,

wherein the apparatus is further adapted to hydraulically fracture third and fourth wells, the third and fourth wells being associated with third and fourth valves, respectively; and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

~~(f) queuing a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue includes a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;~~

~~(g) dequeuing the fourth well from the second hydraulic fracturing queue;~~

([[h]]c) permitting hydraulic fracturing of the fourth well;

~~(i) dequeuing the third well from the second hydraulic fracturing queue; and~~

([[j]]d) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

29. (Currently amended) The apparatus of claim 28,

wherein steps ([[c]]a) and ([[h]]c) are executed simultaneously using hydraulic fracturing fluid from[[a]] the hydraulic manifold; and

wherein steps ([[e]]b) and ([[j]]d) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

30. (Currently amended) The apparatus of claim 28,

~~wherein step (e) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;~~

~~wherein step (e) comprises:~~

~~opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and~~

~~closing the second valve associated with the second well;~~

wherein, during step (d), hydraulic fracturing fluid is continuously pumped to the third and fourth valves via the hydraulic manifold;

wherein step ([[h]]c) comprises opening[[a]] the fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step ([[j]]d) comprises:

opening[[a]] the third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

31. (New) The method of claim 15,

wherein the flow rate measured at step (a) has met the flow rate threshold when the flow rate measured at step (a) is below the flow rate threshold and has been below the flow rate threshold for a threshold amount of time; and

wherein the flow rate measured at step (a) has not met the flow rate threshold when the flow rate measured at step (a) is:

above the flow rate threshold; or

below another flow rate threshold, which another flow rate threshold is lower than the flow rate threshold.

32. (New) The method of claim 15,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

33. (New) The method of claim 32,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

34. (New) The method of claim 20,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue;

and

wherein step (c) further comprises:

dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

35. (New) The method of claim 34,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue;

and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

36. (New) The apparatus of claim 23,

wherein the flow rate measured at step (a) has met the flow rate threshold when the flow rate measured at step (a) is below the flow rate threshold and has been below the flow rate threshold for a threshold amount of time; and

wherein the flow rate measured at step (a) has not met the flow rate threshold when the flow rate measured at step (a) is:

above the flow rate threshold; or

below another flow rate threshold, which another flow rate threshold is lower than the flow rate threshold.

37. (New) The apparatus of claim 23,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue.

38. (New) The apparatus of claim 37,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue.

39. (New) The apparatus of claim 28,

wherein step (a) further comprises:

dequeuing, using a controller, the second well from a first hydraulic fracturing queue;

and

wherein step (c) further comprises:

dequeuing, using the controller, the fourth well from a second hydraulic fracturing queue.

40. (New) The apparatus of claim 39,

wherein step (b) further comprises:

queuing, using a controller, the first well in the first hydraulic fracturing queue; and

dequeuing, using the controller, the first well from the first hydraulic fracturing queue;

and

wherein step (d) further comprises:

queuing, using the controller, the third well in the second hydraulic fracturing queue; and

dequeuing, using the controller, the third well from the second hydraulic fracturing queue.

III. Remarks

A. Status of the Application

Claims 1-30 were previously pending.

Claims 4, 7, 11, 14-15, 18-23, and 26-30 have been amended.

Claims 16-17 and 24-25 have been cancelled without prejudice or disclaimer.

Claims 1-3, 5-6, 8-10, and 12-13 have been maintained in their original form.

Claims 31-40 have been added.

As a result, claims 1-15, 18-23, and 26-40 are pending.

No new subject matter has been added. In view of the amendments above and the remarks that follow, favorable consideration of this application is respectfully requested.

B. Allowable Subject Matter

Applicant acknowledges with appreciation the Examiner's indication on page 4 of the Office Action mailed January 5, 2022 (the "Office Action") that:

- claims 1-3, 5-6, 8-10, and 12-13 are allowed;
- claims 4, 7, 11, and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112(b) or (pre-AIA) 35 U.S.C. § 112, second paragraph, set forth in the Office Action; and
- claims 18-19 and 26-27 would be allowable if rewritten into independent form to include all of the limitations of their respective base claims and any intervening claims.

In response, claims 4, 7, 11, and 14 have been so rewritten to overcome the rejection(s) under 35 U.S.C. § 112(b) or (pre-AIA) 35 U.S.C. § 112, second paragraph, set forth in the Office Action. Additionally, claims 18-19 and 26-27 have been so rewritten to include all of the limitations of their respective base claims and any intervening claims As a result, claims 4, 7, 11, 14, 18-19 and 26-27 are allowable, in addition to allowed claims 1-3, 5-6, 8-10, and 12-13.

C. Rejection Under 35 U.S.C. § 112

Claims 4, 7, 11, and 14 stand rejected under 35 U.S.C. § 112(b) or (pre-AIA) 35 U.S.C. § 112, second paragraph, as being allegedly indefinite. As noted above, Applicant has amended claims 4, 7, 11, and 14 to address the alleged deficiencies. Therefore, it is respectfully requested that the rejection of claims 4, 7, 11, and 14 under 35 U.S.C. § 112(b) or (pre-AIA) 35 U.S.C. § 112, second paragraph, be reconsidered and withdrawn.

D. Rejection Under 35 U.S.C. § 102

Claims 15-16, 20-24, and 28-30 stand rejected under 35 U.S.C. § 102(a)(1) over U.S. Patent Application Publication No. 2017/0275980 ("Kajaria"). Insofar as it may be applied against the present claims, this rejection is respectfully traversed.

Claim 15, as amended, recites:

> A method of hydraulically fracturing at least first and second wells of a plurality of wells, the first and second wells being associated with first and second valves, respectively, the method comprising:
> (a) permitting hydraulic fracturing of the second well, comprising:
> opening the second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and
> measuring a flow rate of the fluid being pumped into the second well;
> and
> (b) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well, comprising:
> opening the first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and
> closing the second valve associated with the second well;
> wherein, during step (b), hydraulic fracturing fluid is continuously pumped to the first and second valves via a hydraulic manifold;
> and
> wherein:
> in response to determining that the flow rate measured at step (a) has met a flow rate threshold, the first valve associated with the first well is opened at step (b) before the second valve associated with the second well is closed at step (b);
> or
> in response to determining that the flow rate measured at step (a) has not met the flow rate threshold, the first valve associated with the first well is opened at step (b) during or after the

second valve associated with the second well is closed at step (b).

The MPEP provides that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131 (citation omitted). Therefore, to support a rejection under 35 U.S.C. § 102 with respect to a claim, Kajaria must disclose each and every element of the claim.

Here, Kajaria fails to disclose each and every element of amended independent claim 15. More particularly, with respect to amended independent claim 15, Kajaria fails to disclose at least:

- wherein, **in response to determining that the flow rate measured at step (a) has met a flow rate threshold**, the first valve associated with the first well is opened at step (b) **before** the second valve associated with the second well is closed at step (b); **or**
- wherein, **in response to determining that the flow rate measured at step (a) has not met the flow rate threshold**, the first valve associated with the first well is opened at step (b) **during or after** the second valve associated with the second well is closed at step (b).

Applicant notes that the above-bulleted subject matter is similar to the subject matter that was previously recited in dependent claims 18 and 19 (as originally filed), which subject matter was indicated allowable by the Examiner in the Office Action (see above). Applicant further notes that certain other subject matter previously recited in independent claim 15 (as originally filed) has been removed to new dependent claims 31 and 32. Nevertheless, Applicant respectfully submits that, due to the addition of the above-bulleted subject matter to amended independent claim 15, amended independent claim 15 is allowable for at least the same reasons as noted by the Examiner in the Office Action with respect to the originally-filed dependent claims 18 and 19.

Dependent claim 16 has been cancelled without prejudice or disclaimer and thus any rejection of this claim is no longer applicable.

Dependent claims 20-22 depend upon and include the subject matter of amended independent claim 15, and are therefore allowable for at least the same reasons as noted above with respect to amended independent claim 15.

Independent claim 23 has been amended to include subject matter analogous to the above-bulleted subject matter of amended independent claim 15, and is therefore allowable for at least the same reasons as noted above with respect to amended independent claim 15.

Dependent claim 24 has been cancelled without prejudice or disclaimer and thus any rejection of this claim is no longer applicable.

Dependent claims 28-30 depend upon and include the subject matter of amended independent claim 23, and are therefore allowable for at least the same reasons as noted above with respect to amended independent claim 23.

For at least the foregoing reasons, it is respectfully requested that the rejection of claims 15-16, 20-24, and 28-30 under 35 U.S.C. § 102(a)(1) over Kajaria be reconsidered and withdrawn.

E. Rejection Under 35 U.S.C. § 103

Claims 17 and 25 stand rejected under 35 U.S.C. § 103 over Kajaria in view of U.S. Patent Application Publication No. 2014/0352968 ("Pitcher"). This rejection is respectfully traversed.

Claims 17 and 25 have been cancelled without prejudice or disclaimer and thus any rejection of these claims is no longer applicable.

For at least the foregoing reasons, it is respectfully requested that the rejection of claims 17 and 25 under 35 U.S.C. § 103 over Kajaria in view of Pitcher be reconsidered and withdrawn.

F. New Claims 31-40

New claims 31-35 depend upon and include the subject matter of amended claim 15, and are therefore allowable for at least the same reasons as noted above with respect to amended claim 15.

New claims 36-40 depend upon and include the subject matter of amended claim 23, and are therefore allowable for at least the same reasons as noted above with respect to amended claim 23.

G. Conclusion

It is believed that all matters set forth in the Office Action mailed January 5, 2022 have been addressed. Applicant has made a diligent effort to advance the prosecution of this application by amending claims 4, 7, 11, 14-15, 18-23, and 26-30, cancelling claims 16-17 and 24-25 without prejudice or disclaimer, adding claims 31-40, and submitting arguments in support of the patentability of claims 4, 7, 11, 14-15, 18-23, and 26-40.

In view of all of the above, the allowance of claims 4, 7, 11, 14-15, 18-23, and 26-40 is respectfully requested, along with previously-allowed claims 1-3, 5-6, 8-10, and 12-13.

The Examiner is invited to call the undersigned at the below-listed telephone number if a telephone conference would expedite or aid the prosecution and examination of this application.

Respectfully submitted,

Date: April 5, 2022

/Zachary A. Halbur/
Zachary A. Halbur (Reg. No. 68,500)

HAYNES AND BOONE, LLP
Customer No. 27683
Telephone: 817-347-6678
Facsimile: 214-200-0853

Electronic Patent Application Fee Transmittal

Application Number:	17388716
Filing Date:	29-Jul-2021
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Filer:	Zachary Arnold Halbur/Q Dismuke
Attorney Docket Number:	57959.12US01

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	6	50	300
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	4	240	960
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1260**

Electronic Acknowledgement Receipt	
EFS ID:	45395809
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Zachary Arnold Halbur/Q Dismuke
Filer Authorized By:	Zachary Arnold Halbur
Attorney Docket Number:	57959.12US01
Receipt Date:	05-APR-2022
Filing Date:	29-JUL-2021
Time Stamp:	11:20:35
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1260
RAM confirmation Number	E202245B21060283
Deposit Account	081394
Authorized User	Q Dismuke
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		57959-12US01-Response.pdf	99456 5cbdfc9a57a302ed67e44c16c88e82310f8edfa4	yes	23

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	18
	Applicant Arguments/Remarks Made in an Amendment	19	23

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40468 064ad58eda254b7ff64b5ccb21b15ac7746ca72a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	139924		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

27683 7590 01/05/2022

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

EXAMINER	
WRIGHT, GIOVANNA COLLINS	

ART UNIT	PAPER NUMBER
3672	

NOTIFICATION DATE	DELIVERY MODE
01/05/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipdocketing@haynesboone.com

Office Action Summary	Application No. 17/388,716	Applicant(s) Kuehn et al.	
	Examiner GIOVANNA WRIGHT	Art Unit 3672	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 29 July 2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-30 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☑ Claim(s) 1-3,5-6,8-10 and 12-13 is/are allowed.

7) ☑ Claim(s) 4,7,11,14-17,20-25 and 28-30 is/are rejected.

8) ☑ Claim(s) 18-19 and 26-27 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 29 July 2021 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4,7,11,14, rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

In claim 4, line 3 the applicant recites “withholding grease for the grease port”. However, the applicant never claims that grease is communicated to the grease port.

The same indefiniteness applies to claims 7, 11 and 14.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

Claim(s) 15-16,20-24,28-30 is/are rejected under 35 U.S.C. 102a1 as being anticipated by Kajaria 20170275980.

Referring to claims 15 and 23, Kajaria discloses a method (see fig. 4 and paragraph 0035), comprising:(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well (see paragraph 00355, operator can select valve to close prevent flow to one of the wells 14 by remotely operating valve 66 to a well); (b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue (the operator can remotely operate valve 66 on a second well 14); (c) permitting hydraulic fracturing of the second well (when valve 66 is opened that fracturing can occur in that valve); (d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue (the operator can close valve 66 after fracturing has occurred as needed); and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well (the operator can allow open valve 66 to allow fluid to go to first well 14 to fracture a different section as needed during the fracturing process) and an apparatus comprising computer readable medium with instructions to execute the method (see paragraph 0028 control vehicle 40 would have computer readable medium to allow operator to control the valves for the fracturing process) .

Referring to claims 16 and 24, Kajaria discloses step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve (opening valve 66 of second well 14); and wherein step (e) comprises: opening a first valve (opening valve of first well 14) associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well.

Referring to claim 20 and 28, Kajaria discloses (f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well (see fig. 1, there are 4 wells 14); (g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue (each well is connected to valve 66 to control flow into each well); (h) permitting hydraulic fracturing of the fourth well (the operator can control valves to permit fracturing); (i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue (the operator can select valves to open as needed); and (j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of

the third well (the operator can allow open valve 66 to allow fluid to go to first well 14 to fracture a different section as needed during the fracturing process).

Referring to claim 21 and 29, Kajaria discloses wherein steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and wherein steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold (see paragraph 0034 since the valves 66 are independently operated, the operator can simultaneously send fracture fluid from manifold 18 to two wells).

Referring to claim 22 and 30, Kajaria discloses step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve (opening valve 66 of second well 14); and wherein step (e) comprises: opening a first valve (opening valve of first well 14) associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; wherein step (h) comprises opening a fourth valve (fourth valve 66) associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and wherein step (j) comprises: opening a third valve (third valve 66) associated with the third well to permit pumping of fluid into the third well via the third valve; and closing the fourth valve associated with the fourth well.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have

> been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 17 and 25 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kajaria 20170275980 in view of Pitcher et al. 20140352968.

Referring to claim 17 and 25, Kajaria discloses that different parameters are provided to the operator to better control the fracturing process (see paragraph 0028) but does not specifically disclose measuring a flow rate of the fluid being pumped into the second well. Pitcher teaches measuring a flow rate of the fluid being pumped into the well (see paragraph 0026, flowmeter 62 used to measure fluid going into well being fractured). As it would be advantageous to known the flow rate the fracture fluid to more efficiently control the fracture process, it would be obvious to one of ordinary skill in the art before the effective filing date to modify the method and system disclosed by Kajaria to measure a flow rate of the fluid being pumped into the second well in view of the teachings of Pitcher.

Allowable Subject Matter

Claims 1-3,5-6,8-10,12-13 are allowed.

Claims 4,7,11, and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 18-19 and 26-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The closest prior art to Kajaria does not teach nor suggest determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time in combination with the other limitations of the claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Boyd 20170123437 and Cherewyk 20180179848 both disclosed using a manifold to sequentially fracture multiple wells.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GIOVANNA WRIGHT whose telephone number is (571)272-7027. The examiner can normally be reached M-F 8 am- 5 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Abby Flynn can be reached on 571- 272-9855. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center,

visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Giovanna Wright/
Primary Examiner, Art Unit 3672

Notice of References Cited	Application/Control No. 17/388,716	Applicant(s)/Patent Under Reexamination Kuehn et al.	
	Examiner GIOVANNA WRIGHT	Art Unit 3672	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20170123437-A1	05-2017	Boyd; Joseph Mark	G05D7/0641	1/1
*	B	US-20170275980-A1	09-2017	Kajaria; Saurabh	F16L55/07	1/1
*	C	US-20180179848-A1	06-2018	CHEREWYK; Boris (Bruce) P.	E21B21/02	1/1
*	D	US-20140352968-A1	12-2014	Pitcher; Jason L.	E21B43/26	166/308.1
	E					
	F					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/388,716	Kuehn et al.
	Examiner	Art Unit
	GIOVANNA WRIGHT	3672

CPC - Searched*		
Symbol	Date	Examiner
E21B43/2607, 43/26	12/30/2021	gcw

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
search history notes	12/30/2021	gcw

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	("20200248529").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 01:54 PM
L2	1	("20200386359").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 01:57 PM
L3	8	("20200386359" "20200355322" "20200248529" "10662740" "20200123876" "10584552" "20200190933" "20200190934").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 06:42 PM
L4	484	e21b43/2607.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 06:45 PM
L5	8342	e21b43/26.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:04 PM
L6	222	5 AND fractur$4 WITH first near2 well SAME second near2 well	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:05 PM
L7	134	5 AND fractur$4 WITH first ADJ well SAME second ADJ well	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:12 PM
L8	126	5 AND fractur$4 WITH first ADJ well SAME second ADJ well WITH fractur$4	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:15 PM
L9	38	5 AND fractur$4 WITH first ADJ well SAME second ADJ well WITH fractur$4 AND manifold	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:23 PM
L10	178	5 AND zipper	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 07:44 PM
L11	243	zipper WITH (frac frack valve fractur$4) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 08:34 PM
L12	83	11 NOT 10	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 08:35 PM
L13	61	zipper WITH (controller control computer) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 08:48 PM
L14	145	zipper WITH (manifold module) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 08:55 PM
L15	112	((("KUEHN") near3 ("Jordan")) OR (("JOHNSON") near3 ("Austin")) OR (("BEASON") near3	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2021/12/23 09:06 PM

		("Ronnie")) OR ((("CANNON") near3 ("Nicholas"))).INV.					
L16	5	15 AND zipper	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 09:06 PM
L17	29	"10260327"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 09:12 PM
L18	1	("10260327").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 09:12 PM
L19	16	zip WITH (frac frack valve fractur$4) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/23 09:15 PM
L20	4	("20030045189" "3123842" "10352128").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 07:43 AM
L21	0	zipper WITH (processor) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 07:49 AM
L22	87	zipper SAME (controller control computer) SAME (frac fractur$4) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 07:50 AM
L23	38	zipper SAME (controller control WITH system computer) SAME (frac fractur$4) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 07:51 AM
L24	18	zipper WITH valve SAME (controller control WITH system computer) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 07:54 AM
L25	1	("20210355784").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 10:12 AM
L26	1	("20200386359").pn.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 11:08 AM
L27	5	frac ADJ leg AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 11:08 AM
L28	1407	sequential$4 WITH (fractur$4 frac$4) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 12:23 PM
L29	96	sequential$4 WITH (fractur$4 frac$4) WITH valve AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 12:24 PM
L30	11	sequential$4 WITH (fractur$4 frac$4) WITH manifold AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 12:25 PM
L31	397	sequential$4 WITH (fractur$4 frac$4) WITH (well wellhead) AND e21b$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 12:26 PM

L32	284	sequential$4 WITH (fractur$4 frac$4) WITH (well wellhead) AND e21b43/26$.cpc.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 12:27 PM
L33	0	(15/852355).APP.	(USPAT; USOCR)	OR	ON	ON	2021/12/30 01:20 PM
L34	7	("20190383125"|"20170123437"|"20170275980"|"20170123437"|"20110048695"|"8813836"|"20170314379"|"20180073308").PN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 01:21 PM
L35	1	(15/471919).APP.	(USPAT; USOCR)	OR	ON	ON	2021/12/30 02:15 PM
L36	22	("5215151" | "8469108" | "8474521" | "8496062" | "8567513" | "8656990" | "8813836" | "9127545" | "9447671" | "9458688" | "9534465" | "20120181013" | "20120181785" | "20140020901" | "20140131954" | "20140151069" | "20150184491" | "20150292297" | "20150345272" | "20160168970" | "20170044872").pn. OR ("10392914").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 02:16 PM
L37	8	("2017/0275980").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 02:18 PM
L38	5	("2018/0179848").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/30 02:22 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01

CONFIRMATION NO. 9925

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

PUBLICATION NOTICE



Title:HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Publication No.US-2021-0355784-A1
Publication Date:11/18/2021

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01	9925

27683 7590 11/09/2021

HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

EXAMINER
CENTRAL, DOCKET

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
11/09/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipdocketing@haynesboone.com

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 17/388,716	**Applicant(s)** Kuehn et al.	
	Examiner Dale A Hall	**Art Unit** OPET	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 29 July 2021 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☑ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Dale Hall at (571)272-3586. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/Michelle R. Eason/ Lead Paralegal Specialist	

U.S. Patent and Trademark Office
PTO-2298 (Rev. 02-2012)

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 17/388,716

filed on July 29, 2021

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Jordan Kuehn Date (Optional): 9/23/21

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 17/388,716 filed on July 29, 2021.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

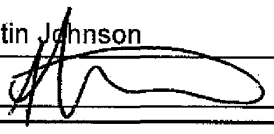
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Austin Johnson Date (Optional): 8/4/21

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 17/388,716 filed on July 29, 2021.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

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LEGAL NAME OF INVENTOR

Inventor: Ronnie B. Beason Date (Optional): 9/28/2021

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (08-12)
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LEGAL NAME OF INVENTOR

Inventor: Nicholas J. Cannon Date (Optional): 07/30/2021

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	43941990
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Alan Herda/Q Dismuke
Filer Authorized By:	Alan Herda
Attorney Docket Number:	57959.12US01
Receipt Date:	04-OCT-2021
Filing Date:	29-JUL-2021
Time Stamp:	16:34:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	57982-12US01-Declarations.pdf	915200 e6bfb08bfbb0a90d7dbc6939472c2162e7fe9933	no	4

Warnings:

Information:	
Total Files Size (in bytes):	915200

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/388,716	07/29/2021	2649	1650	57959.12US01	30	4

CONFIRMATION NO. 9925

FILING RECEIPT

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

OC000000127595745

Date Mailed: 08/11/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Jordan Kuehn, Forest Park, IL;
Austin Johnson, Edmond, OK;
Ronnie B. Beason, Lexington, OK;
Nicholas J. Cannon, Washington, OK;

Applicant(s)

Downing Wellhead Equipment, LLC, Oklahoma City, OK;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 63/189,663 05/17/2021
and is a CON of 17/319,854 05/13/2021
which is a CIP of 16/855,749 04/22/2020
which claims benefit of 62/836,761 04/22/2019
and is a CIP of 16/248,648 01/15/2019 PAT 10724682
which claims benefit of 62/617,443 01/15/2018
and said 16/855,749 04/22/2020
is a CIP of 16/803,156 02/27/2020
which is a CIP of 16/248,633 01/15/2019 PAT 10584552
which claims benefit of 62/617,438 01/15/2018
and said 16/803,156 02/27/2020
is a CIP of 16/436,623 06/10/2019
which claims benefit of 62/755,170 11/02/2018

and said 16/803,156 02/27/2020
is a CIP of 16/100,741 08/10/2018 PAT 10689938
which claims benefit of 62/638,688 03/05/2018
and claims benefit of 62/638,681 03/05/2018
and claims benefit of 62/637,220 03/01/2018
and claims benefit of 62/637,215 03/01/2018
and claims benefit of 62/598,914 12/14/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/10/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/388,716**

Projected Publication Date: 11/18/2021

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Preliminary Class

455

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ

in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/388,716

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	30 minus 20 =	* 10	x 50 =	500	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1	x 240 =	240			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1570		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/388,716	07/29/2021	Jordan Kuehn	57959.12US01

CONFIRMATION NO. 9925

27683
HAYNES AND BOONE, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, TX 75219

INFORMAL NOTICE

OC000000127595746

Date Mailed: 08/11/2021

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Jordan Kuehn
  Austin Johnson
  Ronnie B. Beason
  Nicholas J. Cannon

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lphan/

Electronic Patent Application Fee Transmittal

Application Number:	17388716
Filing Date:	
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Filer:	Zachary Arnold Halbur/Q Dismuke
Attorney Docket Number:	57959.12US01

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**80**

Electronic Acknowledgement Receipt	
EFS ID:	43380697
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Zachary Arnold Halbur/Q Dismuke
Filer Authorized By:	Zachary Arnold Halbur
Attorney Docket Number:	57959.12US01
Receipt Date:	29-JUL-2021
Filing Date:	
Time Stamp:	15:56:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$80
RAM confirmation Number	E20217SF57461970
Deposit Account	081394
Authorized User	Q Dismuke
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	38183 8795468e67ee7750b398fdfc0fcdbfd66718d812	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	38183		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Jordan Kuehn	Nonprovisional Application Number (if known):	57959.12US01
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Zachary A. Halbur/	Date 2021-07-29
Name (Print/Typed) Zachary A. Halbur	Practitioner Registration Number 68,500

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jordan		Kuehn	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Forest Park	State/Province	IL	Country of Residence	US

Mailing Address of Inventor:

Address 1	3528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Austin		Johnson	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	Edmond	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	3528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ronnie	B.	Beason	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

City	Lexington	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	3528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Nicholas	J.	Cannon	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Washington	State/Province	OK	Country of Residence	US

Mailing Address of Inventor:

Address 1	3528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	State/Province	OK
Postal Code	73128	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	27683		
Email Address	ipdocketing@haynesboone.com	Add Email	Remove Email

Application Information:

Title of the Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME		
Attorney Docket Number	57959.12US01	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	50	Suggested Figure for Publication (if any)	1B

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	27683		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	63/189663	2021-05-17

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	17/319854	2021-05-13
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
17/319854	Continuation in part of	16/855749	2020-04-22
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/855749	Claims benefit of provisional	62/836761	2019-04-22
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/855749	Continuation in part of	16/248648	2019-01-15	10724682	2020-07-28

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12/248648	Claims benefit of provisional	62/617443	2018-01-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/855749	Continuation in part of	16/803156	2020-02-27
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/248633	2019-01-15	10584552	2020-03-10

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/248633	Claims benefit of provisional	62/617438	2018-01-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/436623	2019-06-10

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/436623	Claims benefit of provisional	62/755170	2018-11-02
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/803156	Continuation in part of	16/100741	2018-08-10	10689938	2020-06-23

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/638688	2018-03-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/638681	2018-03-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/637220	2018-03-01
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/637215	2018-03-01
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/100741	Claims benefit of provisional	62/598914	2017-12-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Downing Wellhead Equipment, LLC		
Mailing Address Information For Applicant:			
Address 1	8528 S.W. 2nd Street		
Address 2			
City	Oklahoma City	**State/Province**	OK
Country	US	Postal Code	73128
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	57959.12US01
	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Zachary A. Halbur/			Date (YYYY-MM-DD)	2021-07-29
First Name	Zachary A.	Last Name	Halbur	Registration Number	68500

Additional Signature may be generated within this form by selecting the Add button. Add

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	Application Number	
Title of Invention	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME	

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U.S. NONPROVISIONAL PATENT APPLICATION

TITLED:

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Inventor(s):

Jordan Kuehn
Forest Park, Illinois
USA

Austin Johnson
Edmond, Oklahoma
USA

Ronnie B. Beason
Lexington, Oklahoma
USA

Nicholas J. Cannon
Washington, Oklahoma
USA

Haynes and Boone, LLP
IP Section
2323 Victory Avenue
Suite 700
Dallas, Texas 75219
USA
214-651-5000
214-200-0853
ipdocketing@haynesboone.com

HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME

Cross-Reference to Related Applications

[0001] This application claims the benefit of the filing date of, and priority to, U.S. Application No. 63/189,663, filed May 17, 2021, the entire disclosure of which is hereby incorporated herein by reference.

[0002] This application is also continuation of U.S. Patent Application No. 17/319,854 (the "'854 Application"), filed May 13, 2021, the entire disclosure of which is hereby incorporated herein by reference.

[0003] The '854 Application is a continuation-in-part (CIP) of U.S. Patent Application No. 16/855,749 (the "'749 Application"), filed April 22, 2020, the entire disclosure of which is hereby incorporated herein by reference. The '749 Application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/836,761, filed April 22, 2019, the entire disclosure of which is hereby incorporated herein by reference.

[0004] The '749 Application is a continuation-in-part (CIP) of U.S. Patent Application No. 16/248,648 (the "'648 Application"), filed January 15, 2019, now issued as U.S. Patent No. 10,724,682, the entire disclosure of which is hereby incorporated herein by reference. The '648 Application claims the benefit of the filing date of, and priority to, U.S. Application No. 62/617,443, filed January 15, 2018, the entire disclosure of which is hereby incorporated herein by reference.

[0005] The '749 Application is also a CIP of U.S. Patent Application No. 16/803,156 (the "'156 Application"), filed February 27, 2020, the entire disclosure of which is hereby incorporated herein by reference. The '156 Application is a CIP of U.S. Patent Application No. 16/248,633 (the "'633 Application"), filed January 15, 2019, now issued as U.S. Patent No. 10,584,552, the entire disclosure of which is hereby incorporated herein by reference. The '633 Application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/617,438 (the "'438 Application"), filed January 15, 2018, the entire disclosure of which is hereby incorporated herein by reference.

[0006] The '156 Application is also a CIP of U.S. Patent Application No. 16/436,623 (the "'623 Application"), filed June 10, 2019, the entire disclosure of which is hereby

incorporated herein by reference. The '623 Application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/755,170, filed November 2, 2018, the entire disclosure of which is hereby incorporated herein by reference.

[0007] The '156 Application is also a CIP of U.S. Patent Application No. 16/100,741 (the "'741 Application"), filed August 10, 2018, now issued as U.S. Patent No. 10,689,938, the entire disclosure of which is hereby incorporated herein by reference. The '741 Application claims the benefit of the filing date of, and priority to, U.S. Patent Application No. 62/638,688, filed March 5, 2018, U.S. Patent Application No. 62/638,681, filed March 5, 2018, U.S. Patent Application No. 62/637,220, filed March 1, 2018, U.S. Patent Application No. 62/637,215, filed March 1, 2018, and U.S. Patent Application No. 62/598,914, filed December 14, 2017, the entire disclosures of which are hereby incorporated herein by reference.

[0008] The '749 Application is related to U.S. Patent Application No. 16/801,911, filed February 26, 2020, the entire disclosure of which is hereby incorporated herein by reference.

[0009] This application is also related to U.S. Patent Application No. 17/360,336, filed June 28, 2021, the entire disclosure of which is hereby incorporated herein by reference.

Background

[0010] This application relates generally to oil and gas hydraulic fracturing operations and, more particularly, to a hydraulic fracturing plan executable by a hydraulic fracturing system to hydraulically fracture a plurality of oil and gas wells.

Brief Description of the Drawings

[0011] Figure 1A is a diagrammatic illustration of a hydraulic fracturing system operably to execute a hydraulic fracturing plan to hydraulically fracture a plurality of oil and gas wells, according to one or more embodiments.

[0012] Figure 1B is a flow diagram illustrating a method for hydraulically fracturing a plurality of wells by executing a hydraulic fracturing plan using the hydraulic fracturing system of Figure 1A, according to one or more embodiments.

[0013] Figure 2A schematically illustrates execution of one or more sub-step(s) of a first step of the method illustrated in Figure 1B, which first step is or includes equalizing a lubricator of a frac leg associated with a first well, and opening the first well, according to one or more embodiments.

[0014] Figure 2B schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0015] Figure 2C schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0016] Figure 2D schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0017] Figure 2E schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0018] Figure 2F schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0019] Figure 2G schematically illustrates execution of one or more additional sub-step(s) of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0020] Figure 3 is a flow diagram illustrating the various sub-steps, illustrated schematically in Figures 2A and 2G, of the first step of the method illustrated in Figure 1B, according to one or more embodiments.

[0021] Figure 4 is a flow diagram illustrating various sub-steps of a second step of the method illustrated in Figure 1B, which second step is or includes perforating a stage of the first well using a wireline perforating system, according to one or more embodiments.

[0022] Figure 5A schematically illustrates execution of one or more sub-step(s) of the second step of the method illustrated in Figure 1B, according to one or more embodiments.

[0023] Figure 5B schematically illustrates execution of one or more additional sub-step(s) of the second step of the method illustrated in Figure 1B, according to one or more embodiments.

[0024] Figure 5C schematically illustrates execution of one or more additional sub-step(s) of the second step of the method illustrated in Figure 1B, according to one or more embodiments.

[0025] Figure 6 is a flow diagram illustrating various sub-steps of a third step of the method illustrated in Figure 1B, which third step is or includes closing the first well using a valve apparatus, and draining a lubricator, according to one or more embodiments.

[0026] Figure 7A schematically illustrates execution of one or more sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0027] Figure 7B schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0028] Figure 7C schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0029] Figure 7D schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0030] Figure 7E schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0031] Figure 7F schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0032] Figure 7G schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0033] Figure 7H schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0034] Figure 7I schematically illustrates execution of one or more additional sub-step(s) of the third step of the method illustrated in Figure 1B, according to one or more embodiments.

[0035]

[0036] Figure 8 is a flow diagram illustrating various sub-steps of a fourth step of the method illustrated in Figure 1B, which fourth step is or includes isolating a stage of a second well in preparation for a hydraulic fracturing operation, according to one or more embodiments.

[0037] Figure 9A schematically illustrates execution of one or more sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0038] Figure 9B schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0039] Figure 9C schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0040] Figure 9D schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0041] Figure 9E schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0042] Figure 9F schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0043] Figure 9G schematically illustrates execution of one or more additional sub-step(s) of the fourth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0044]

[0045] Figure 10 is a flow diagram illustrating various sub-steps of a fifth step of the method illustrated in Figure 1B, which fifth step is or includes detecting or otherwise determining that a fracturing stage of a third well has ended, according to one or more embodiments.

[0046] Figure 11 schematically illustrates execution of one or more subs-step(s) of the fifth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0047] Figure 12 is a flow diagram illustrating various sub-steps of a sixth step of the method illustrated in Figure 1B, which sixth step is or includes determining whether to permit a regular swap or a continuous pumping swap (or "CP swap"), according to one or more embodiments.

[0048] Figure 13 is a flow diagram illustrating various sub-steps of a seventh step of the method illustrated in Figure 1B, which seventh step is or includes the regular swap from hydraulically fracturing the third well to hydraulically fracturing the second well, according to one or more embodiments.

[0049] Figure 14A schematically illustrates execution of one or more sub-step(s) of the seventh step of the method illustrated in Figure 1B, according to one or more embodiments.

[0050] Figure 14B schematically illustrates execution of one or more additional sub-step(s) of the seventh step of the method illustrated in Figure 1B, according to one or more embodiments.

[0051] Figure 15 is a flow diagram illustrating various sub-steps of an eighth step of the method illustrated in Figure 1B, which eighth step is or includes the CP swap from

hydraulically fracturing the third well to hydraulically fracturing the second well, according to one or more embodiments.

[0052] Figure 16A schematically illustrates execution of one or more sub-step(s) of the eighth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0053] Figure 16B schematically illustrates execution of one or more additional sub-step(s) of the eighth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0054] Figure 16C schematically illustrates execution of one or more additional sub-step(s) of the eighth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0055] Figure 16D is a chart illustrating execution of one or more of the various sub-steps, schematically illustrated in Figures 16A through 16C, of the eighth step of the method illustrated in Figures 1B, according to one or more embodiments.

[0056] Figure 16E is another chart illustrating execution of one or more of the various sub-steps, schematically illustrated in Figures 16A through 16C, of the eighth step of the method illustrated in Figures 1B, according to one or more embodiments.

[0057] Figure 17 is a flow diagram illustrating various sub-steps of a ninth step of the method illustrated in Figure 1B, which ninth step is or includes latching, filling, and pressure testing a frac leg associated with a fourth well in preparation for perforating a stage of the fourth well using the wireline perforating system, according to one or more embodiments.

[0058] Figure 18A schematically illustrates execution of one or more sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0059] Figure 18B schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0060] Figure 18C schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0061] Figure 18D schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0062] Figure 18E schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0063] Figure 18F schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0064] Figure 18G schematically illustrates execution of one or more additional sub-step(s) of the ninth step of the method illustrated in Figure 1B, according to one or more embodiments.

[0065] Figure 19A is a flow diagram illustrating a portion of another method for fracturing wells using the fracturing system of Figure 1A, which another method includes swapping from simultaneously fracturing first and second wells to simultaneously fracturing third and fourth wells, according to one or more embodiments.

[0066] Figure 19B is a flow diagram illustrating another portion of the another method of Figure 20A, according to one or more embodiments.

[0067] Figure 20 is a diagrammatic illustration of a computing node for implementing one or more embodiments of the present disclosure.

Detailed Description

[0068] Referring to Figure 1A, in an embodiment, a hydraulic fracturing system 100 for executing a hydraulic fracturing plan to hydraulically fracture wells 105A through 105C+n is illustrated, which hydraulic fracturing system 100 includes: a blender 110 adapted to mix fluid from a fluid source 115 with sand from a sand source 120 to produce hydraulic fracturing fluid; a suction manifold 125 adapted to receive the hydraulic fracturing fluid from the blender 110; a discharge manifold 130; a plurality of swap stations 135, each adapted to communicate the hydraulic fracturing fluid from the suction manifold 125 to a corresponding pump truck 140, and, after pressurization by the corresponding pump truck

140, to communicate the pressurized hydraulic fracturing fluid from the corresponding pump truck 140 to the discharge manifold 130; and a zipper manifold 145 adapted to communicate the pressurized hydraulic fracturing fluid from the discharge manifold 130 to a plurality of hydraulic fracturing legs (or "frac legs") 150A through 150C+n, each of which is adapted to communicate the pressurized hydraulic fracturing fluid from the zipper manifold 145 to a corresponding one of the wells 105A through 105C+n. In one or more embodiments, each of the swap stations 135 is or includes one or more components shown and described in U.S. Patent Application No. 16/436,189, filed June 10, 2019, now published as U.S. Patent Application Publication No. 2020/0386359, the entire disclosure of which is hereby incorporated herein by reference.

[0069] A grease system 155 is adapted to communicate lubricating grease to various components of the frac legs 150A through 150C+n, including, for example, pump-down valves 160a-b, master valves 165a-b, and zipper valves 170a-b associated with each of the frac legs 150A through 150C+n (which components are shown in Figures 2A-G, 5A-C, 7A-I, 9A-G, 11, 14A-B, 16A-C, and 18A-G). In one or more embodiments, the grease system 155 is or includes one or more components shown and described in U.S. Patent Application No. 16/248,648, filed January 15, 2019 bearing Attorney Docket No. 57959.3US01, now issued as U.S. Patent No. 10,724,682, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the grease system 155 is or includes one or more components shown and described in U.S. Patent Application No. 16/938,341, filed July 24, 2020 bearing Attorney Docket No. 57959.3US02, now published as U.S. Patent Application Publication No. 2020/0355322, the entire disclosure of which is hereby incorporated herein by reference in its entirety. In addition, or instead, in one or more embodiments, the grease system 155 is or includes one or more components shown and described in the '749 Application, filed April 22, 2020 bearing Attorney Docket No. 57959.5US01, now published as U.S. Patent Application Publication No. 2020/0248529, the entire disclosure of which is hereby incorporated herein by reference in its entirety. In addition, or instead, in one or more embodiments, the grease system 155 is or includes one or more components shown and described in the '854 Application, filed May 13, 2021 bearing Attorney Docket No.

57959.11US01, the entire disclosure of which is hereby incorporated herein by reference in its entirety.

[0070] A controller 156 is adapted to control the grease system 155, the frac legs 150A through 150C+n, or both. In one or more embodiments, the controller 156 is or includes a non-transitory computer readable medium and one or more processors adapted to execute instructions stored on the non-transitory computer readable medium. In one or more embodiments, the controller 156 is located on-site at the well site. Alternatively, the controller 156 may be located remotely from the well site. In one or more embodiments, the controller 156 includes a plurality of controllers. In one or more embodiments, the controller 156 includes a plurality of controllers, with one or more controllers located on-site at the well site and/or one or more other controllers located remotely from the well site.

[0071] Referring to Figure 1B, in an embodiment, a method 175 for hydraulically fracturing the wells 105A through 105C+n by executing a hydraulic fracturing plan using the hydraulic fracturing system 100 of Figure 1A is illustrated. The method 175 generally includes: at step(s) 176a, perforating a stage of each well using, for example, a wireline perforating system 177; at step(s) 176b, isolating the perforated stage of each well using an object dropped, for example, from a launcher 178 of the wireline perforating system 177; and, at step(s) 176c, hydraulically fracturing the isolated/perforated stage of each well. More particularly, as will be described in further detail below, the method 175 includes: at a step 225, equalizing a lubricator 220 of the frac leg 150A associated with the well 105A, and opening the well 105A; at a step 230, perforating a stage of the well 105A using the wireline perforating system 177; at a step 235, closing the well 105A using the valve apparatus 210 and draining the lubricator 220; at a step 238a, queuing the well 105A (as indicated at queue position n_2) in a frac queue 239 in preparation for a hydraulic fracturing operation; at a step 238b, dequeuing the well 105B (as indicated at queue position n_1+1) from the frac queue 239 in preparation for the hydraulic fracturing operation; at a step 240, isolating a stage of the well 105B in preparation for the hydraulic fracturing operation; at a step 245, detecting or otherwise determining that a fracturing stage of the well 105D has ended; at a step 250, determining whether to permit a regular

swap or a CP swap from hydraulically fracturing (at a step 262) the well 105D to hydraulically fracturing (at the step 262) the well 105B; at a step 255, executing the regular swap from hydraulically fracturing (at the step 262) the well 105D to hydraulically fracturing (at the step 262) the well 105B, or, at a step 260, executing the CP swap from hydraulically fracturing (at the step 262) the well 105D to hydraulically fracturing (at the step 262) the well 105B; at the step 262, hydraulically fracturing the well 105B; optionally, at a step 263a, queuing the well 105D (as indicated at queue position n_1) in a wireline queue 264 in preparation for perforating a next stage of the well 105D; optionally, at a step 238b, dequeuing the well 105E (as indicated at queue position 1) from the wireline queue 264 in preparation for perforating a next stage of the well 105E; and, at a step 265, latching, filling, and pressure testing the frac leg 150E associated with the well 105E.

[0072] In one or more embodiments, the controller 156 is adapted to control the grease system 155, the frac legs 150A through 150C+n, or both, in order to execute the method 175 described herein. In one or more embodiments, the frac queue 239 and the wireline queue 264 are stored on a non-transitory computer readable medium that includes or is part of, for example, the controller 156. In one or more embodiments, the frac queue 239 is or includes a list of data items, commands, etc., stored on the computer readable medium so as to be retrievable by one or more processors in a definite order (but not necessarily in the order stored), and the frac queue 239 is associated with the wells 105A through 105C+n, as shown in Figure 1B. In addition, or instead, the frac queue 239 can be at least partially populated by an external source, such as, for example, the frac operator. Likewise, in one or more embodiments, the wireline queue 264 is or includes a list of data items, commands, etc., stored on the computer readable medium so as to be retrievable by one or more processors in a definite order (but not necessarily in the order stored), and the wireline queue 264 is associated with the wells 105A through 105C+n, as shown in Figure 1B. In addition, or instead, the wireline queue 264 can be at least partially populated by an external source, such as, for example, the wireline operator.

[0073] Referring to Figures 2A through 2G, in an embodiment, the frac leg 150A associated with the well 105A is illustrated, which frac leg 150A includes: a wellhead including the master valves 165a-b (such as, for example, gate valves) operably coupled

to, and adapted to be in fluid communication with, the well 105A, each of the master valves 165a-b including associated grease ports (or "GPs") 185a-b; the pump-down valves 160a-b (such as, for example, gate valves) operably coupled to, and adapted communicate fluid between, a pump-down truck 190 and the well 105A, via the master valves 165a-b, each of the pump-down valves 160a-b including an associated GP 195; and the zipper valves 170a-b (such as, for example, gate valves) operably coupled to, and adapted communicate fluid between, the zipper manifold 145 and the well 105A, via the master valves 165a-b, each of the zipper valves 170a-b including associated GPs 200a-b. In one or more embodiments, one or both of the zipper valves 170a-b of each of the frac legs 150A through 150C+n include(s), or is/are part of, the zipper manifold 145. In one or more embodiments, as in Figures 2A through 2G, the frac leg 150A associated with the well 105A also includes a flow block 205 to which the pump-down valves 160a-b and the zipper valves 170a-b are operably coupled.

[0074] The frac leg 150A associated with the well 105A further includes a valve apparatus 210 via which both the wireline perforating system 177 and the object launched from, for example, the launcher 178, are permitted entry to the well 105A. The valve apparatus 210 includes: a containment area 215a (labeled "WELL") adapted to be in fluid communication with the well 105A via the master valves 165a-b; a containment area 215b (labeled "LUB") adapted to be in fluid communication with the lubricator 220 of the wireline perforating system 177; and a containment area 215c (labeled "LL") adapted to be in fluid communication with the containment area 215a via a flow control device 221a (e.g., a flapper-type flow control device), and adapted to be in fluid communication with the containment area 215b via a flow control device 221b (e.g., a flapper-type flow control device).

[0075] An equalization ("EQ") valve 222a is connected between the containment areas 215a and 215c, which EQ valve 222a is openable to permit pressure equalization between the containment areas 215a and 215c when the flow control device 221a is closed. Likewise, an equalization valve 222b is connected between the containment areas 215b and 215c, which EQ valve 222b is openable to permit pressure equalization between the containment areas 215b and 215c when the flow control device 221b is

closed. Additionally, an EQ valve 222c is connected between the lubricator 220 and atmosphere (labeled "ATM"), which EQ valve 222c permits pressure equalization between the lubricator 220 and atmosphere. A drain 223 is connected between a latch 234 (via which the lubricator 220 is detachably couplable to the valve apparatus 210) and a pump station 224a, via which drain 223 fluid is communicable to and/or from the lubricator 220, using, for example, an auto-fill/auto-drain pump of the pump station 224a, when the lubricator 220 is connected to the valve apparatus 210 via the latch 234. Finally, when the lubricator 220 is connected to the valve apparatus 210 via the latch 234, fluid can also be communicated to the lubricator 220 (via, for example, the containment area 215c and the EQ valve 222b) using one or more boost pump(s) 224b in order to increase a fluid pressure in the lubricator 220, aiding in pressure equalization between the lubricator 220 and the associated wellhead. For example, the boost pump(s) 224b may include: a first boost pump capable of pumping at relatively higher volumes and relatively lower pressures; and a second boost pump capable of pumping at relatively lower volumes and relatively higher pressures. The first and second boost pumps are used in combination to achieve combined pumping at relatively higher volumes and relatively higher pressures. In addition, or instead, a third boost pump capable of pumping at relatively higher volumes and relatively higher pressures may be used. Moreover, although shown as being connected to, and in fluid communication with, the containment area 215c, one or more of the boost pump(s) 224b may instead be, include, or be part of the pump station 224a.

[0076] In one or more embodiments, the valve apparatus 210 is or includes one or more components shown and described in U.S. Patent Application No. 15/487,785, filed April 14, 2017, now issued as U.S. Patent No. 10,662,740, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the valve apparatus 210 is or includes one or more components shown and described in U.S. Patent Application No. 16/721,203, filed December 19, 2019, now published as U.S. Patent Application Publication No. 2020/0123876, the entire disclosure of which is hereby incorporated herein by reference.

[0077] In one or more embodiments, the launcher 178 is or includes one or more components shown and described in U.S. Patent Application No. 16/248,633, filed January 15, 2019 bearing Attorney Docket No. 57959.4US01, now issued as U.S. Patent No. 10,584,552, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the launcher 178 is or includes one or more components shown and described in U.S. Patent Application No. 16/801,911, filed February 26, 2020 bearing Attorney Docket No. 57959.4US02, now published as U.S. Patent Application Publication No. 2020/0190933, the entire disclosure of which is hereby incorporated herein by reference. In addition, or instead, in one or more embodiments, the launcher 178 is or includes one or more components shown and described in U.S. Patent Application No. 16/803,156, filed February 27, 2020 bearing Attorney Docket No. 57959.8US01, now published as U.S. Patent Application Publication No. 2020/0190934, the entire disclosure of which is hereby incorporated herein by reference.

[0078] In one or more embodiments, the frac legs 150B through 150C+n associated with each of the wells 105B through 105C+n, respectively, are substantially identical to the frac leg 150A associated with the well 105A; therefore, the frac legs 150B through 150C+n associated with each of the wells 105B through 105C+n will not be described in further detail. Accordingly, each of the frac legs 150B through 150C+n associated with the wells 105B through 105C+n includes features/components substantially identical to corresponding features/components of the frac leg 150A associated with the well 105A, which substantially identical features/components are given the same reference numerals and will also not be described in further detail.

[0079] Referring to Figure 3, with continuing reference to Figures 2A through 2G, in an embodiment, various sub-steps 226a-h of the step 225 of the method 175 illustrated in Figure 1B are shown in detail, which step 225 is or includes equalizing the lubricator 220 of the frac leg 150A associated with the well 105A, and opening the well 105A. In one or more embodiments, the lubricator 220 is or includes one or more components shown and described in the '749 Application. In addition, or instead, in one or more embodiments,

the lubricator 220 is or includes one or more components shown and described in the '854 Application.

[0080] At the sub-step 226a, the boost pump(s) 224b is/are turned on to increase a fluid pressure in the lubricator 220 of the frac leg 150A, thereby aiding in pressure equalization between said lubricator 220 and the well 105A, as shown in Figures 2A and 3 (indicated by arrow 232a in Figure 2A). As shown in Figure 1B, the step 265 of latching, filling, and pressure testing the frac leg 150A associated with the well 105A is executed on the frac leg 150A just prior to the execution of the sub-step 226a on the frac leg 150A. The step 265 will be described in further detail below as executed on the frac leg 150E; however, the description below also applies to the execution of the step 265 on the frac leg 150A. As a result, in one or more embodiments, just prior to execution of the sub-step 226a on the frac leg 150A: the EQ valve 222c is closed; the drain 223 is closed; the lubricator 220 extends within, and is latched to, the latch 234; the flow control device 221b is closed; the EQ valve 222b is open; the flow control device 221a is closed; the EQ valve 222a is closed; the pump-down valves 160a-b closed, and grease from the grease system 155 is withheld from the corresponding GPs 195; the zipper valves 170a-b are closed, and grease from the grease system 155 is withheld from the corresponding GPs 200a-b; and the master valves 165a-b are open, and grease from the grease system 155 is communicated to the corresponding GPs 185a-b. The communication of grease from the grease system 155 to the corresponding GPs 185a-b is not indicated by arrows in Figure 2A but is instead indicated by a lack of shading of the GPs 185a-b as shown in Figure 2A; the same lack of shading indication applies to the GPs 185a-b as shown in Figures 2B-G, 5A-C, 7A-I, 9A-G, 11, 14A-B, 16A-C, and 18A-G.

[0081] At the sub-step 226b, respective fluid pressures within the containment areas 215a and 215c are compared to determine whether the fluid pressure in the lubricator 220 of the frac leg 150A has been equalized to within a threshold amount of the fluid pressure in the well 105A. If it is determined that the fluid pressure in the lubricator 220 of the frac leg 150A has not been equalized to within the threshold amount of the fluid pressure in the well 105A, the EQ valve 222a is opened at the sub-step 226c to further encourage such pressure equalization between said lubricator 220 and the well 105A, as

shown in Figures 2B and 3. Alternatively, the order in which the sub-steps 226a and 226c are executed may be reversed, or one of the sub-steps 226a and 226c may be omitted altogether.

[0082] At the sub-step 226d, once it is determined that the fluid pressure in the lubricator 220 of the frac leg 150A has been equalized to within the threshold amount of the fluid pressure in the well 105A, the flow control device 221a is opened, as shown in Figures 2C and 3. At the sub-step 226e, the EQ valve 222a is closed, as shown in Figures 2D and 3. However, in those embodiments in which the sub-step 226c of opening the EQ valve 222a is omitted, the sub-step 226e of closing the EQ valve 222a is also omitted. Additionally, the sub-step 226e may be executed to close the EQ valve 222a at any time before, during, or after, execution of the sub-steps 226d, 226f, or 226g. At the sub-step 226f, the flow control device 221b is opened, as shown in Figures 2E and 3. At the sub-step 226g, the boost pump(s) 224b is/are turned off, as shown in Figures 2F and 3. At the sub-step 226h, the EQ valve 222b is closed, as shown in Figures 2G and 3. Once the sub-steps 226a-h are executed, the well 105A is ready for execution of the step 230, namely perforating a stage of the well 105A using the wireline perforating system 177, as will be described in detail below in connection with Figures 4 and 5A through 5C.

[0083] Referring to Figures 4 and 5A through 5C, in an embodiment, various sub-steps 231a-h of the step 230 of the method 175 illustrated in Figure 1B are shown in detail, which step 230 is or includes perforating a stage of the well 105A using the wireline perforating system 177. In one or more embodiments, the wireline perforating system 177 is or includes the pump-down truck 190, a wireline truck 233, the lubricator 220, the launcher 178, the latch 234 (via which the lubricator 220 is detachably couplable to the valve apparatus 210), or any combination thereof. In addition, or instead, the wireline perforating system 177 may be or include one or more components shown and described in the '749 Application. In addition, or instead, in one or more embodiments, the wireline perforating system 177 may be or include one or more components shown and described in the '854 Application.

[0084] At the sub-step 231a, a plug and perforating gun(s) are deployed from the lubricator 220, as shown in Figures 4 and 5A (indicated by arrow 232b in Figure 5A). At

the sub-step 231b, the pump-down valves 160a-b are opened, as shown in Figures 4 and 5B. At the sub-step 231c, grease from the grease system 155 is communicated to the corresponding GPs 195 of the pump-down valves 160a-b, respectively, as shown in Figures 4 and 5B (indicated by arrows 232c in Figure 5B). At the sub-step 231d, the plug and perforating gun(s) are pumped down into the well 105A using the pump-down truck 190, as shown in Figures 4 and 5B (indicated by arrows 232d and 232e in Figure 5B). At the sub-step 231e, the pump-down valves 160a-b are closed, and grease from the grease system 155 is withheld from the corresponding GPs 195, as shown in Figures 4 and 5C. Additionally, the sub-step 231e may be executed to close the pump-down valves 160a-b at any time before, during, or after, execution of the sub-steps 231f, 231g, or 231h. At the sub-step 231f, the plug is set in the well 105A, as shown in Figure 4. At the sub-step 231g, the perforating gun(s) are detonated in the well 105A, as shown in Figure 4. Finally, at the sub-step 231h, the spent perforating gun(s) are retrieved from the well 105A, as shown in Figures 4 and 5C (indicated by arrows 232f and 232g in Figure 5C). Once the sub-steps 231a-h are executed, the well 105A is ready for execution of the step 235, namely closing the well 105A using the valve apparatus 210 and draining the lubricator 220, as will be described in detail below in connection with Figures 6 and 7A through 7I.

[0085] Referring to Figures 6 and 7A through 7I, in an embodiment, various sub-steps 236a-n of the step 235 of the method 175 illustrated in Figure 1B are shown in detail, which step 235 is or includes closing the well 105A using the valve apparatus 210 and draining the lubricator 220. At the sub-step 236a, bump up of the retrieved spent perforating gun(s) within the lubricator 220 is determined and/or confirmed. The sub-step 236a can be achieved in several ways, including, but not limited to: prompting the wireline operation for bump up; checking with the wireline operator to determine whether bump up has occurred; detecting bump up using a switch (e.g., a proximity switch) and/or another sensor (e.g., an accelerometer, a wireline speed sensor, a wireline tension sensor, a wireline length sensor, a wireline direction sensor, the like, or any combination thereof) associated with the lubricator 220; receiving verbal confirmation that bump up has occurred; or any combination thereof.

[0086] At the sub-step 236b, once the bump up of the retrieved spent perforating gun(s) within the lubricator 220 is determined and/or confirmed, the flow control device 221b is closed, as shown in Figures 6 and 7A. At the sub-step 236c, the flow control device 221a is closed, as shown in Figures 6 and 7B. At the sub-step 236d, the EQ valve 222c is opened, as shown in Figures 6 and 7C, to bleed down a fluid pressure in the lubricator 220 (indicated by arrow 232g in Figure 7C). At the sub-step 236e, the EQ valve 222b is opened, as shown in Figures 6 and 7D. At the sub-step 236f, the lubricator 220 is checked to determine whether the fluid pressure in the lubricator 220 has dropped (or "bled down") to below a threshold value (e.g., a bleed PSI limit), as shown in Figure 6. At the sub-step 236g, once it has been determined that the fluid pressure in the lubricator 220 has dropped to below the threshold value, the EQ valve 222b is closed, as shown in Figures 6 and 7E.

[0087] At the sub-step 236h, the drain 223 is opened, as shown in Figures 6 and 7F. At the sub-step 236i, the auto-drain pump of the pump station 224a is turned on to drain fluid from the lubricator 220 via the drain 223, as shown in Figures 6 and 7F (indicated by arrow 232h in Figure 7F). At the sub-step 236j, the auto-drain pump is allowed to finish auto-draining the lubricator 220 before the drain 223 is closed, as shown in Figures 6 and 7G. At the sub-step 236k, the latch 234 is unlatched, as shown in Figures 6 and 7G. At the sub-step 236l, the lubricator 220 is removed, as shown in Figures 6 and 7H (indicated by arrow 232i in Figure 7H). At the sub-step 236m, the EQ valve 222c is closed, as shown in Figure 7I. Finally, at the sub-step 236n, an object drop (e.g., from the launcher 178) and/or a pressure test is/are enabled, as shown in Figure 6. More particularly, once the sub-steps 236a-n are executed, the well 105A is ready for execution of the step 240, namely isolating a stage of the well 105A in preparation for a hydraulic fracturing operation. The step 240 will be described in further detail below (in connection with Figures 8 and 9A through 9G) as executed on the frac leg 150B to isolate a stage of the well 105B; however, the description below also applies to the execution of the step 240 on the frac leg 150A to isolate a stage of the well 105A.

[0088] Referring to Figures 8 and 9A through 9G, in an embodiment, various sub-steps 241a-o of the step 240 of the method 175 illustrated in Figure 1B are shown in detail,

which step 240 is or includes isolating a stage of the well 105B in preparation for a hydraulic fracturing operation. In one or more embodiments, the step 240 that is or includes isolating the stage of the well 105B includes or is part of a hydraulic fracturing operation. At the sub-step 241a, the EQ valve 222b is opened to facilitate pressure equalization between the containment areas 215b and 215c, as shown in Figures 8 and 9A. At the sub-step 241b, an object is dropped from the launcher 178, as shown in Figures 8 and 9A. At the sub-step 241c, respective fluid pressures within the containment areas 215b and 215c are checked to determine whether the containment areas 215b and 215c have been pressure equalized to within a threshold amount, as shown in Figure 8. At the sub-step 241d, once it is determined that the containment areas 215b and 215c have been pressure equalized to within the threshold amount, the flow control device 221b is opened, as shown in Figures 8 and 9B. At the sub-step 241e, the object passes into the containment area 215c, as shown in Figures 8 and 9C. At the sub-step 241f, the flow control device 221b is closed, as shown in Figures 8 and 9C. At the sub-step 241g, the EQ valve 222b is closed, as shown in Figures 8 and 9D.

[0089] At the sub-step 241h, the boost pump(s) 224b is/are turned on to increase a fluid pressure in the containment area 215c, thereby aiding in pressure equalization between the containment areas 215a and 215c, as shown in Figures 8 and 9D (indicated by arrow 232j in Figure 9D). At the sub-step 241i, respective fluid pressures within the containment areas 215a and 215c are compared to determine whether the fluid pressure in the containment area 215c has been equalized to within a threshold amount of the fluid pressure in the well 105B. If it is determined that the fluid pressure in the containment area 215c has not been equalized to within the threshold amount of the fluid pressure in the well 105B, the EQ valve 222a is opened at the sub-step 241j to further encourage such pressure equalization between said containment area 215c and the well 105B, as shown in Figures 8 and 9E. Alternatively, the order in which the sub-steps 241h and 241j are executed may be reversed, or one of the sub-steps 241h and 241j may be omitted altogether.

[0090] At the sub-step 241k, once it is determined that the fluid pressure in the containment area 215c has been equalized to within the threshold amount of the fluid

pressure in the well 105B, the flow control device 221a is opened, as shown in Figures 8 and 9F. At the sub-step 241l, the boost pump(s) 224b is/are turned off, as shown in Figures 8 and 9F. At the sub-step 241m, the EQ valve 222a is closed, as shown in Figures 8 and 9F. However, in those embodiments in which the sub-step 241j of opening the EQ valve 222a is omitted, the sub-step 241m of closing the EQ valve 222a is also omitted. Additionally, the sub-step 241m may be executed to close the EQ valve 222a at any time before, during, or after, execution of the sub-steps 241k or 241l. At the sub-step 241n, the object is permitted passage to the well 105B, as shown in Figures 8 and 9G. Finally, at the sub-step 241o, the flow control device 221a is closed, as shown in Figures 8 and 9G. Once the sub-steps 241a-o are executed, the well 105B is ready for execution of the step 245, namely detecting or otherwise determining that a fracturing stage of the well 105D has ended, as will be described in detail below in connection with Figures 10 and 11.

[0091] Referring to Figures 10 and 11, in an embodiment, various sub-steps 246a-c of the step 245 of the method 175 illustrated in Figure 1B are shown in detail, which step 245 is or includes detecting or otherwise determining that a fracturing stage of the well 105D has ended. At the sub-step 246a, the n_1 well (e.g., well 105D) is monitored for an external signal indicating the fracturing stage has ended, as shown in Figure 10. At the sub-step 246b, the n_1 well's frac data is monitored to determine whether the fracturing stage has ended, as shown in Figure 10. Finally, at the sub-step 246c, the zipper valves 170a-b associated with the n_1+1 well (e.g., well 105B) are dequeued and compared against the frac order (if available). During execution of the sub-steps 246a-c: grease from the grease system 155 is communicated to the corresponding GPs 200a-b of the zipper valves 170a-b, respectively, as shown in Figure 11 (indicated by arrows 232k in Figure 5B); and hydraulic fracturing fluid is communicated from the zipper manifold 145 to the well 105D, as shown in Figure 11 (indicated by arrows 232l and 232m in Figure 11).

[0092] Referring to Figure 12, in an embodiment, various sub-steps 251a-c of the step 250 of the method 175 illustrated in Figure 1B are shown in detail, which step 250 is or includes determining whether to permit a regular swap or a CP swap from hydraulically

fracturing (at a step 262) the well 105D to hydraulically fracturing (at the step 262) the well 105B, by, for example: checking an idle rate of the hydraulic fracturing system 100 at the sub-step 251a; and detecting or otherwise determining that an idle rate of the hydraulic fracturing system 100 is below an upper threshold and above a lower threshold at the sub-step 251b, or, at the sub-step 251c, detecting or otherwise determining that the idle rate of the hydraulic fracturing system 100 is below the lower threshold. More particularly, as shown in Figure 12: at the sub-step 251a, a frac rate of the n_1 well (e.g., well 105D) is checked; and, at the sub-step 251b, if the frac rate of the n_1 well is below the upper threshold rate (e.g., 10 bbl) and above the lower threshold rate (e.g., 0 bbl) for a threshold amount of time (e.g., 10s), a CP swap from hydraulically fracturing the n_1 well to hydraulically fracturing the n_1+1 well is permitted at step 260, but, at the sub-step 251c, if the frac rate of the n_1 well is below the lower threshold rate for a threshold amount of time, only a regular swap from hydraulically fracturing the n_1 well to hydraulically fracturing the n_1+1 well is permitted at step 255.

[0093] Referring to Figures 13 and 14A through 14B, in an embodiment, various sub-steps 256a-c of the step 255 of the method 175 illustrated in Figure 1B are shown in detail, which step 255 is or includes executing the regular swap from hydraulically fracturing (at the step 262) the n_1 well (e.g., well 105D) to hydraulically fracturing (at the step 262) the n_1+1 well (e.g., well 105B). At the sub-step 256a, the n_1 well's (e.g., well 105D) zipper valves 170a-b are closed, and grease from the grease system 155 is withheld from the corresponding GPs 200a-b, as shown in Figures 13 and 14A. At the sub-step 256b, a signal to advance is received, as shown in Figure 13. For example, a user input such as a screen click may be received at the sub-step 256b. In addition, or instead, an external signal, such as an external signal from the frac operator, may be received at the sub-step 256b. In addition, or instead, a signal to advance may be generated by detecting or otherwise determining that pressure equalization has been achieved to within a threshold amount between the hydraulic fracturing pressure in the zipper manifold 145 and the fluid pressure in the n_1+1 well (e.g., well 105B) for a threshold amount of time. At the sub-step 256c, the n_1+1 well's zipper valves 170a-b are opened, as shown in Figures 13 and 14B, so that hydraulic fracturing fluid is communicated from

the zipper manifold 145 to the n_1+1 well (indicated by arrows 232n and 232o in Figures 14B), and grease from the grease system 155 is communicated to the corresponding GPs 200a-b (indicated by arrow 232p in Figure 14B).

[0094] Referring to Figures 15 and 16A through 16E, in an embodiment, various sub-steps 261a-c of the step 260 of the method 175 illustrated in Figure 1B are shown in detail, which step 260 is or includes executing the CP swap from hydraulically fracturing (at the step 262) the n_1 well (e.g., well 105D) to hydraulically fracturing (at the step 262) the n_1+1 well (e.g., well 105B). At the sub-step 261a, the n_1+1 well's (e.g., well 105B) zipper valves 170a-b are opened, as shown in Figures 15 and 16A, hydraulic fracturing fluid is communicated from the zipper manifold 145 to the n_1+1 well (indicated by arrows 232n and 232o in Figure 16A), and grease from the grease system 155 is communicated to the corresponding GPs 200a-b (indicated by arrow 232p in Figure 16A). At the sub-step 261b, both the n_1+1 well's (e.g., well 105B) zipper valves 170a-b and the n_1 well's (e.g., well D) zipper valves 170a-b are allowed to fully open, as shown in Figures 15, 16A and 16B, so that: hydraulic fracturing fluid is communicated from the zipper manifold 145 to the n_1 well (indicated by arrows 232l and 232m in Figure 16B) and the n_1+1 well (indicated by arrows 232n and 232o in Figure 14A); and grease from the grease system 155 is communicated to the corresponding GPs 200a-b (indicated by arrows 232p and 232k in Figure 16A and 16B, respectively). Finally, at the sub-step 261c, the n_1 well's (e.g., well 105D) zipper valves 170a-b are closed, as shown in Figures 15 and 16C, and grease from the grease system 155 is withheld from the corresponding GPs 200a-b.

[0095] As shown in Figures 16D and 16E, executing the CP swap from hydraulically fracturing (at the step 262) the n_1 well (e.g., well 105D) to hydraulically fracturing (at the step 262) the n_1+1 well (e.g., well 105B) transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous and the total time between stages measured at treatment pressure is less than 20 seconds (as fast as 19 seconds in some instances).

[0096] Referring to Figures 17 and 18A through 18G, in an embodiment, various sub-steps 266a-s of the step 265 of the method 175 illustrated in Figure 1B are shown in detail, which step 265 is or includes latching, filling, and pressure testing the frac leg 150E

associated with the well 105E in preparation for perforating a stage of the well 105E using the wireline perforating system 177 (in a manner similar to that described above in connection with the well 105A and shown in Figures 5A through 5C). At the sub-step 266a, the lubricator 220 is stabbed into the latch 234, as shown in Figures 17 and 18A (indicated by arrow 232q in Figure 18A). At the sub-step 266b, the EQ valve 222c is closed, as shown in Figures 17 and 18B. At the sub-step 266c, the latch close relay is energized to close the latch 234, thereby connecting the lubricator 220 to the valve apparatus 210, as shown in Figures 17 and 18C. At the sub-step 266d, a latch close proximity switch is checked to determine whether the latch 234 has successfully latched the lubricator 220 to the valve apparatus 210. At the sub-step 266e, once it is determined that the latch 234 has successfully latched the lubricator 220 to the valve apparatus 210, the latch close relay is de-energized, as shown in Figure 17. At the sub-step 266f, a test pressure relay is energized, as shown in Figure 17. At the sub-step 266g, a determination is made as to whether the connection of the lubricator 220 to the valve apparatus 210 via the latch 234 is or is not capable of holding pressure, as shown in Figure 17. At the sub-step 266h, once the determination is made that the connection of the lubricator 220 to the valve apparatus 210 via the latch 234 is capable of holding pressure, the test pressure relay is de-energized, as shown in Figure 17.

[0097] At the sub-step 266i, the drain 223 is opened, as shown in Figures 17 and 18D. At the sub-step 266j, the EQ valve 222c is opened, as shown in Figures 17 and 18E. At the sub-step 266k, the auto-fill pump of the pump station 224a is turned on to fill the lubricator 220 via the open drain 223, as shown in Figures 17 and 18E (indicated by arrow 232r in Figure 18E). At the sub-step 266l, the auto-fill pump is allowed to finish auto-filling the lubricator 220, as shown in Figure 17. At the sub-step 266m, the drain 223 is closed, as shown in Figures 17 and 18F. At the sub-step 266n, the EQ valve 222c is closed, as shown in Figures 17 and 18F. At the sub-step 266o, the EQ valve 222b is opened, as shown in Figures 17 and 18F. At the sub-step 266p, the boost pump(s) 224b is/are turned on to increase the fluid pressure within the lubricator 220, as shown in Figures 17 and 18F (indicated by arrow 232s in Figure 18F). At the sub-step 266q, a determination is made as to whether the pressure in the lubricator 220 comes to within

the pressure in the well 105E by a threshold amount (e.g., 500 PSI), as shown in Figure 17. Once the determination is made that the pressure in the lubricator 220 comes to within the pressure in the well 105E by the threshold amount, the boost pump(s) 224b is/are turned off at the sub-step 266r, and the EQ valve 222b is closed at the sub-step 266s in preparation for the next wireline swap (e.g., to the well 105E), as shown in Figures 17 and 18G.

[0098] Referring to Figures 19A and 19B, in an embodiment, a method 270 for fracturing the wells 105A through 105C+n using the hydraulic fracturing system 100 of Figure 1A is illustrated, which method 270 includes swapping from simultaneously fracturing the wells n_1 and n_3 (e.g., wells 105D and 105X) to simultaneously fracturing the wells n_1+1 and n_3+1 (e.g., wells 105B and 105V). More particularly, the method 270 includes steps substantially identical to corresponding steps of the method 175 described above, which steps are given the same reference numerals. In addition, the method 270 includes additional steps executable to simultaneously fracture the n_1 and n_3 wells (e.g., wells 105D and 105X), and to swap from simultaneously fracturing the n_1 and n_3 wells to simultaneously fracturing the n_1+1 and n_3+1 wells (e.g., wells 105B and 105V), which additional steps are given the same reference numerals, except that the suffix "'" is added. Specifically, in some instances the suffix "'" signifies that the referenced step of the method 270 is substantially identical to the corresponding step of the method 175, except that the referenced step is instead performed on a different one of the wells than that on which the corresponding step of the method 175 is performed (i.e., the steps 225', 230', 235', 238a', 239', 238b', 263a', 264', 263b', 265', and 268' fall into this category), while, in other instances, the suffix "'" signifies that the referenced step of the method 270 is substantially similar to the corresponding step of the method 175, except that the referenced step is simultaneously performed on another one of the wells other than that on which the corresponding step of the method 175 is performed (i.e., the steps 240', 245', 250', 255', 260', and 262' fall into this category). In one or more embodiments, the controller 156 is adapted to control the grease system 155, the frac legs 150A through 150C+n, or both, in order to execute the method 270 described herein.

[0099] Referring to Figure 20, with continuing reference to Figures 1A through 19B, an illustrative node 1000 for implementing one or more of the embodiments of one or more of the controller(s) (e.g., the controller 156), element(s), apparatus, system(s) (e.g., the hydraulic fracturing system 100), method(s) (e.g., the method 175, the method 270, or both), step(s), and/or sub-step(s), or any combination thereof, described above and/or illustrated in Figures 1A through 19B is depicted. The node 1000 includes a microprocessor 1000a, an input device 1000b, a storage device 1000c, a video controller 1000d, a system memory 1000e, a display 1000f, and a communication device 1000g all interconnected by one or more buses 1000h. In one or more embodiments, the storage device 1000c may include a hard drive, CD-ROM, optical drive, any other form of storage device and/or any combination thereof. In one or more embodiments, the storage device 1000c may include, and/or be capable of receiving, a CD-ROM, DVD-ROM, or any other form of non-transitory computer-readable medium that may contain executable instructions. In one or more embodiments, the communication device 1000g may include a modem, network card, or any other device to enable the node 1000 to communicate with other node(s). In one or more embodiments, the node and the other node(s) represent a plurality of interconnected (whether by intranet or Internet) computer systems, including without limitation, personal computers, mainframes, PDAs, smartphones and cell phones.

[0100] In one or more embodiments, one or more of the embodiments described above and/or illustrated in Figures 1A through 19B include at least the node 1000 and/or components thereof, and/or one or more nodes that are substantially similar to the node 1000 and/or components thereof. In one or more embodiments, one or more of the above-described components of the node 1000 and/or the embodiments described above and/or illustrated in Figures 1A through 19B include respective pluralities of same components.

[0101] In one or more embodiments, one or more of the embodiments described above and/or illustrated in Figures 1A through 19B include a computer program that includes a plurality of instructions, data, and/or any combination thereof; an application written in, for example, Arena, HyperText Markup Language (HTML), Cascading Style Sheets (CSS),

JavaScript, Extensible Markup Language (XML), asynchronous JavaScript and XML (Ajax), and/or any combination thereof; a web-based application written in, for example, Java or Adobe Flex, which in one or more embodiments pulls real-time information from one or more servers, automatically refreshing with latest information at a predetermined time increment; or any combination thereof.

[0102] In one or more embodiments, a computer system typically includes at least hardware capable of executing machine readable instructions, as well as the software for executing acts (typically machine-readable instructions) that produce a desired result. In one or more embodiments, a computer system may include hybrids of hardware and software, as well as computer sub-systems.

[0103] In one or more embodiments, hardware generally includes at least processor-capable platforms, such as client-machines (also known as personal computers or servers), and hand-held processing devices (such as smart phones, tablet computers, or personal computing devices (PCDs), for example). In one or more embodiments, hardware may include any physical device that is capable of storing machine-readable instructions, such as memory or other data storage devices. In one or more embodiments, other forms of hardware include hardware sub-systems, including transfer devices such as modems, modem cards, ports, and port cards, for example.

[0104] In one or more embodiments, software includes any machine code stored in any memory medium, such as RAM or ROM, and machine code stored on other devices (such as floppy disks, flash memory, or a CD-ROM, for example). In one or more embodiments, software may include source or object code. In one or more embodiments, software encompasses any set of instructions capable of being executed on a node such as, for example, on a client machine or server.

[0105] In one or more embodiments, combinations of software and hardware could also be used for providing enhanced functionality and performance for certain embodiments of the present disclosure. In an embodiment, software functions may be directly manufactured into a silicon chip. Accordingly, it should be understood that combinations of hardware and software are also included within the definition of a computer system

and are thus envisioned by the present disclosure as possible equivalent structures and equivalent methods.

[0106] In one or more embodiments, computer readable mediums include, for example, passive data storage, such as a random-access memory (RAM) as well as semi-permanent data storage such as a compact disk read only memory (CD-ROM). One or more embodiments of the present disclosure may be embodied in the RAM of a computer to transform a standard computer into a new specific computing machine. In one or more embodiments, data structures are defined organizations of data that may enable an embodiment of the present disclosure. In an embodiment, a data structure may provide an organization of data, or an organization of executable code.

[0107] In one or more embodiments, any networks and/or one or more portions thereof may be designed to work on any specific architecture. In an embodiment, one or more portions of any networks may be executed on a single computer, local area networks, client-server networks, wide area networks, internets, hand-held and other portable and wireless devices and networks.

[0108] In one or more embodiments, a database may be any standard or proprietary database software. In one or more embodiments, the database may have fields, records, data, and other database elements that may be associated through database specific software. In one or more embodiments, data may be mapped. In one or more embodiments, mapping is the process of associating one data entry with another data entry. In an embodiment, the data contained in the location of a character file can be mapped to a field in a second table. In one or more embodiments, the physical location of the database is not limiting, and the database may be distributed. In an embodiment, the database may exist remotely from the server, and run on a separate platform. In an embodiment, the database may be accessible across the Internet. In one or more embodiments, more than one database may be implemented.

[0109] In one or more embodiments, a plurality of instructions stored on a computer readable medium may be executed by one or more processors to cause the one or more processors to carry out or implement in whole or in part one or more of the embodiments of one or more of the controller(s) (e.g., the controller 156), element(s), apparatus,

system(s) (e.g., the hydraulic fracturing system 100), method(s) (e.g., the method 175, the method 270, or both), step(s), and/or sub-step(s), or any combination thereof, described above and/or illustrated in Figures 1A through 19B. In one or more embodiments, such a processor may include one or more of the microprocessor 1000a, any processor(s) that are part of the components of the hydraulic fracturing system 100, such as, for example, the controller 156, and/or any combination thereof, and such a computer readable medium may be distributed among one or more components of the system. In one or more embodiments, such a processor may execute the plurality of instructions in connection with a virtual computer system. In one or more embodiments, such a plurality of instructions may communicate directly with the one or more processors, and/or ay interact with one or more operating systems, middleware, firmware, other applications, and/or any combination thereof, to cause the one or more processors to execute the instructions.

[0110] A first method has been disclosed. The first method generally includes: (a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation includes pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well; (b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time; (c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well; (d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation includes pumping fluid into the second well via the second valve; and (e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well; wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or

both the first valve and the second valve. In one or more embodiments, the second valve is opened after step (b). In one or more embodiments, the first valve includes a grease port; and the method further includes withholding grease from the grease port after step (e). In one or more embodiments, the second valve includes a grease port; and the method further includes: during and/or after opening the second valve, communicating grease to the grease port of the second valve. In one or more embodiments, each of the first and second valves is a zipper valve. In one or more embodiments, step (d): further includes measuring a flow rate of the fluid being pumped into the second well; and is, or is part of, a hydraulic fracturing stage of the second well; and the method further includes: determining that the hydraulic fracturing stage of the second well has ended; determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold; closing the second valve associated with the second well; withholding grease from a grease port of the second valve; receiving a signal to advance; opening a third valve associated with a third well; and during and/or after opening the third valve, communicating grease to a grease port of the third valve.

[0111] A first apparatus has also been disclosed. The first apparatus generally includes: a non-transitory computer readable medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed: (a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation includes pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well; (b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time; (c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well; (d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation includes pumping fluid into the second well via the second valve; and (e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well; wherein, during each of steps (a), (b),

(c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve. In one or more embodiments, the second valve is opened after step (b). In one or more embodiments, the first valve includes a grease port; and, when the instructions are executed by the one or more processors, the following step is also executed: withholding grease from the grease port after step (e). In one or more embodiments, the second valve includes a grease port; and, when the instructions are executed by the one or more processors, the following step is also executed: during and/or after opening the second valve, communicating grease to the grease port of the second valve. In one or more embodiments, each of the first and second valves is a zipper valve. In one or more embodiments, step (d): further includes measuring a flow rate of the fluid being pumped into the second well; and is, or is part of, a hydraulic fracturing stage of the second well; and, when the instructions are executed by the one or more processors, the following steps are also executed: determining that the hydraulic fracturing stage of the second well has ended; determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold; closing the second valve associated with the second well; withholding grease from a grease port of the second valve; receiving a signal to advance; opening a third valve associated with a third well; and during and/or after opening the third valve, communicating grease to a grease port of the third valve.

[0112] A second method has also been disclosed. The second method generally includes: (a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well; (b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue; (c) permitting hydraulic fracturing of the second well; (d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and (e) swapping from permitting

hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well. In one or more embodiments, step (c) further includes measuring a flow rate of the fluid being pumped into the second well. In one or more embodiments, step (e) further includes, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e). In one or more embodiments, the step (e) further includes, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e). In one or more embodiments, the method further includes: (f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well; (g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue; (h) permitting hydraulic fracturing of the fourth well; (i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue; and (j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well. In one or more embodiments, steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; step (h) includes opening a fourth valve associated with

the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and step (j) includes: opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and closing the fourth valve associated with the fourth well.

[0113] A second apparatus has also been disclosed. The second apparatus generally includes: a non-transitory computer readable medium; and a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed: (a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well; (b) dequeuing the second well from the first hydraulic fracturing queue; (c) permitting hydraulic fracturing of the second well; (d) dequeuing the first well from the first hydraulic fracturing queue; and (e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well. In one or more embodiments, step (c) further includes measuring a flow rate of the fluid being pumped into the second well. In one or more embodiments, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e). In one or more embodiments, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e). In one or more embodiments, when the instructions are executed by the one or more processors, the following steps are also executed: (f) queuing a third well in a second hydraulic fracturing

queue, which second hydraulic fracturing queue includes a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well; (g) dequeuing the fourth well from the second hydraulic fracturing queue; (h) permitting hydraulic fracturing of the fourth well; (i) dequeuing the third well from the second hydraulic fracturing queue; and (j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well. In one or more embodiments, steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold. In one or more embodiments, step (c) includes opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; step (e) includes: opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and closing the second valve associated with the second well; step (h) includes opening a fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and step (j) includes: opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and closing the fourth valve associated with the fourth well.

[0114] It is understood that variations may be made in the foregoing without departing from the scope of the present disclosure.

[0115] In several embodiments, the elements and teachings of the various embodiments may be combined in whole or in part in some (or all) of the embodiments. In addition, one or more of the elements and teachings of the various embodiments may be omitted, at least in part, and/or combined, at least in part, with one or more of the other elements and teachings of the various embodiments.

[0116] Any spatial references, such as, for example, "upper," "lower," "above," "below," "between," "bottom," "vertical," "horizontal," "angular," "upwards," "downwards," "side-to-side," "left-to-right," "right-to-left," "top-to-bottom," "bottom-to-top," "top," "bottom," "bottom-up," "top-down," etc., are for the purpose of illustration only and do not limit the specific orientation or location of the structure described above.

[0117] In several embodiments, while different steps, processes, and procedures are described as appearing as distinct acts, one or more of the steps, one or more of the processes, and/or one or more of the procedures may also be performed in different orders, simultaneously and/or sequentially. In several embodiments, the steps, processes, and/or procedures may be merged into one or more steps, processes and/or procedures.

[0118] In several embodiments, one or more of the operational steps in each embodiment may be omitted. Moreover, in some instances, some features of the present disclosure may be employed without a corresponding use of the other features. Moreover, one or more of the above-described embodiments and/or variations may be combined in whole or in part with any one or more of the other above-described embodiments and/or variations.

[0119] Although several embodiments have been described in detail above, the embodiments described are illustrative only and are not limiting, and those skilled in the art will readily appreciate that many other modifications, changes and/or substitutions are possible in the embodiments without materially departing from the novel teachings and advantages of the present disclosure. Accordingly, all such modifications, changes, and/or substitutions are intended to be included within the scope of this disclosure as defined in the following claims. In the claims, any means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents, but also equivalent structures. Moreover, it is the express intention of the applicant not to invoke 35 U.S.C. § 112(f) for any limitations of any of the claims herein, except for those in which the claim expressly uses the word “means” together with an associated function.

Claims

What is claimed is:

1. A method, comprising:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

2. The method of claim 1,

wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve; and

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

3. The method of claim 1, wherein the second valve is opened after step (b).

4. The method of claim 1,
wherein the first valve comprises a grease port; and
wherein the method further comprises withholding grease from the grease port after step (e).

5. The method of claim 1,
wherein the second valve comprises a grease port; and
wherein the method further comprises:
during and/or after opening the second valve, communicating grease to the grease port of the second valve.

6. The method of claim 1, wherein each of the first and second valves is a zipper valve.

7. The method of claim 1,
wherein step (d):
further comprises measuring a flow rate of the fluid being pumped into the second well; and
is, or is part of, a hydraulic fracturing stage of the second well;
and
wherein the method further comprises:
determining that the hydraulic fracturing stage of the second well has ended;
determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;
closing the second valve associated with the second well;
withholding grease from a grease port of the second valve;
receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

8. An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) permitting performance of a first hydraulic fracturing operation on a first well, which first hydraulic fracturing operation comprises pumping fluid into the first well via a first valve associated with the first well, and measuring a flow rate of the fluid being pumped into the first well;

(b) determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time;

(c) during pumping of the fluid into the first well via the first valve, opening a second valve associated with a second well;

(d) permitting performance of a second hydraulic fracturing operation on the second well, which second hydraulic fracturing operation comprises pumping fluid into the second well via the second valve; and

(e) during pumping of the fluid into the second well via the second valve, closing the first valve associated with the first well;

wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped to the first valve, the second valve, or both the first valve and the second valve.

9. The apparatus of claim 8,
wherein each of the first and second valves is in fluid communication with a hydraulic manifold from which fluid is pumped to the first valve and/or the second valve;
wherein, during each of steps (a), (b), (c), (d), and (e), fluid is continuously pumped from the hydraulic manifold to the first valve, the second valve, or both the first valve and the second valve.

10. The apparatus of claim 8, wherein the second valve is opened after step (b).

11. The apparatus of claim 8,
wherein the first valve comprises a grease port; and
wherein, when the instructions are executed by the one or more processors, the following step is also executed:
withholding grease from the grease port after step (e).

12. The apparatus of claim 8,
wherein the second valve comprises a grease port; and
wherein, when the instructions are executed by the one or more processors, the following step is also executed:
during and/or after opening the second valve, communicating grease to the grease port of the second valve.

13. The apparatus of claim 8, wherein each of the first and second valves is a zipper valve.

14. The apparatus of claim 8,
wherein step (d):
further comprises measuring a flow rate of the fluid being pumped into the second well; and

is, or is part of, a hydraulic fracturing stage of the second well;

and

wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

determining that the hydraulic fracturing stage of the second well has ended;

determining that the flow rate of the fluid being pumped into the second well is above the flow rate threshold;

closing the second valve associated with the second well;

withholding grease from a grease port of the second valve;

receiving a signal to advance;

opening a third valve associated with a third well; and

during and/or after opening the third valve, communicating grease to a grease port of the third valve.

15. A method, comprising:

(a) queuing, using a controller, a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue is associated with a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing, using the controller, the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well;

(d) dequeuing, using the controller, the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well.

16. The method of claim 15,

wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

wherein step (e) comprises:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well.

17. The method of claim 16,

wherein step (c) further comprises measuring a flow rate of the fluid being pumped into the second well.

18. The method of claim 17,

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

19. The method of claim 17,

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

20. The method of claim 15, further comprising:

(f) queuing, using the controller, a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue is associated with a

second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;

(g) dequeuing, using the controller, the fourth well from the second hydraulic fracturing queue;

(h) permitting hydraulic fracturing of the fourth well;

(i) dequeuing, using the controller, the third well from the second hydraulic fracturing queue; and

(j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

21. The method of claim 20,

wherein steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and

wherein steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

22. The method of claim 20,

wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;

wherein step (e) comprises:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein step (h) comprises opening a fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step (j) comprises:

opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

23. An apparatus, comprising:

a non-transitory computer readable medium; and

a plurality of instructions stored on the non-transitory computer readable medium and executable by one or more processors, wherein, when the instructions are executed by the one or more processors, the following steps are executed:

(a) queuing a first well in a first hydraulic fracturing queue, which first hydraulic fracturing queue includes a first plurality of wells standing by for hydraulic fracturing, including at least the first well and a second well;

(b) dequeuing the second well from the first hydraulic fracturing queue;

(c) permitting hydraulic fracturing of the second well;

(d) dequeuing the first well from the first hydraulic fracturing queue; and

(e) swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing the first well.

24. The apparatus of claim 23,

wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve; and

wherein step (e) comprises:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well.

25. The apparatus of claim 24,

wherein step (c) further comprises measuring a flow rate of the fluid being pumped into the second well.

26. The apparatus of claim 25,

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time, the first valve associated with the first well is opened at step (e) before the second valve associated with the second well is closed at step (e).

27. The apparatus of claim 25,

wherein, in response to determining that the flow rate of the fluid being pumped into the second well is above a flow rate threshold, the first valve associated with the first well is opened at step (e) after the second valve associated with the second well is closed at step (e).

28. The apparatus of claim 23, wherein, when the instructions are executed by the one or more processors, the following steps are also executed:

(f) queuing a third well in a second hydraulic fracturing queue, which second hydraulic fracturing queue includes a second plurality of wells standing by for hydraulic fracturing, including at least the third well and a fourth well;

(g) dequeuing the fourth well from the second hydraulic fracturing queue;

(h) permitting hydraulic fracturing of the fourth well;

(i) dequeuing the third well from the second hydraulic fracturing queue; and

(j) swapping from permitting hydraulic fracturing of the fourth well to permitting hydraulic fracturing of the third well.

29. The apparatus of claim 28,

wherein steps (c) and (h) are executed simultaneously using hydraulic fracturing fluid from a hydraulic manifold; and

wherein steps (e) and (j) are executed simultaneously using hydraulic fracturing fluid from the hydraulic manifold.

30. The apparatus of claim 28,

wherein step (c) comprises opening a second valve associated with the second well to permit pumping of fluid into the second well via the second valve;

wherein step (e) comprises:

opening a first valve associated with the first well to permit pumping of fluid into the first well via the first valve; and

closing the second valve associated with the second well;

wherein step (h) comprises opening a fourth valve associated with the fourth well to permit pumping of fluid into the fourth well via the fourth valve; and

wherein step (j) comprises:

opening a third valve associated with the third well to permit pumping of fluid into the third well via the third valve; and

closing the fourth valve associated with the fourth well.

Abstract

A hydraulic fracturing plan executable by a hydraulic fracturing system to hydraulically fracture a plurality of oil and gas wells.

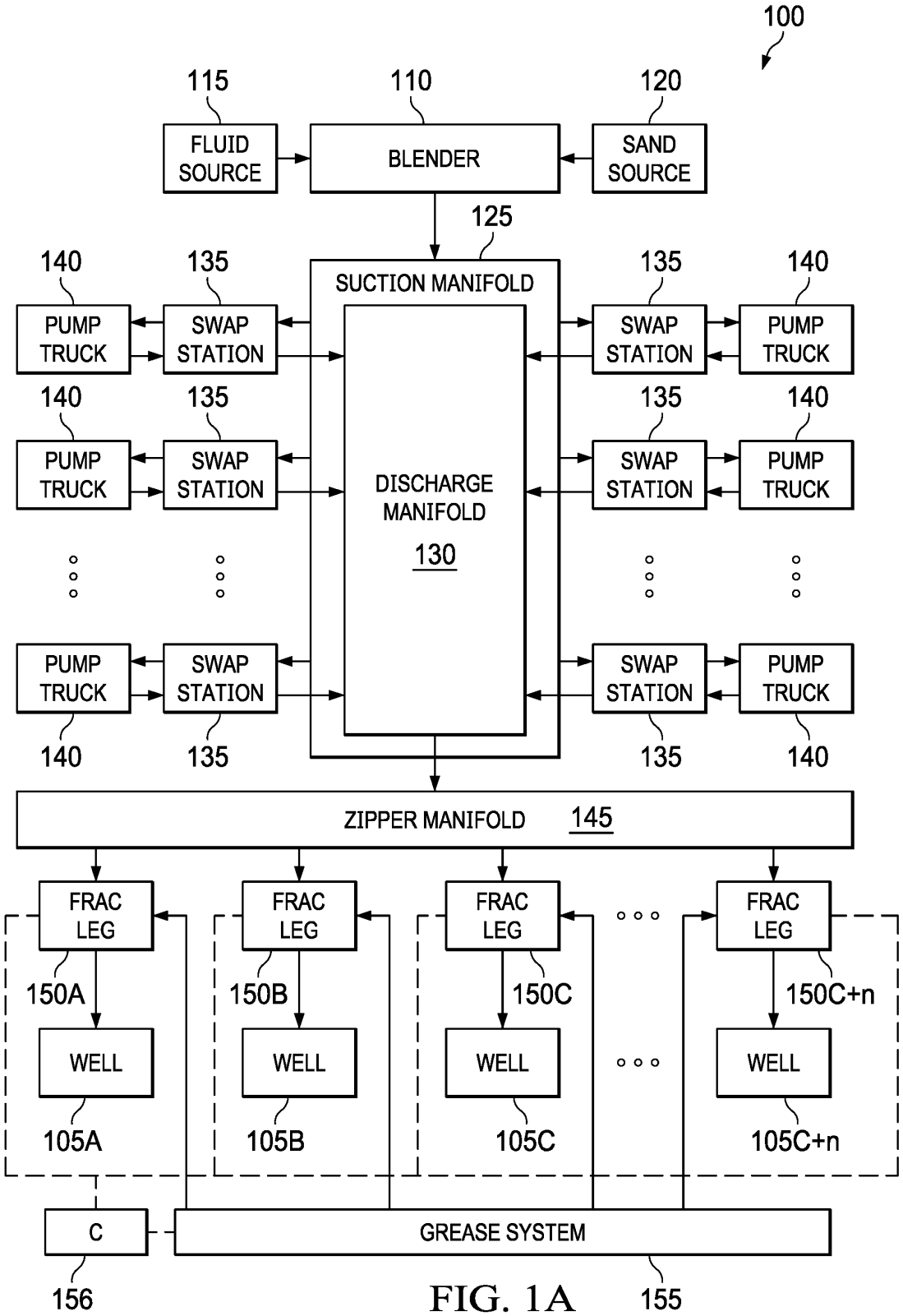

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FLUID SOURCE
110
BLENDER
120
SAND SOURCE
125
SUCTION MANIFOLD
DISCHARGE MANIFOLD
130
140
135
PUMP TRUCK
SWAP STATION
ZIPPER MANIFOLD
145
FRAC LEG
150A
150B
150C
150C+n
WELL
105A
105B
105C
105C+n
C
156
GREASE SYSTEM
155

FIG. 1A

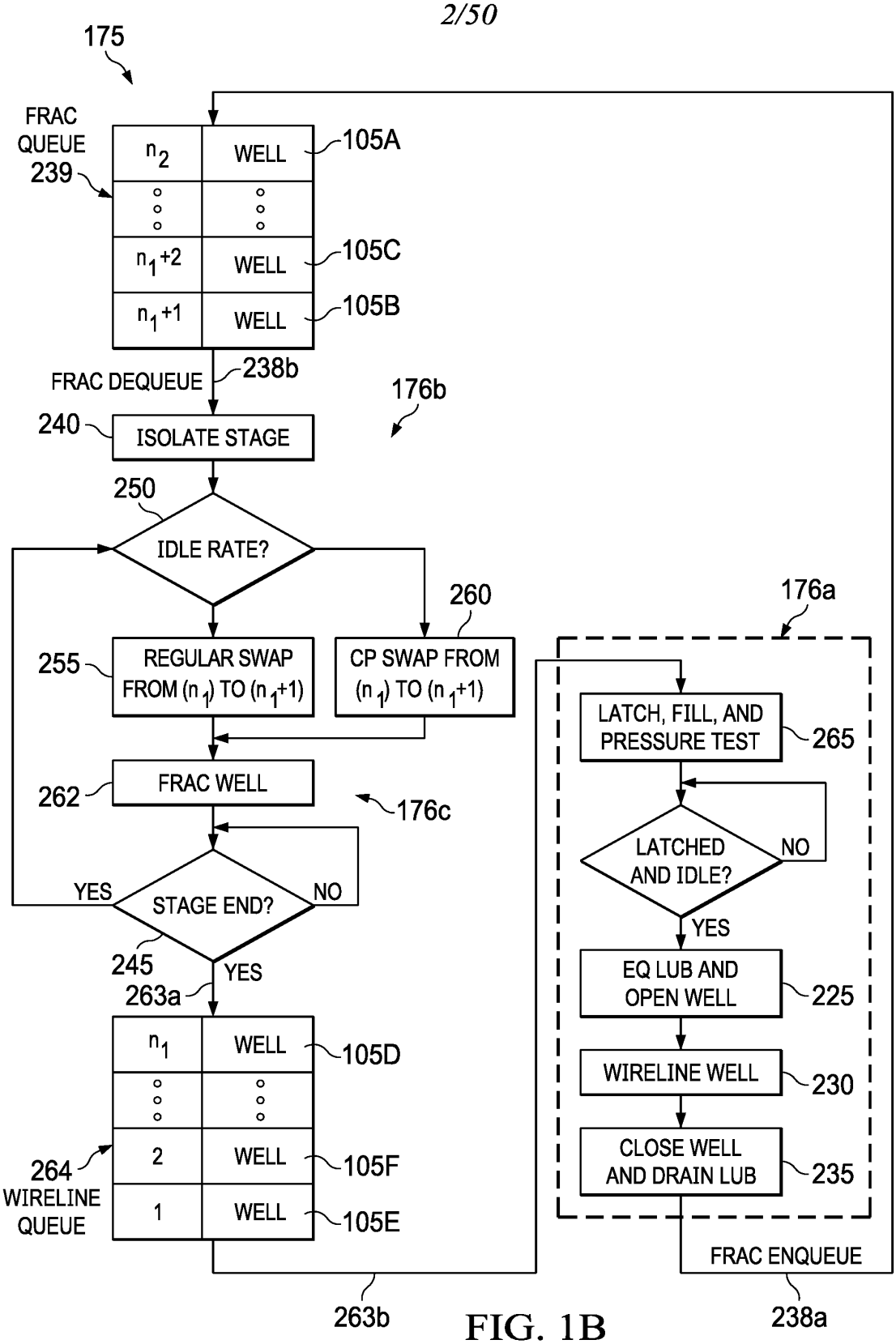

175
FRAC QUEUE
239
n_2
WELL
105A
n_1+2
WELL
105C
n_1+1
WELL
105B
FRAC DEQUEUE
238b
176b
240
ISOLATE STAGE
250
IDLE RATE?
260
176a
255
REGULAR SWAP FROM (n_1) TO (n_1+1)
CP SWAP FROM (n_1) TO (n_1+1)
LATCH, FILL, AND PRESSURE TEST
265
262
FRAC WELL
176c
LATCHED AND IDLE?
NO
YES
YES
STAGE END?
NO
245
YES
263a
EQ LUB AND OPEN WELL
225
n_1
WELL
105D
WIRELINE WELL
230
2
WELL
105F
CLOSE WELL AND DRAIN LUB
235
264
WIRELINE QUEUE
1
WELL
105E
FRAC ENQUEUE
263b
238a

FIG. 1B

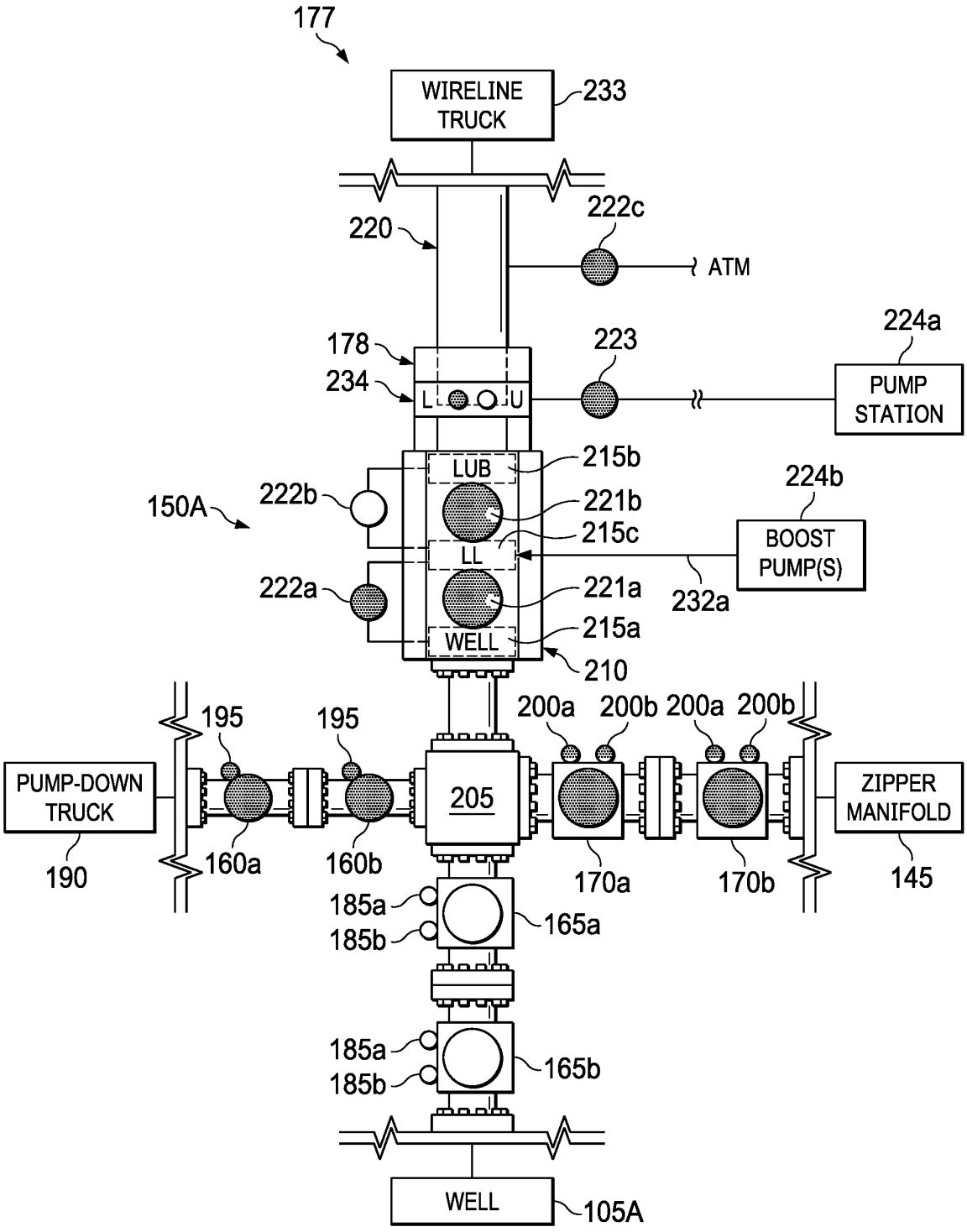

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2A

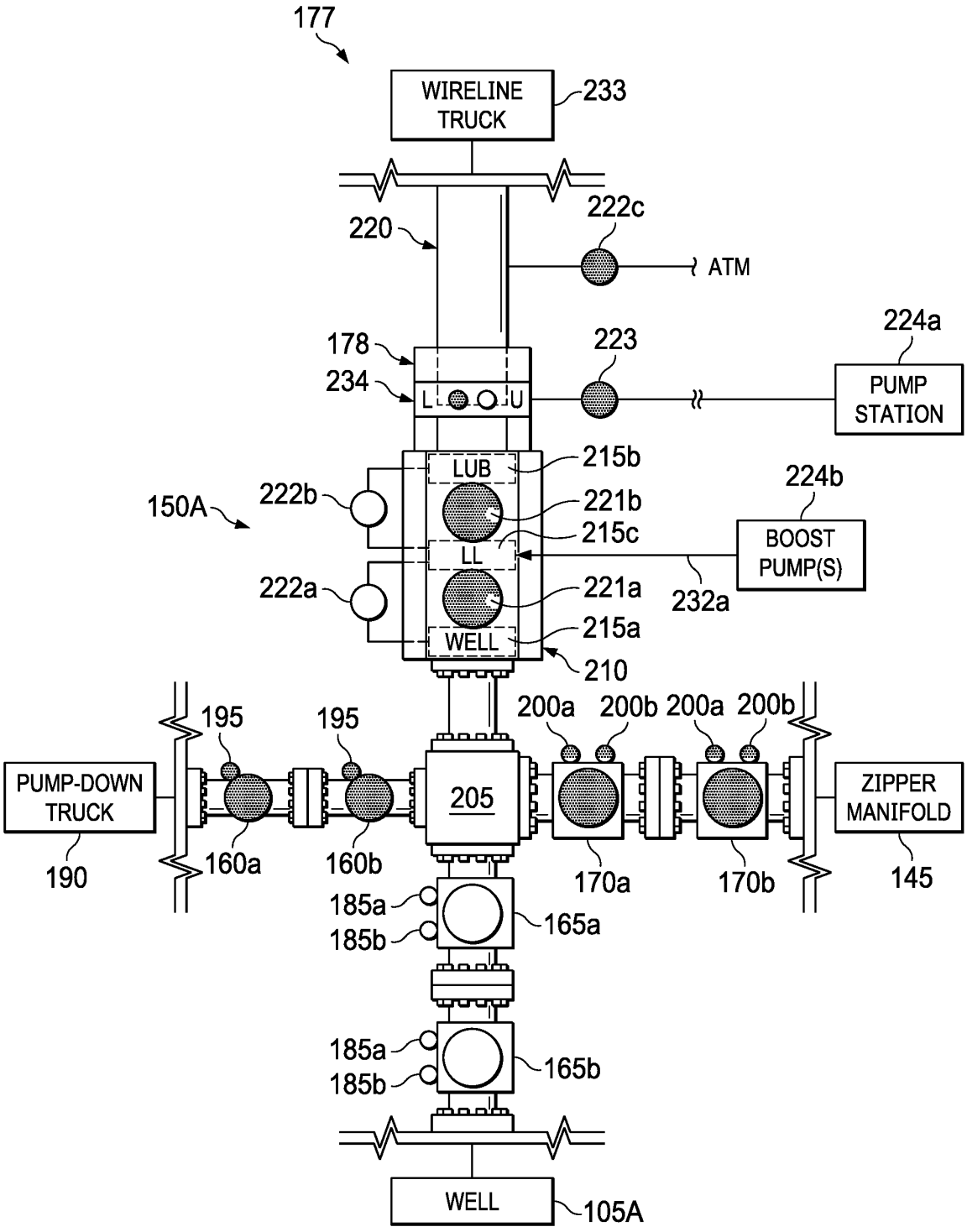

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2B

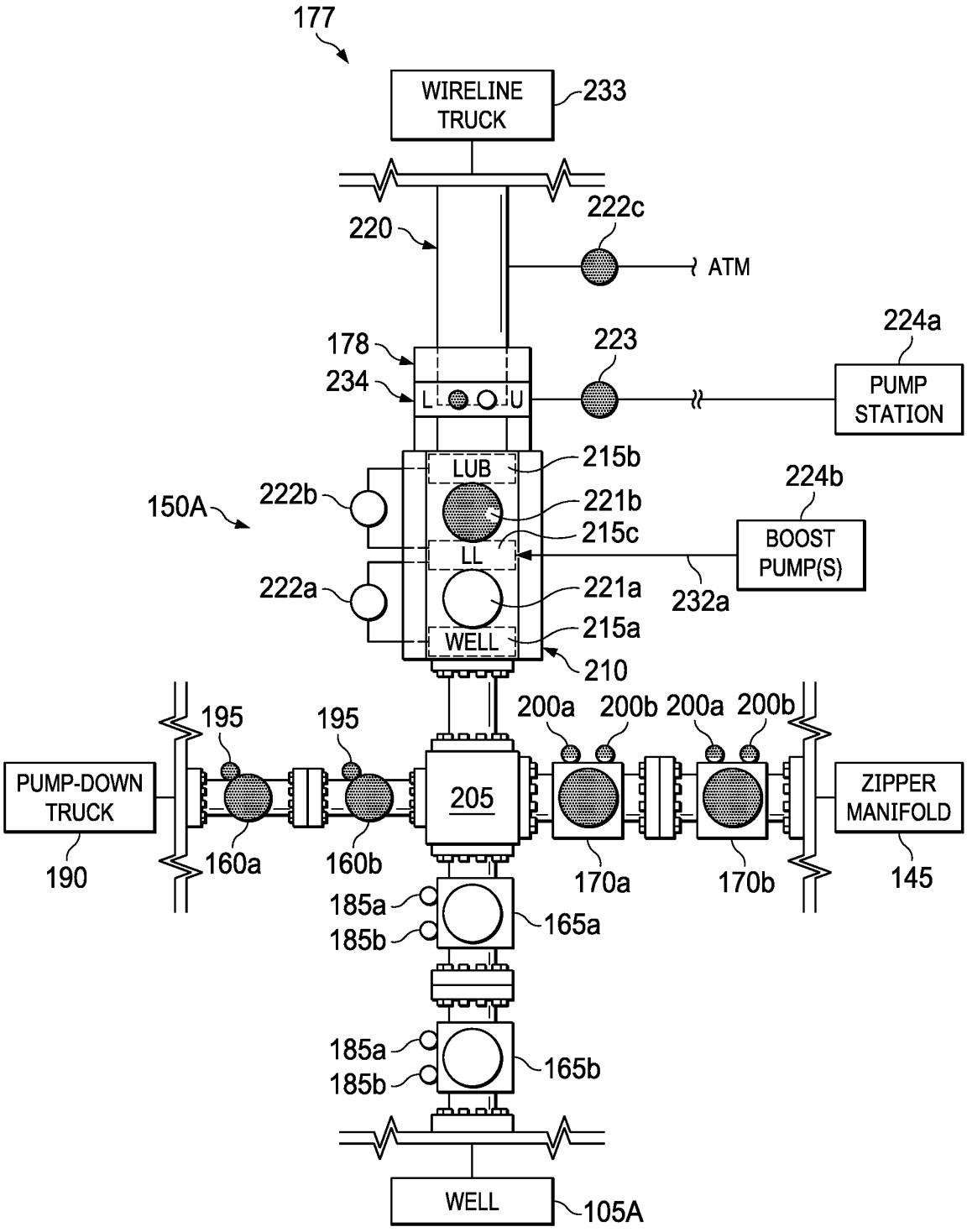

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2C

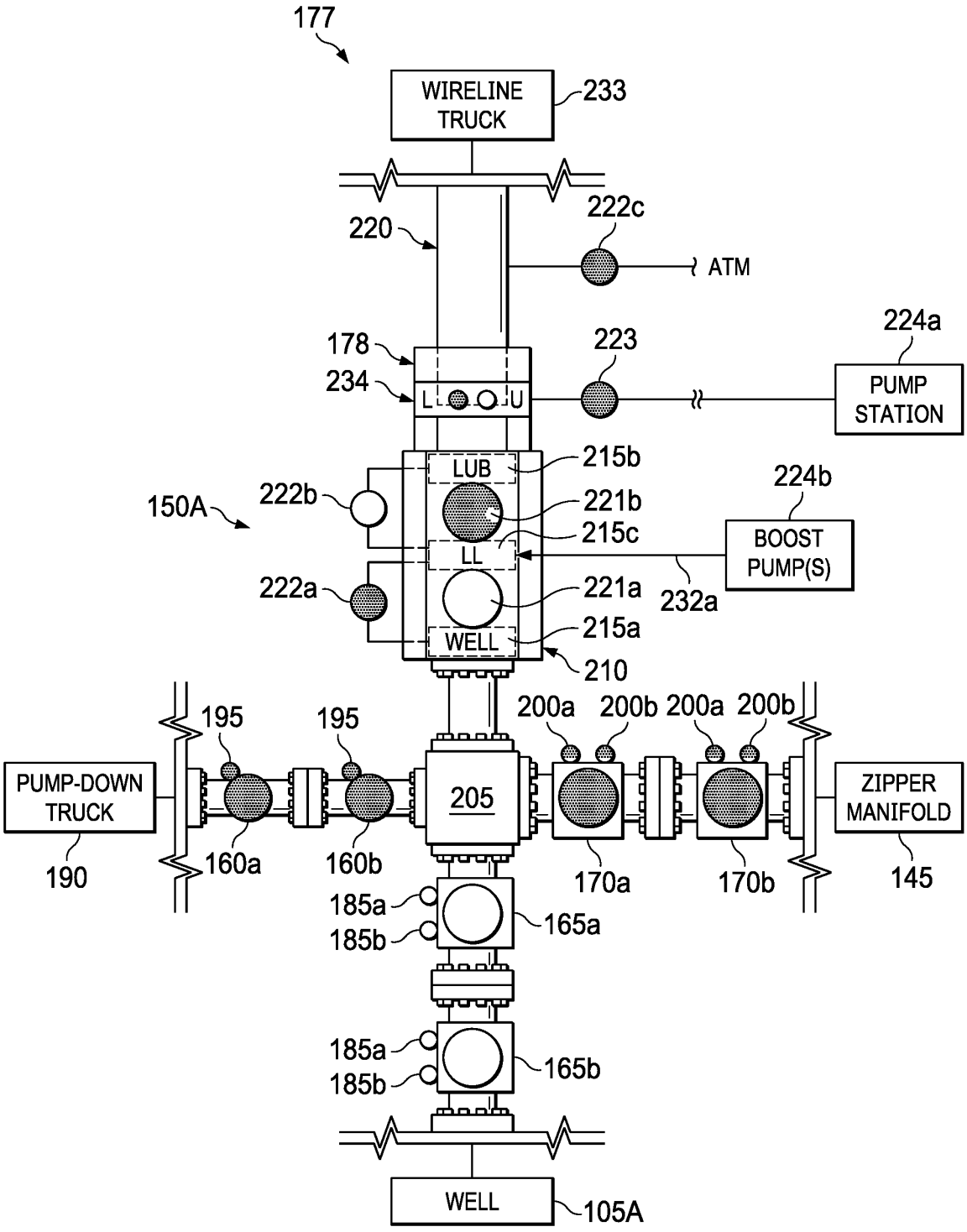

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2D

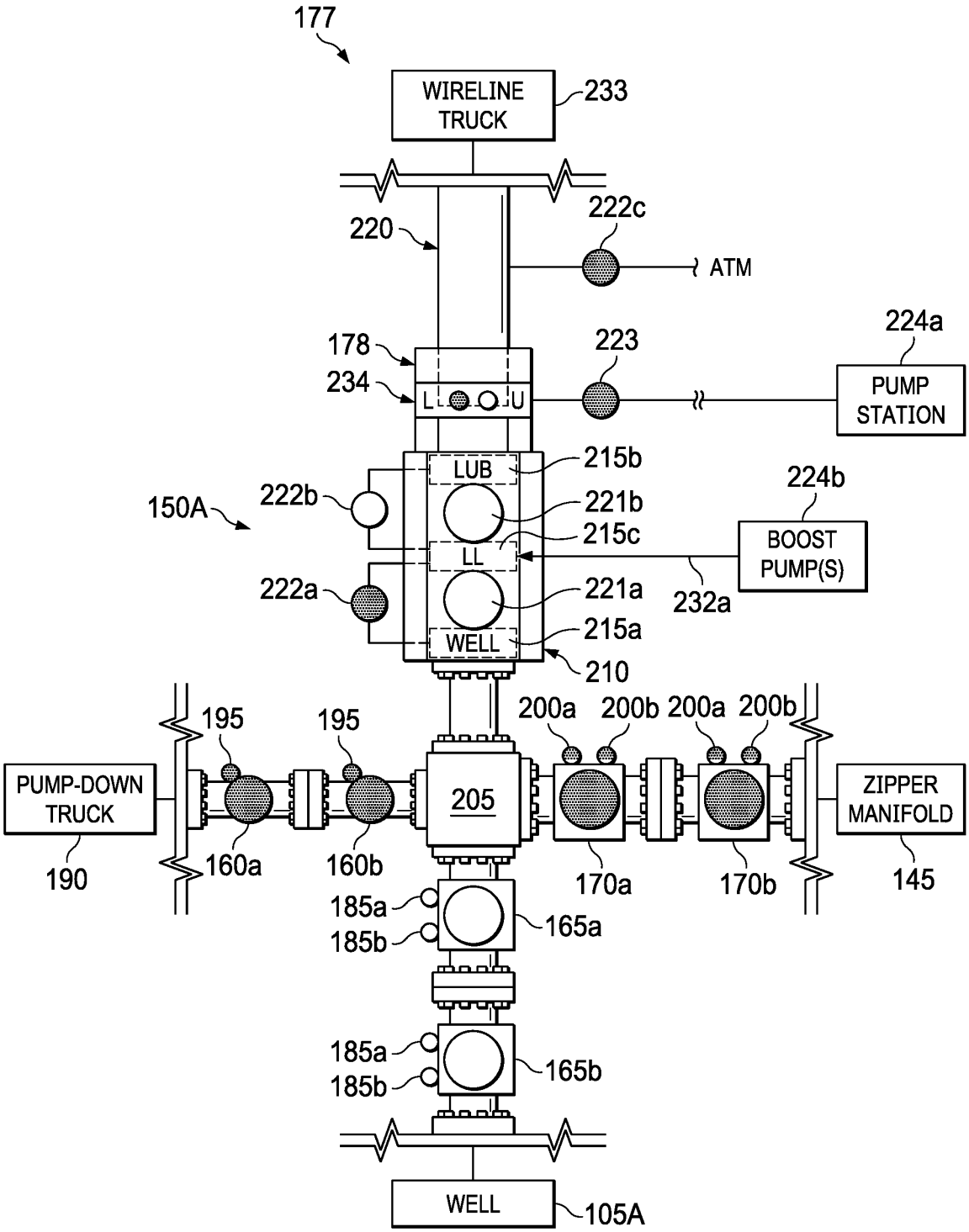

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2E

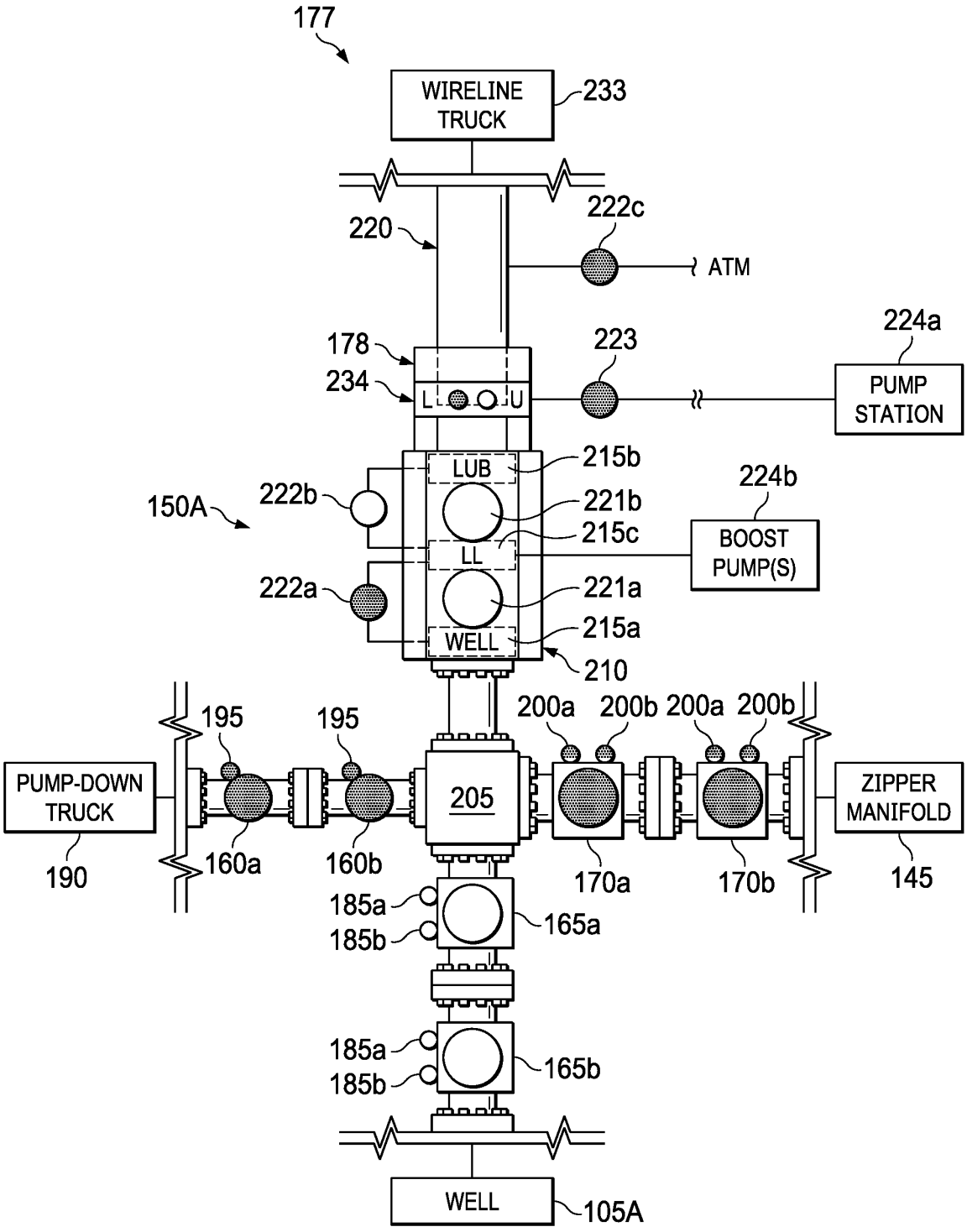

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2F

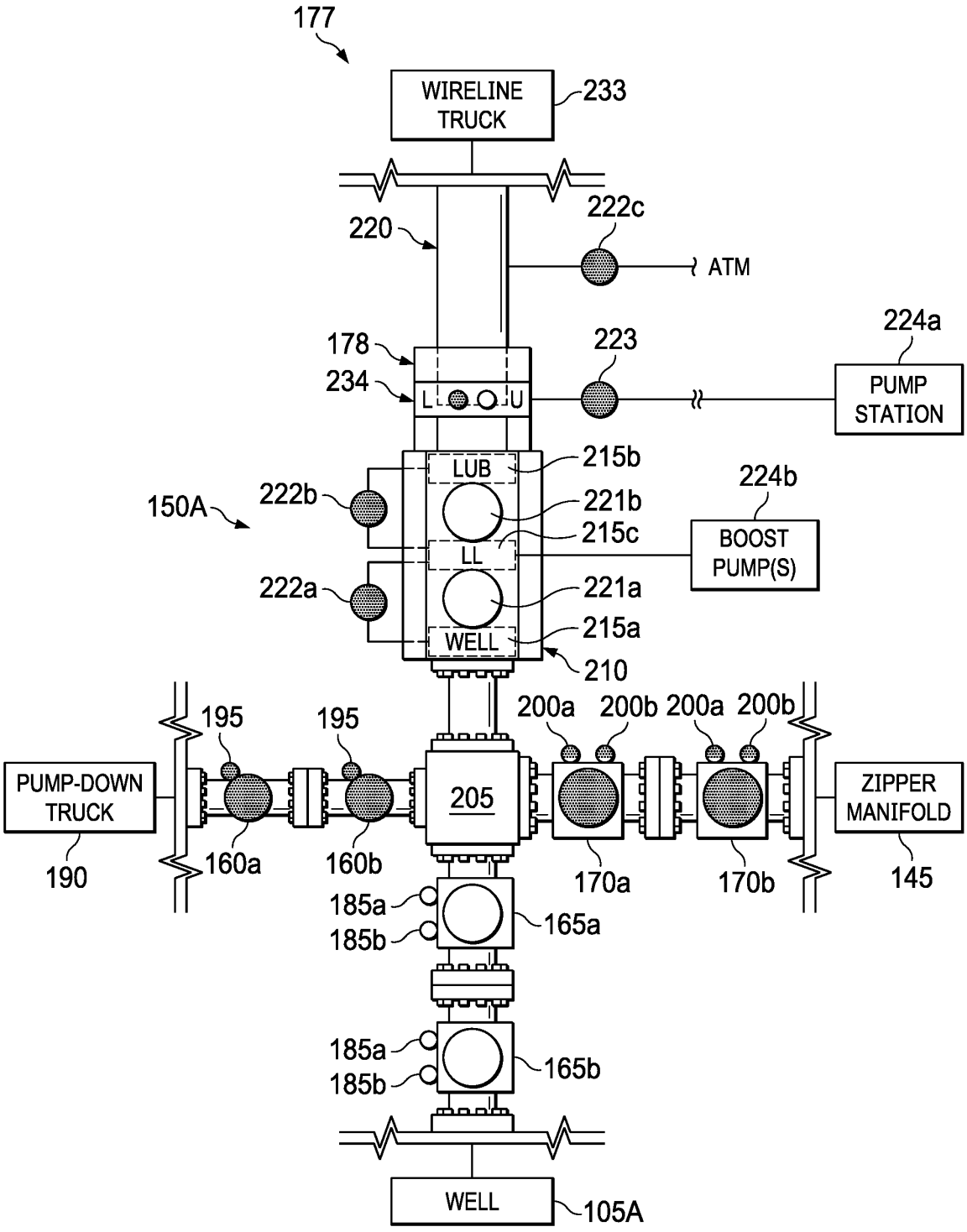

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 2G

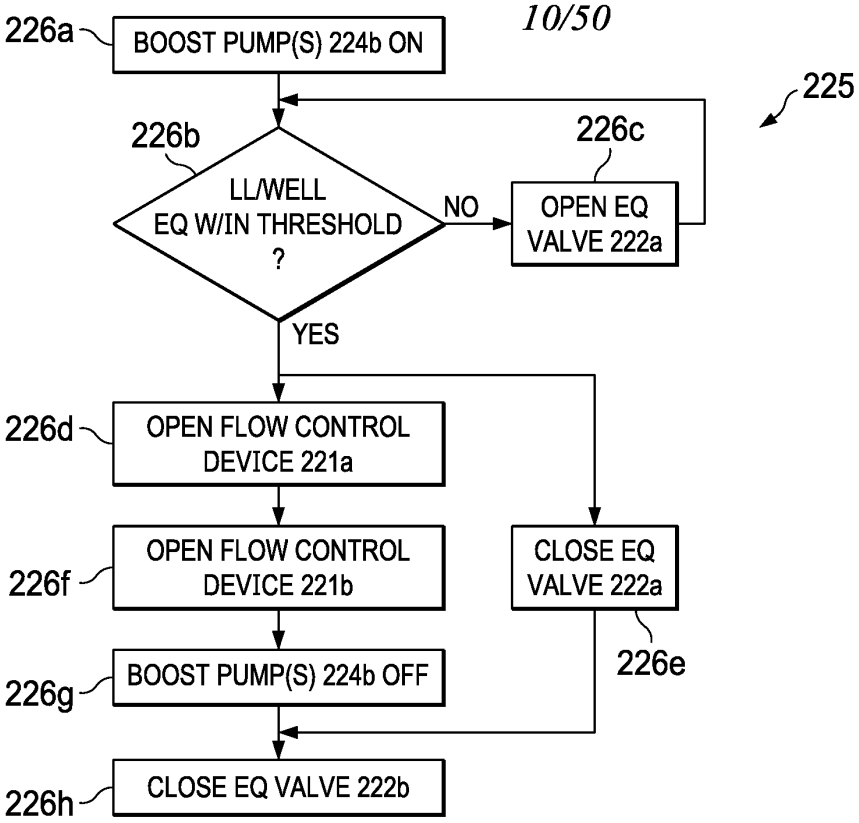

226a
BOOST PUMP(S) 224b ON
225
226b
LL/WELL EQ W/IN THRESHOLD ?
NO
226c
OPEN EQ VALVE 222a
YES
226d
OPEN FLOW CONTROL DEVICE 221a
226f
OPEN FLOW CONTROL DEVICE 221b
CLOSE EQ VALVE 222a
226e
226g
BOOST PUMP(S) 224b OFF
226h
CLOSE EQ VALVE 222b

FIG. 3

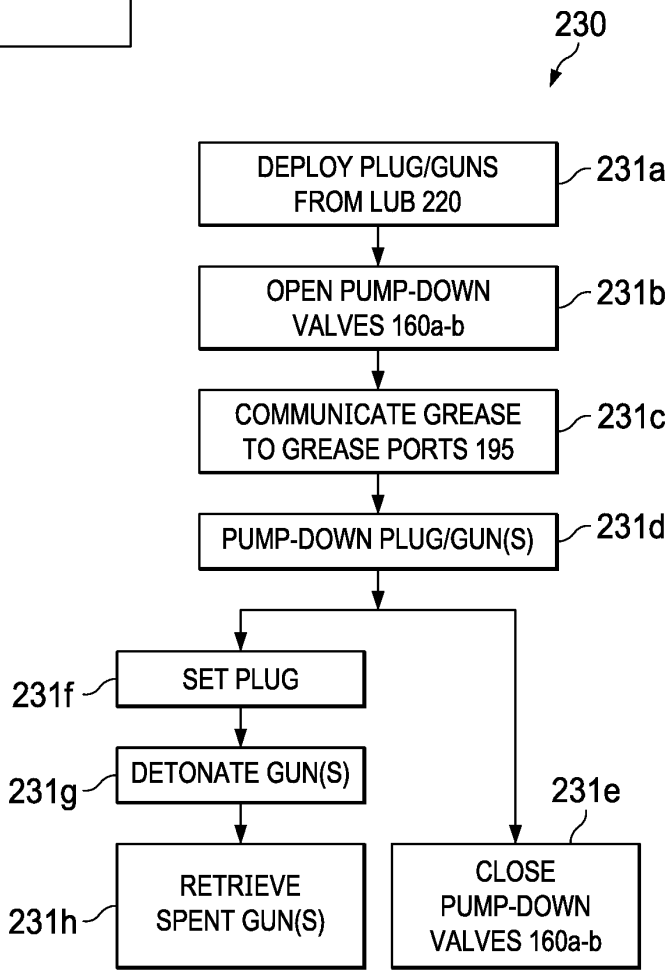

230
DEPLOY PLUG/GUNS FROM LUB 220
231a
OPEN PUMP-DOWN VALVES 160a-b
231b
COMMUNICATE GREASE TO GREASE PORTS 195
231c
PUMP-DOWN PLUG/GUN(S)
231d
231f
SET PLUG
231g
DETONATE GUN(S)
231e
231h
RETRIEVE SPENT GUN(S)
CLOSE PUMP-DOWN VALVES 160a-b

FIG. 4

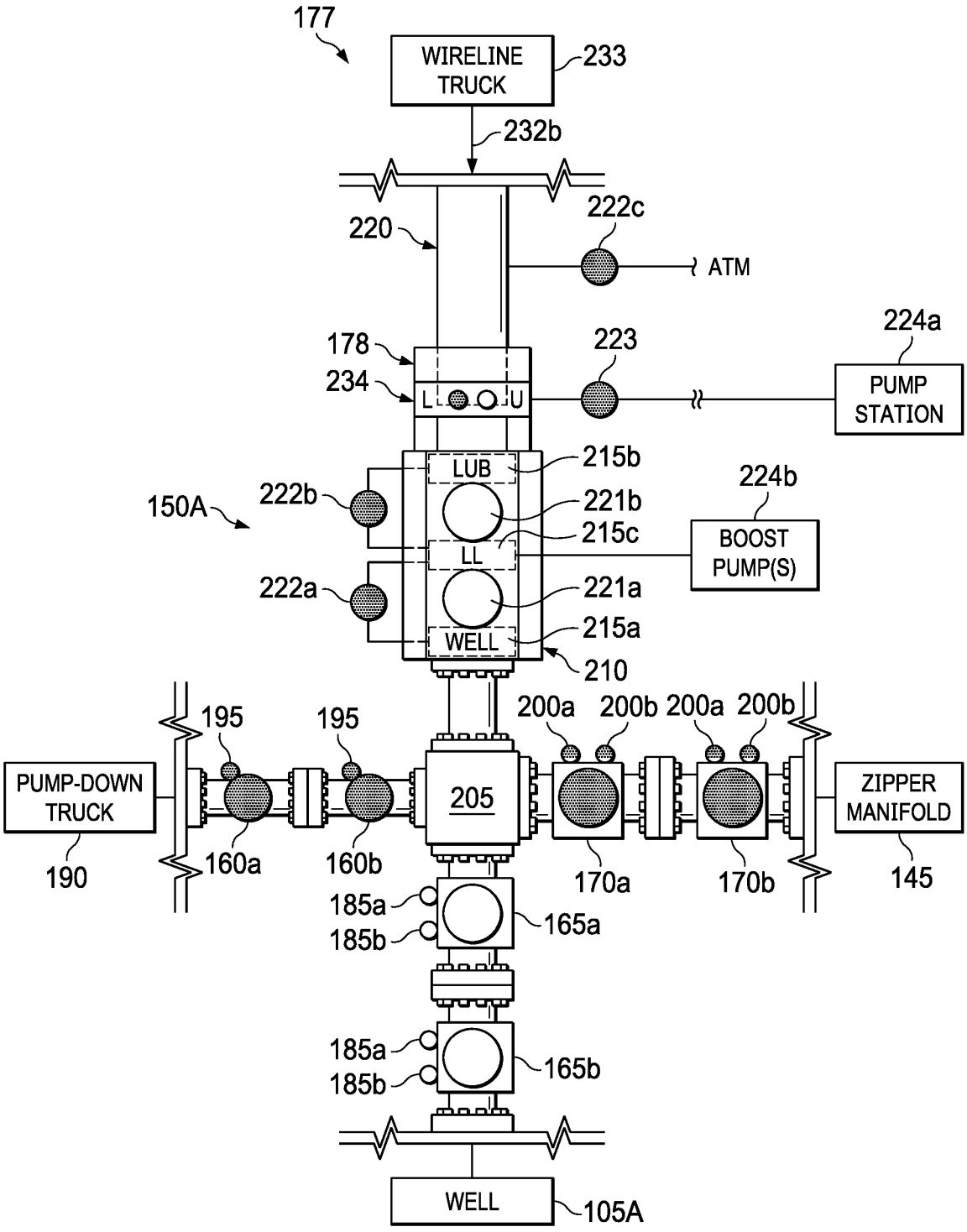

177
WIRELINE TRUCK
233
232b
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
222b
221b
150A
215c
LL
BOOST PUMP(S)
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 5A

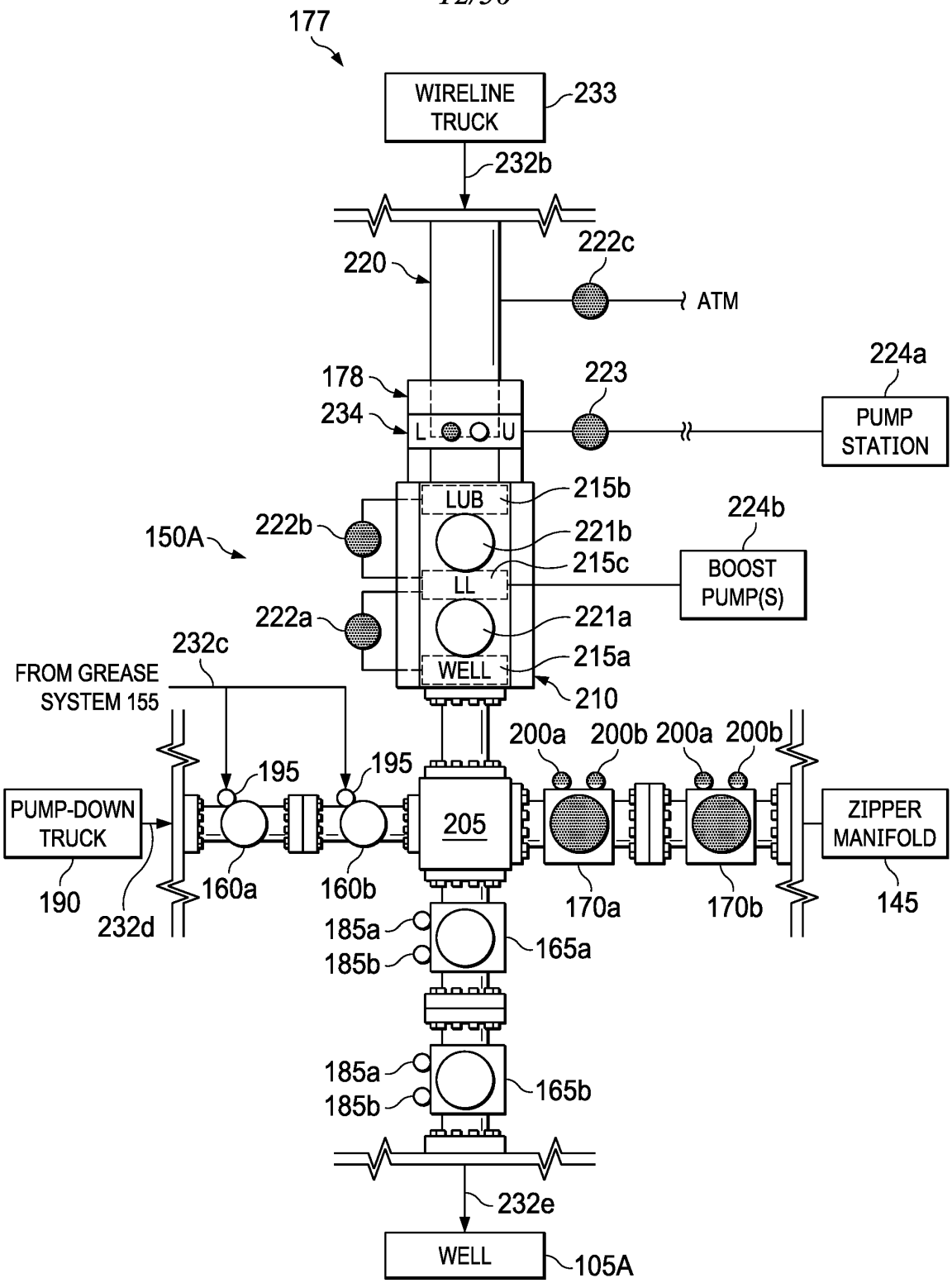

177
WIRELINE TRUCK
233
232b
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232c
FROM GREASE SYSTEM 155
215a
WELL
210
200a
200b
200a
200b
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
232d
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
232e
WELL
105A

FIG. 5B

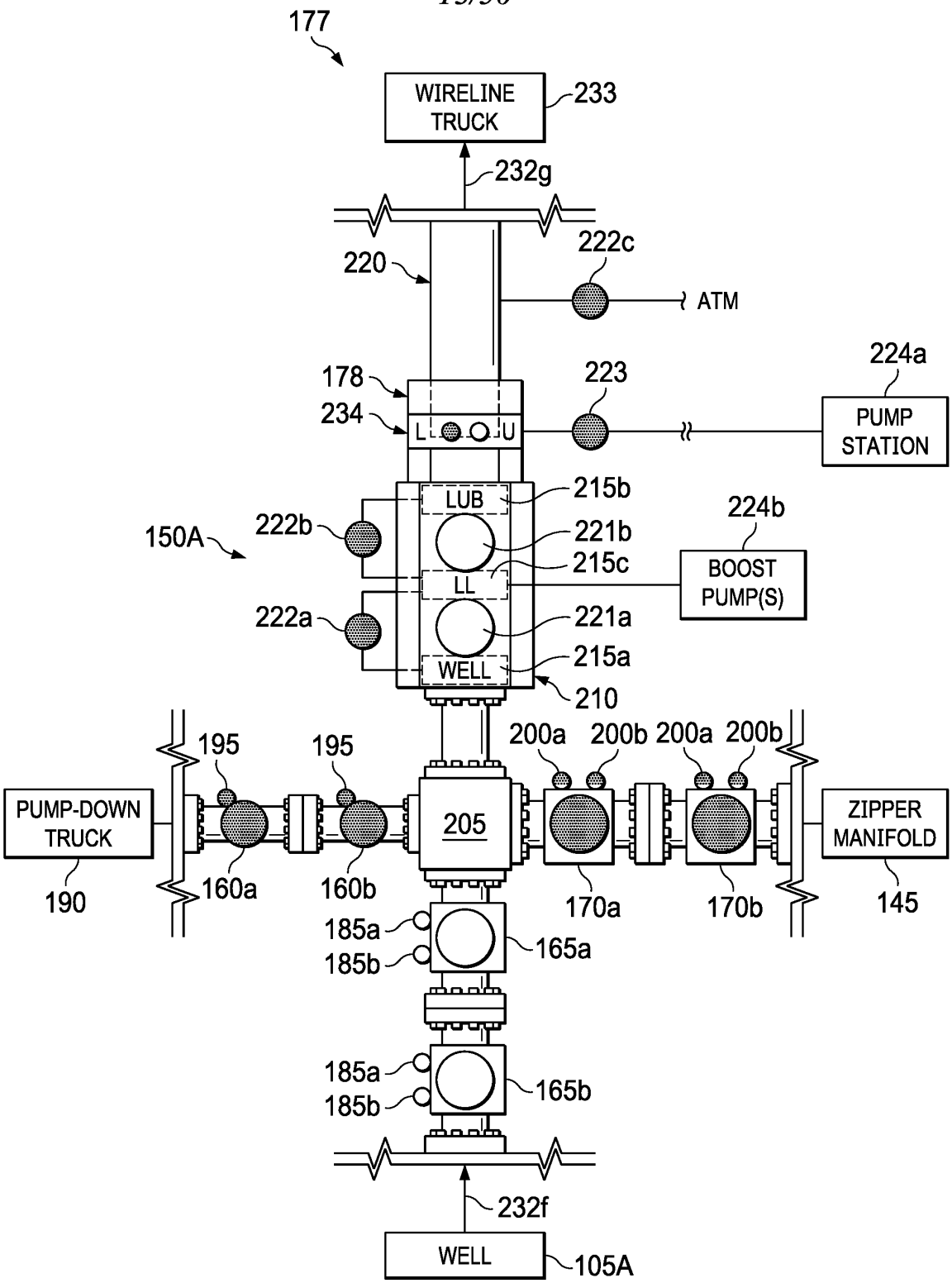

177
WIRELINE TRUCK
233
232g
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
222b
221b
150A
215c
LL
BOOST PUMP(S)
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
232f
WELL
105A

FIG. 5C

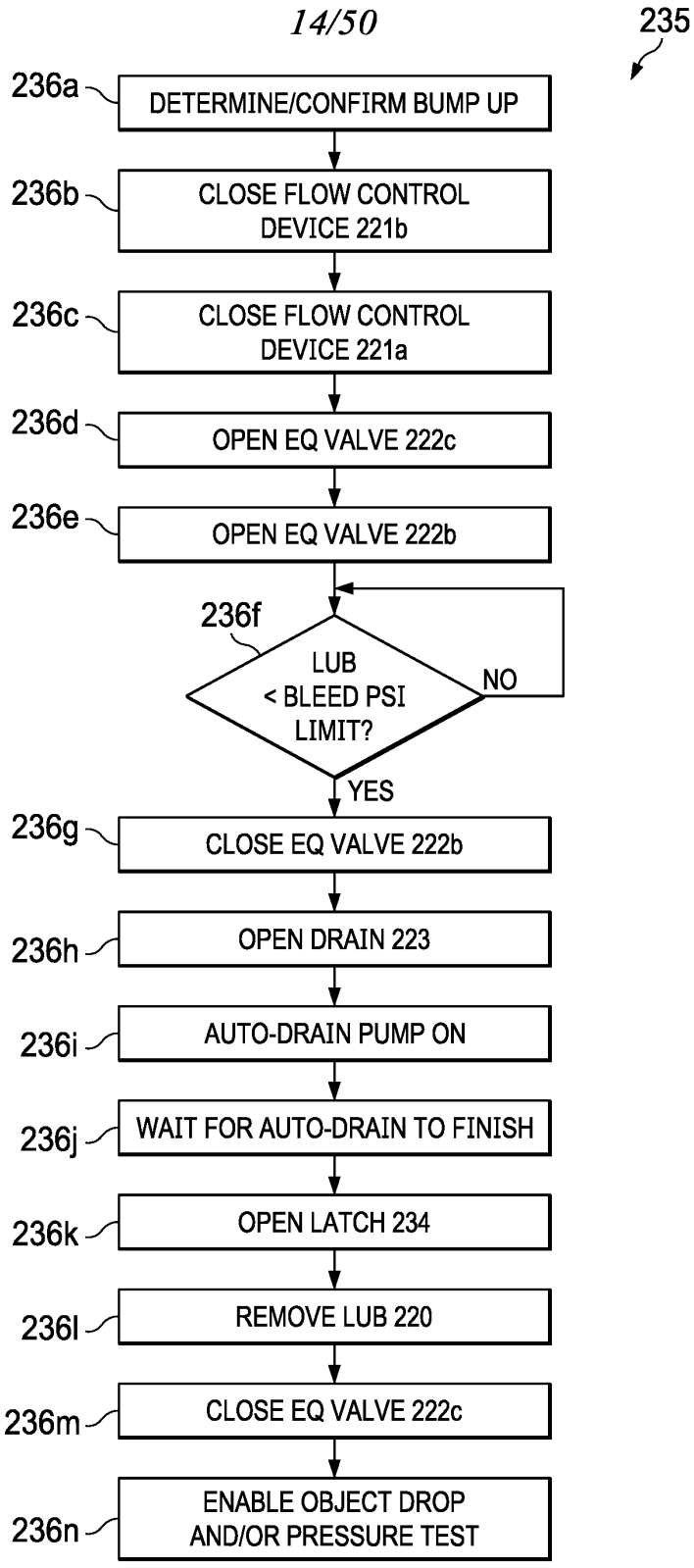

235
236a
DETERMINE/CONFIRM BUMP UP
236b
CLOSE FLOW CONTROL DEVICE 221b
236c
CLOSE FLOW CONTROL DEVICE 221a
236d
OPEN EQ VALVE 222c
236e
OPEN EQ VALVE 222b
236f
LUB < BLEED PSI LIMIT?
NO
YES
236g
CLOSE EQ VALVE 222b
236h
OPEN DRAIN 223
236i
AUTO-DRAIN PUMP ON
236j
WAIT FOR AUTO-DRAIN TO FINISH
236k
OPEN LATCH 234
236l
REMOVE LUB 220
236m
CLOSE EQ VALVE 222c
236n
ENABLE OBJECT DROP AND/OR PRESSURE TEST

FIG. 6

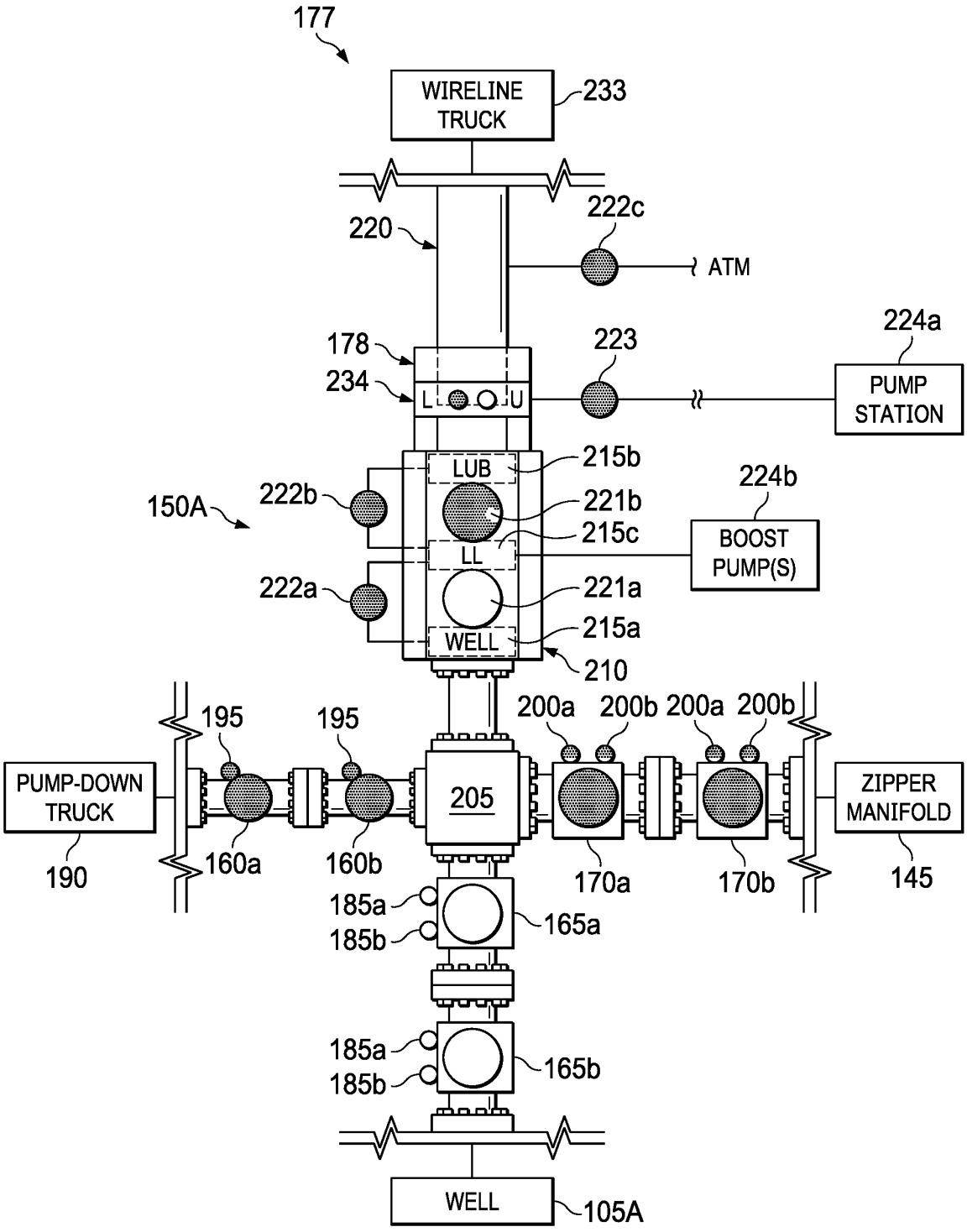

177
WIRELINE TRUCK
233
222c
220
ATM
224a
178
223
234
L
U
PUMP STATION
215b
LUB
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7A

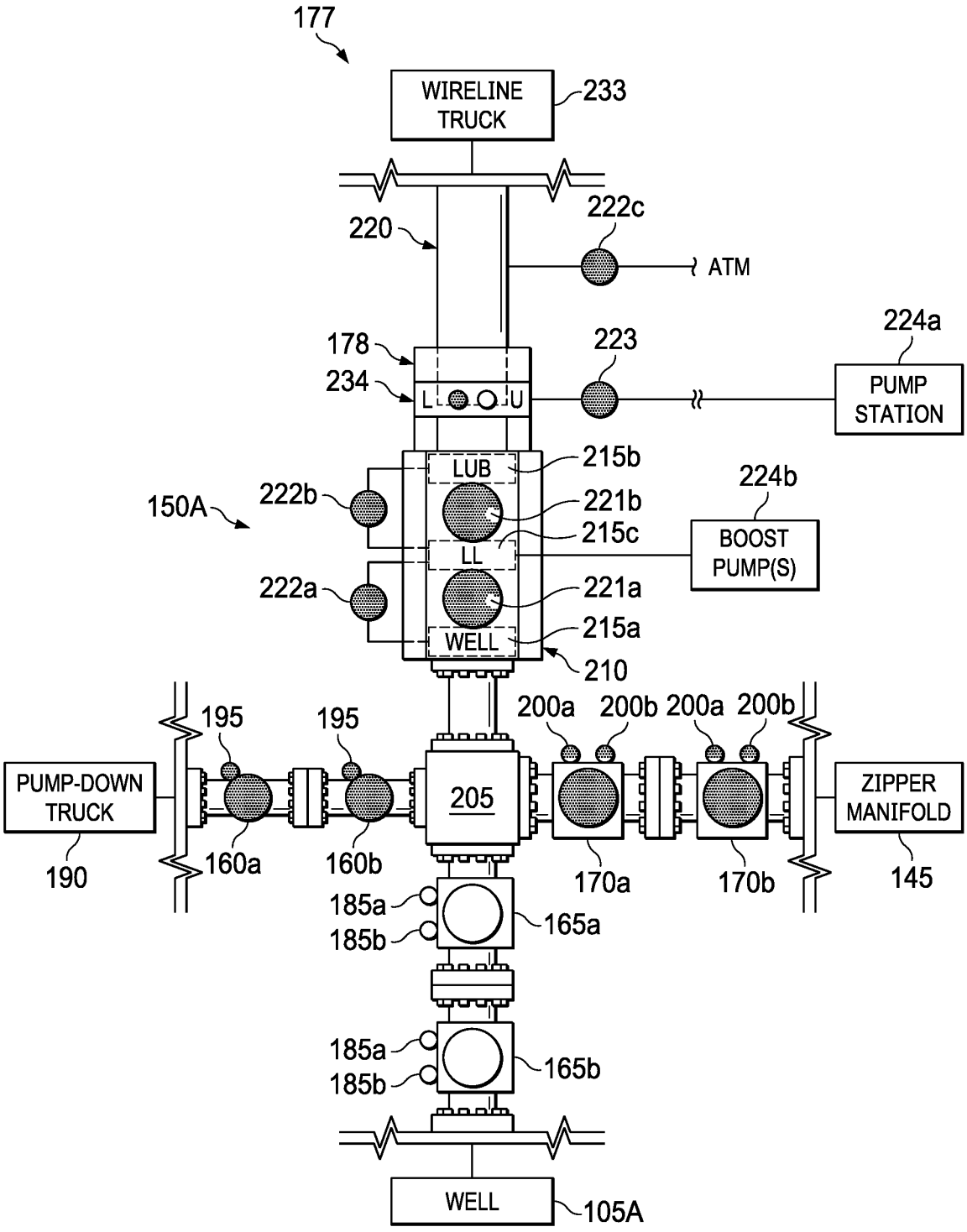

177
WIRELINE TRUCK
233
220
222c
ATM
224a
PUMP STATION
178
234
223
L
U
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7B

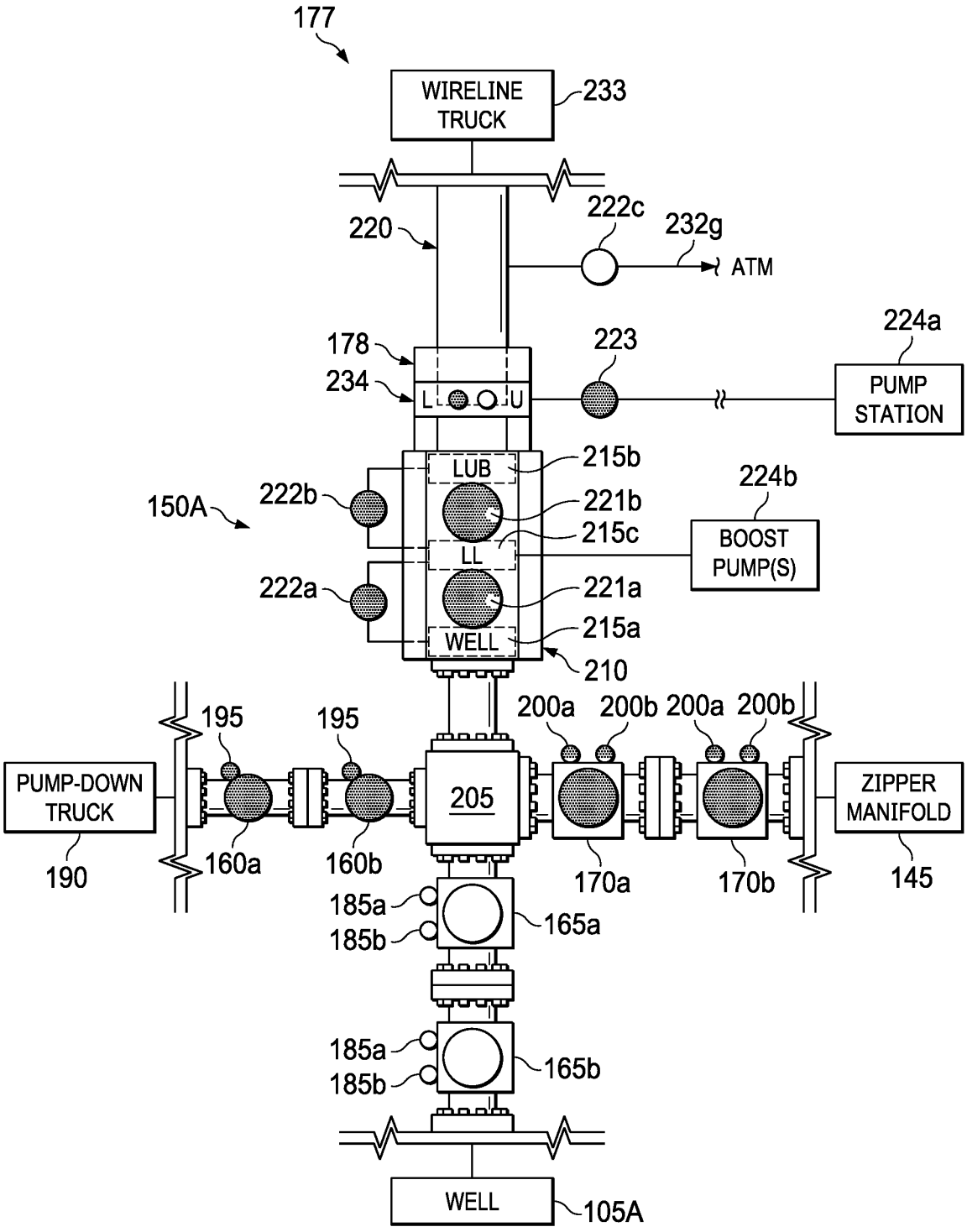

177
WIRELINE TRUCK
233
220
222c
232g
ATM
224a
178
223
234
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7C

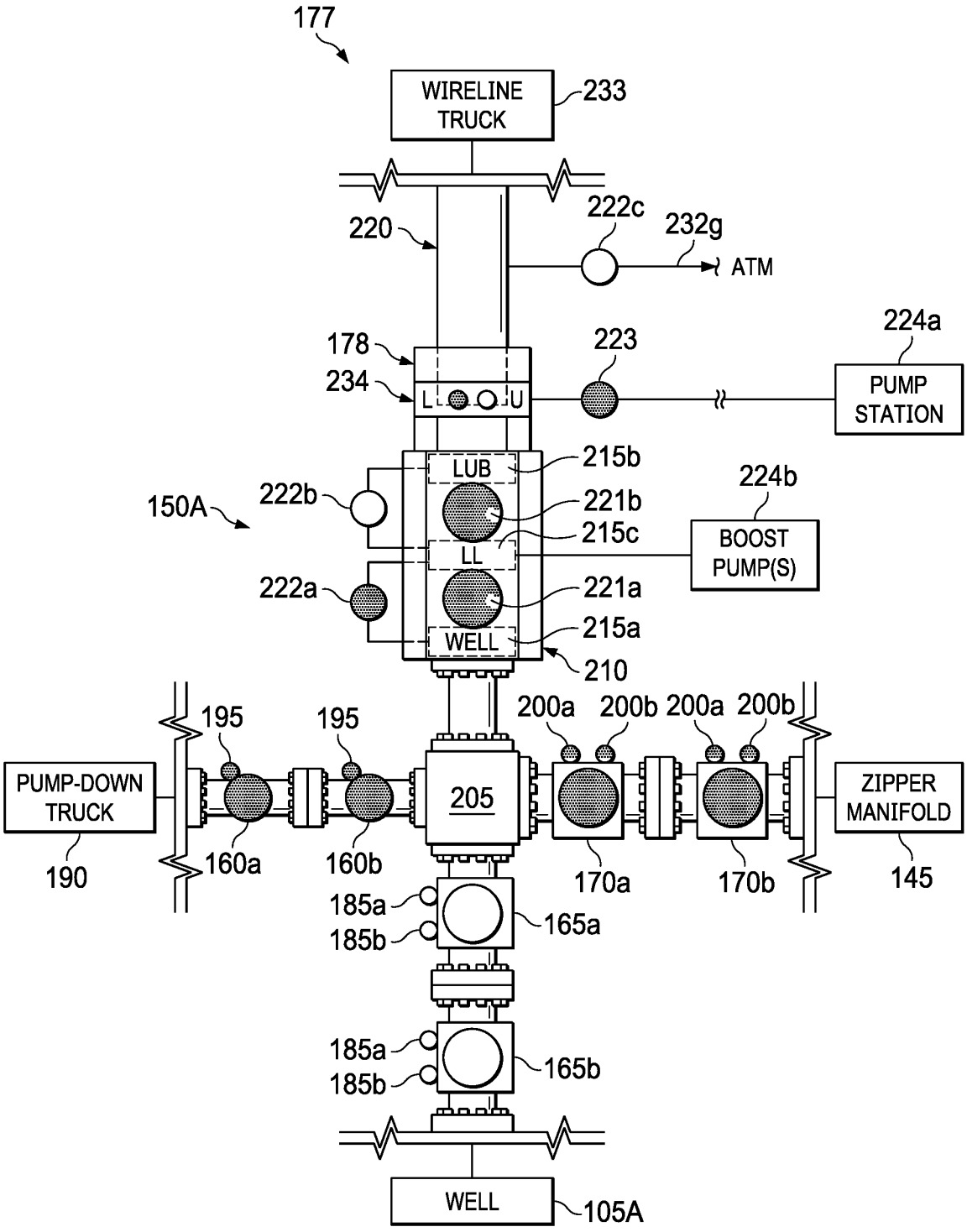

177
WIRELINE TRUCK
233
220
222c
232g
ATM
224a
PUMP STATION
178
234
223
L
U
LUB
215b
150A
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7D

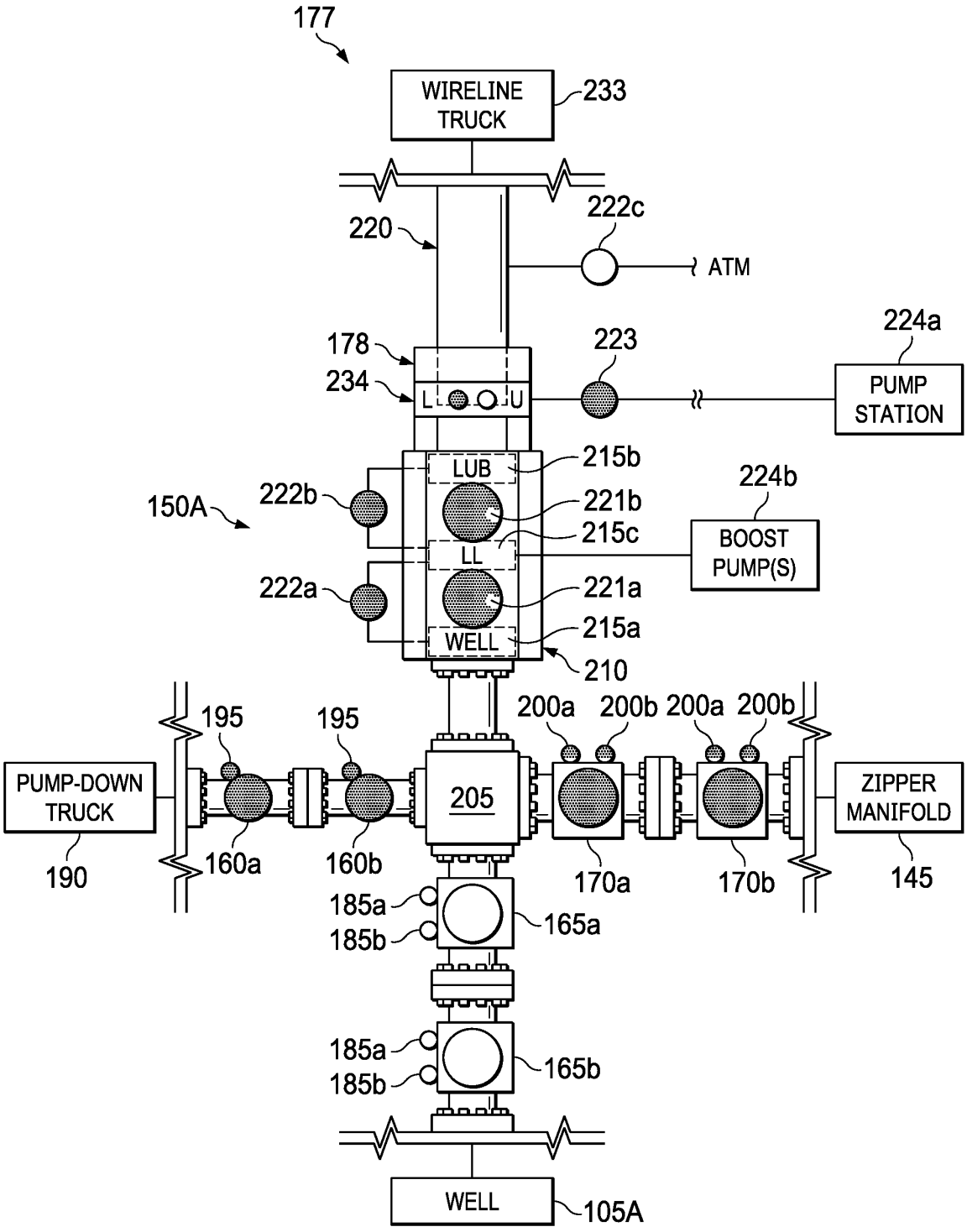

177
WIRELINE TRUCK
233
220
222c
ATM
224a
PUMP STATION
178
234
223
L
U
LUB
215b
150A
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7E

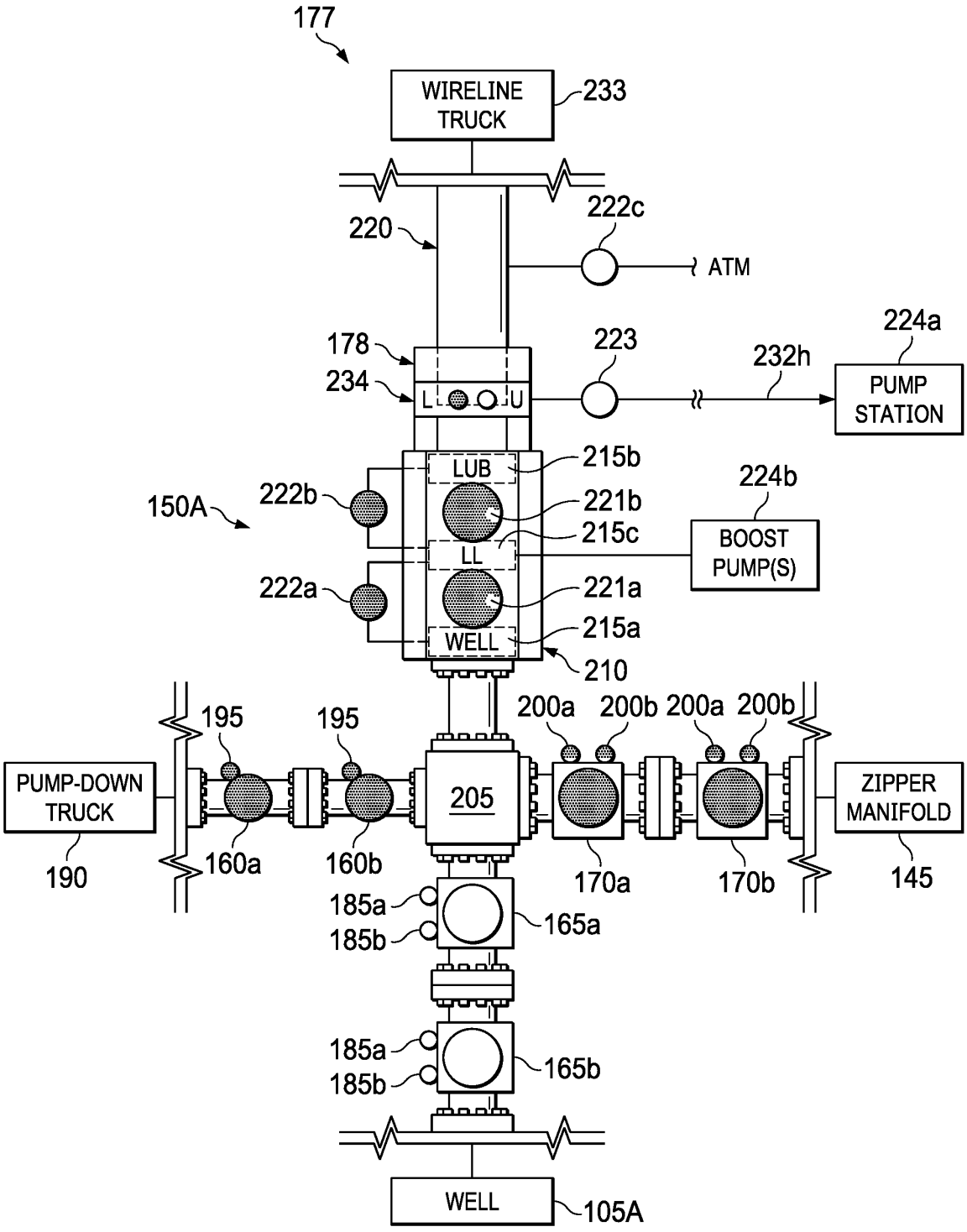

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
232h
PUMP STATION
L
U
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7F

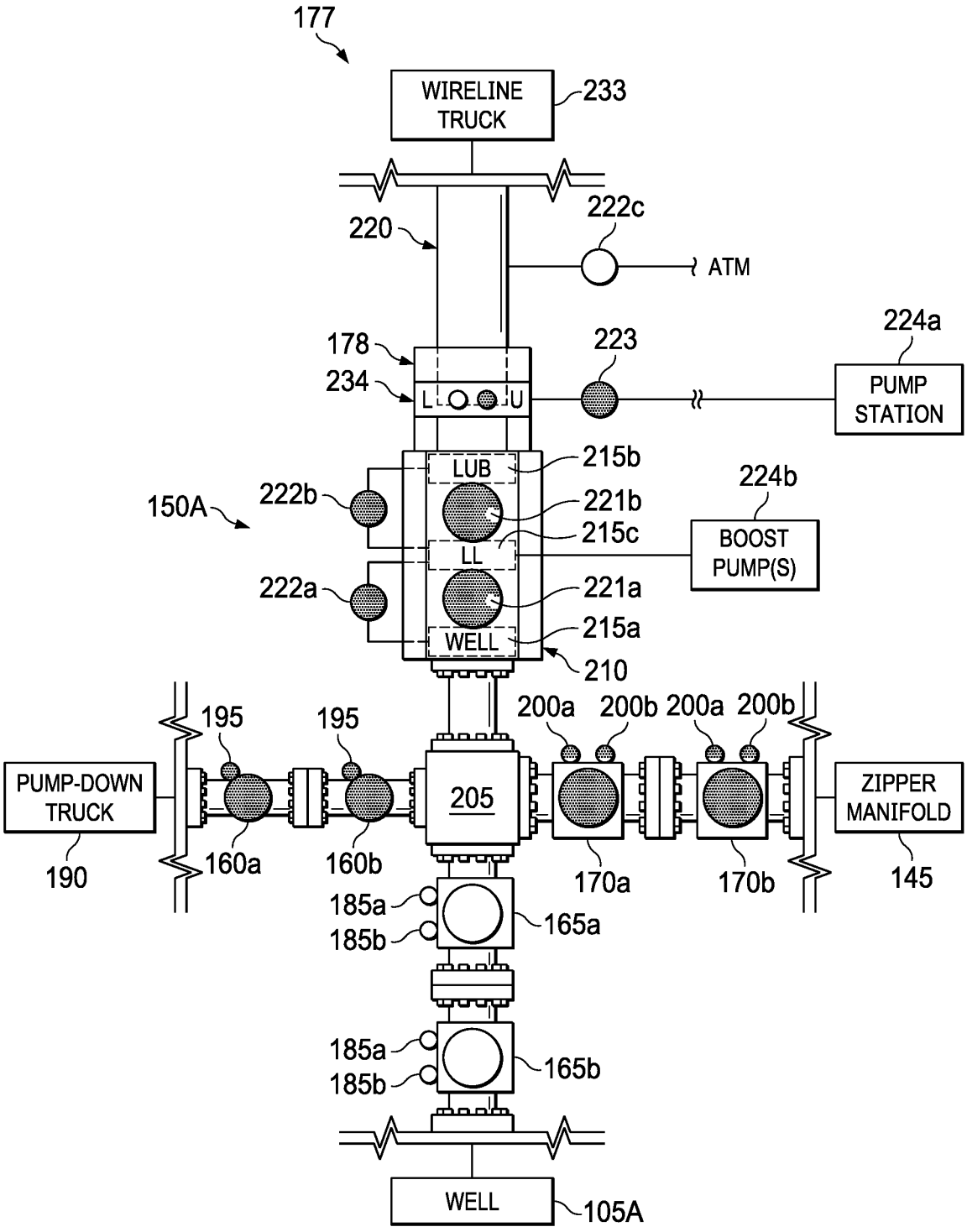

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7G

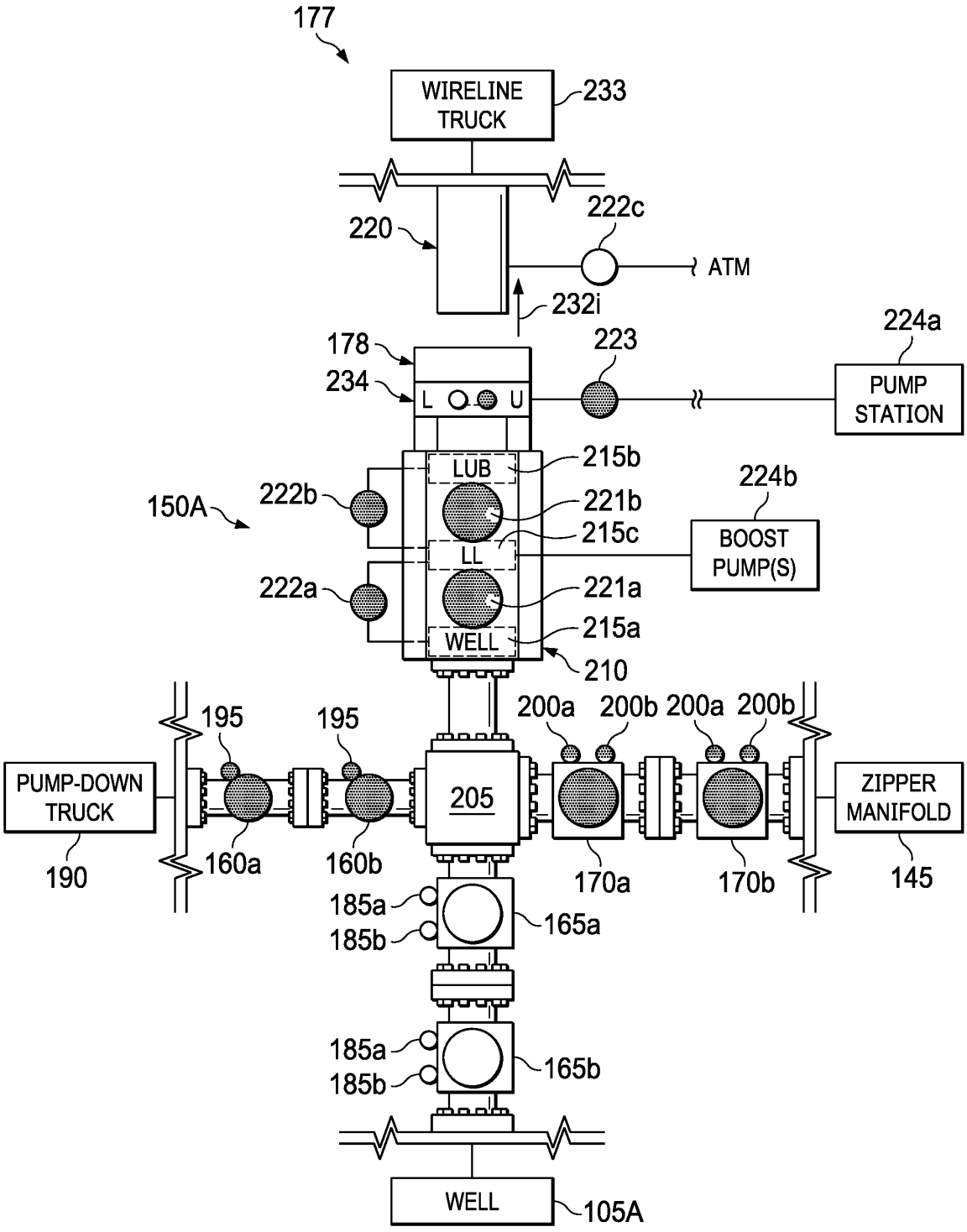

177
WIRELINE TRUCK
233
220
222c
ATM
232i
178
234
L
U
223
224a
PUMP STATION
LUB
215b
150A
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7H

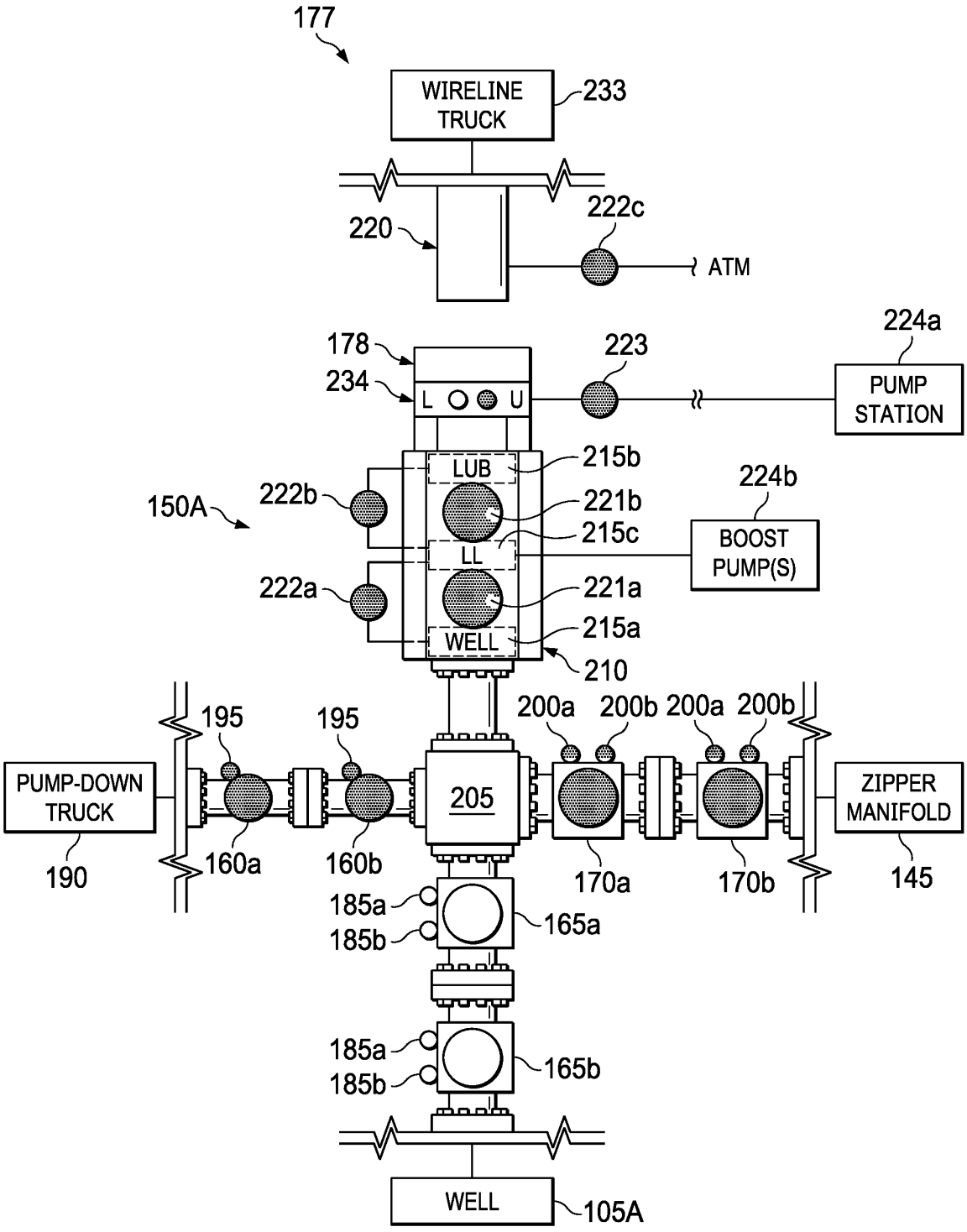

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150A
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105A

FIG. 7I

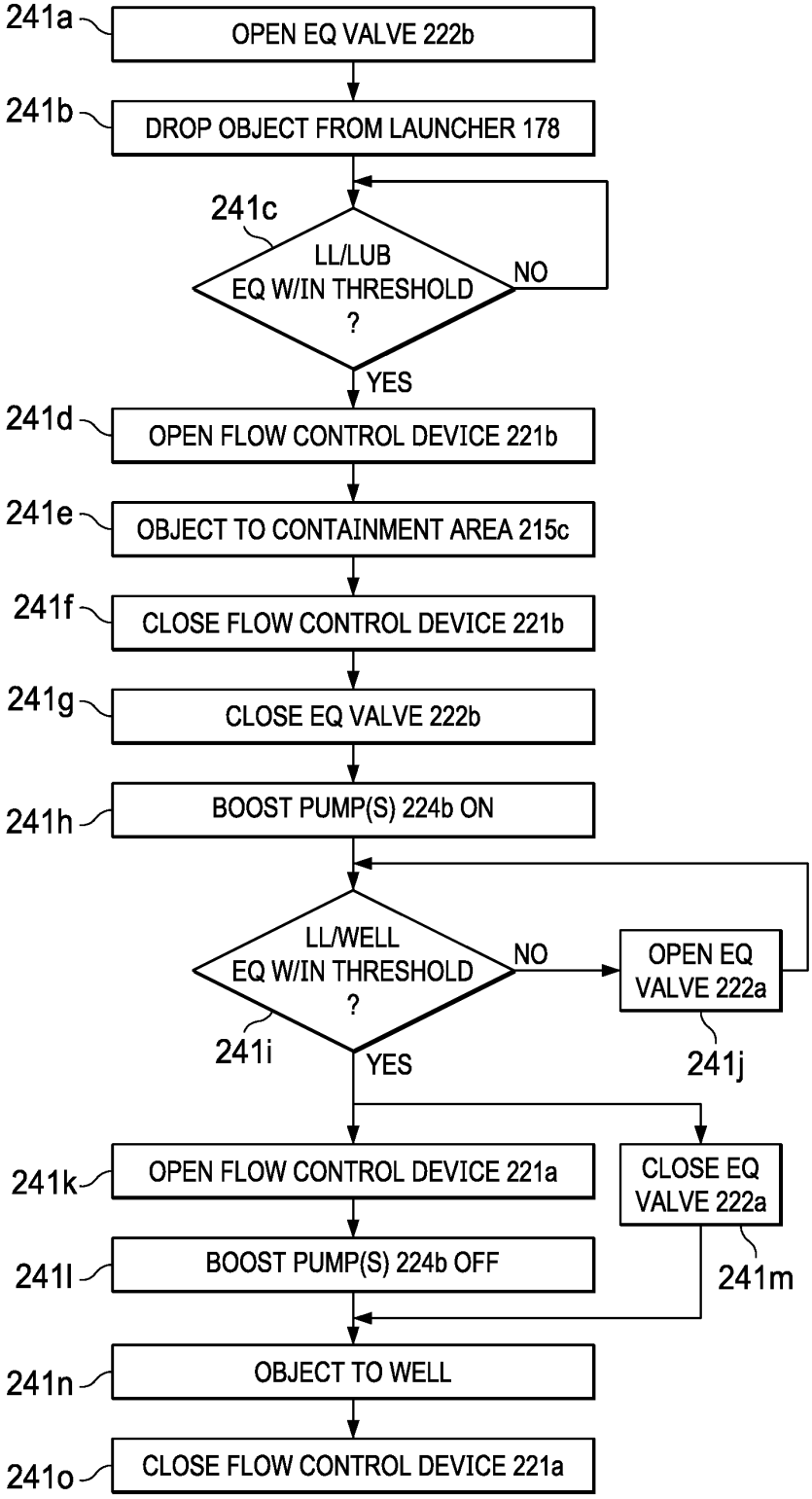

241a
OPEN EQ VALVE 222b
241b
DROP OBJECT FROM LAUNCHER 178
241c
LL/LUB EQ W/IN THRESHOLD ?
NO
YES
241d
OPEN FLOW CONTROL DEVICE 221b
241e
OBJECT TO CONTAINMENT AREA 215c
241f
CLOSE FLOW CONTROL DEVICE 221b
241g
CLOSE EQ VALVE 222b
241h
BOOST PUMP(S) 224b ON
LL/WELL EQ W/IN THRESHOLD ?
NO
OPEN EQ VALVE 222a
241i
YES
241j
241k
OPEN FLOW CONTROL DEVICE 221a
CLOSE EQ VALVE 222a
241l
BOOST PUMP(S) 224b OFF
241m
241n
OBJECT TO WELL
241o
CLOSE FLOW CONTROL DEVICE 221a

FIG. 8

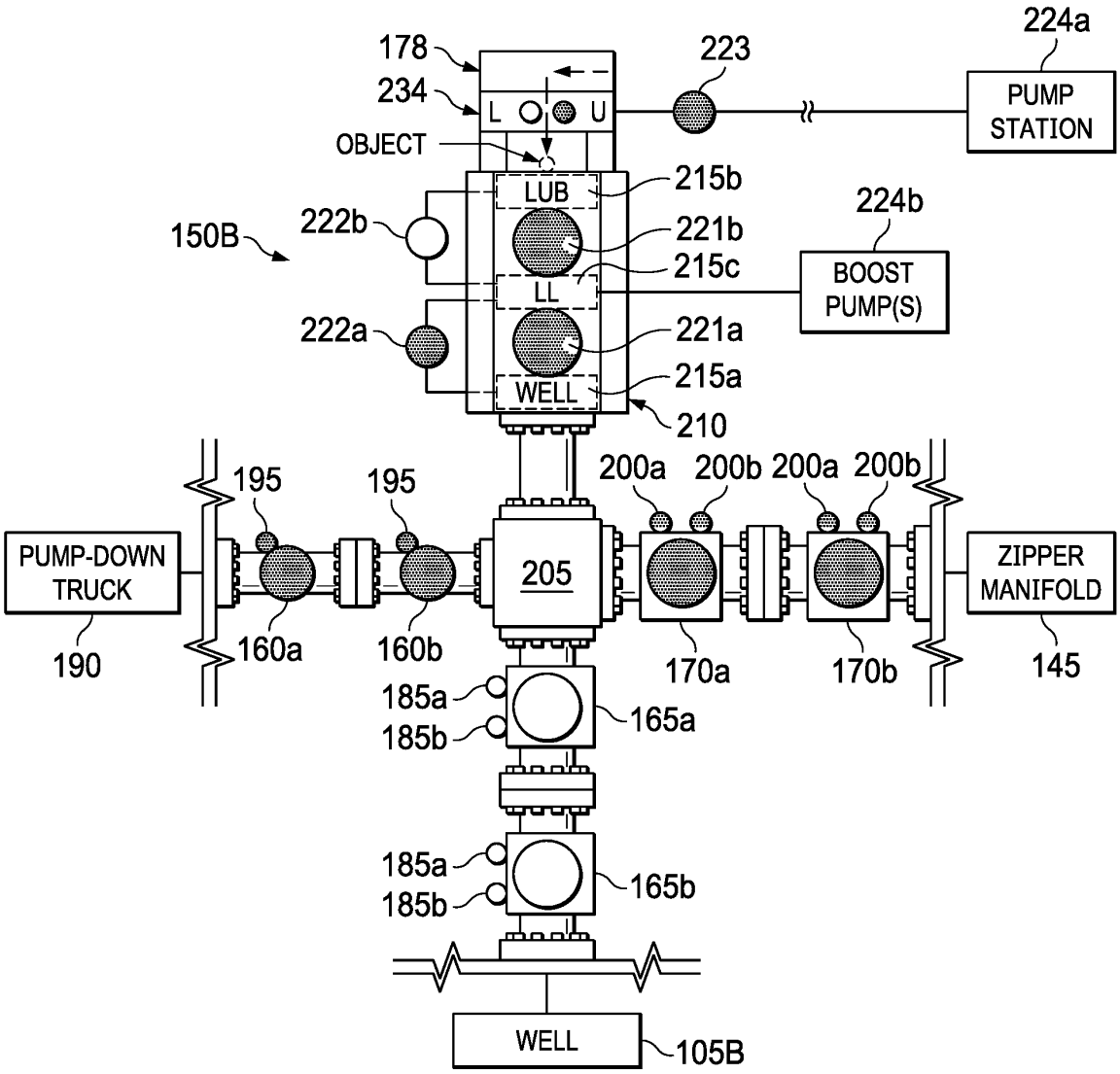

178
234
L
U
OBJECT
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9A

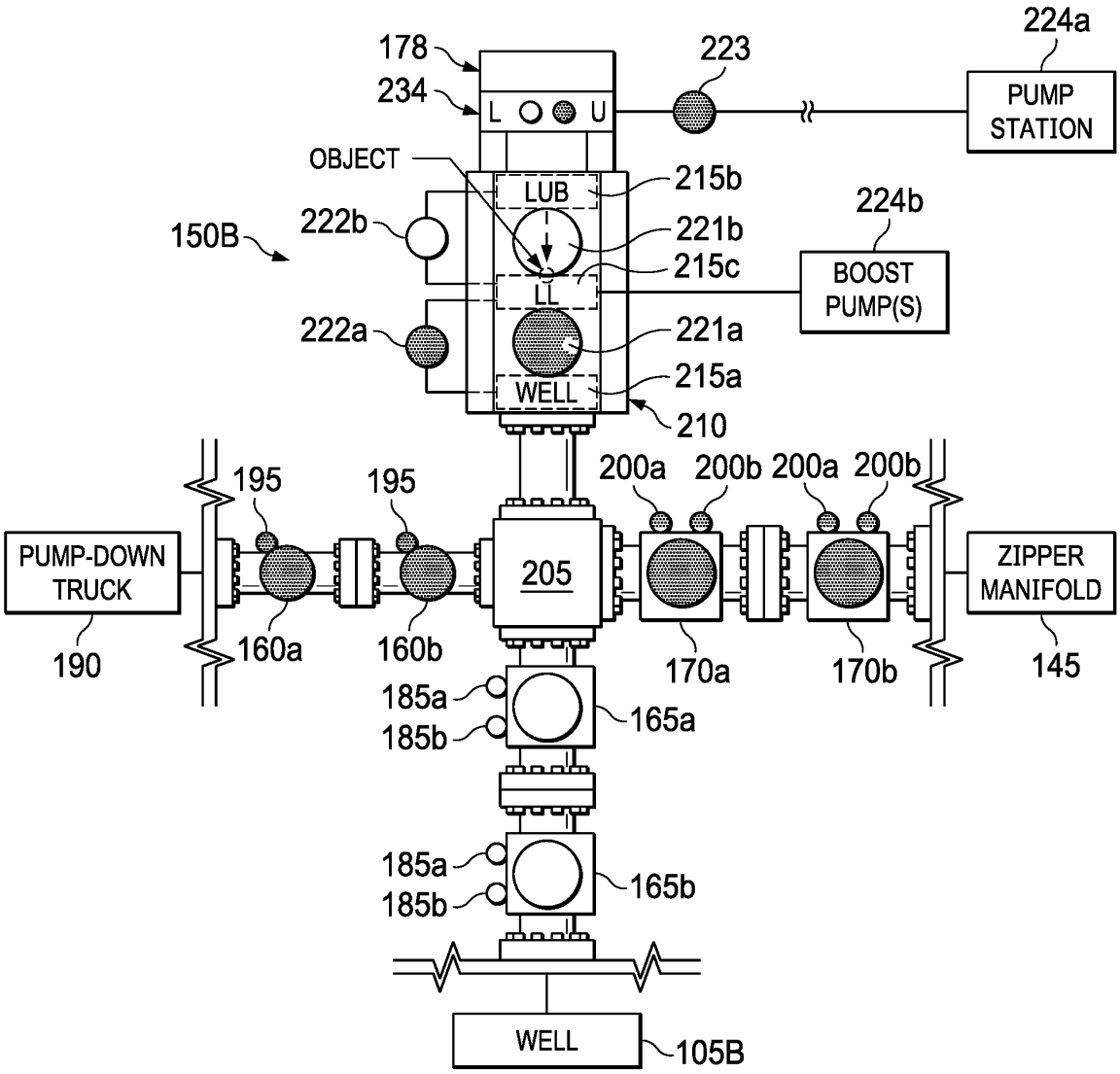

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9B

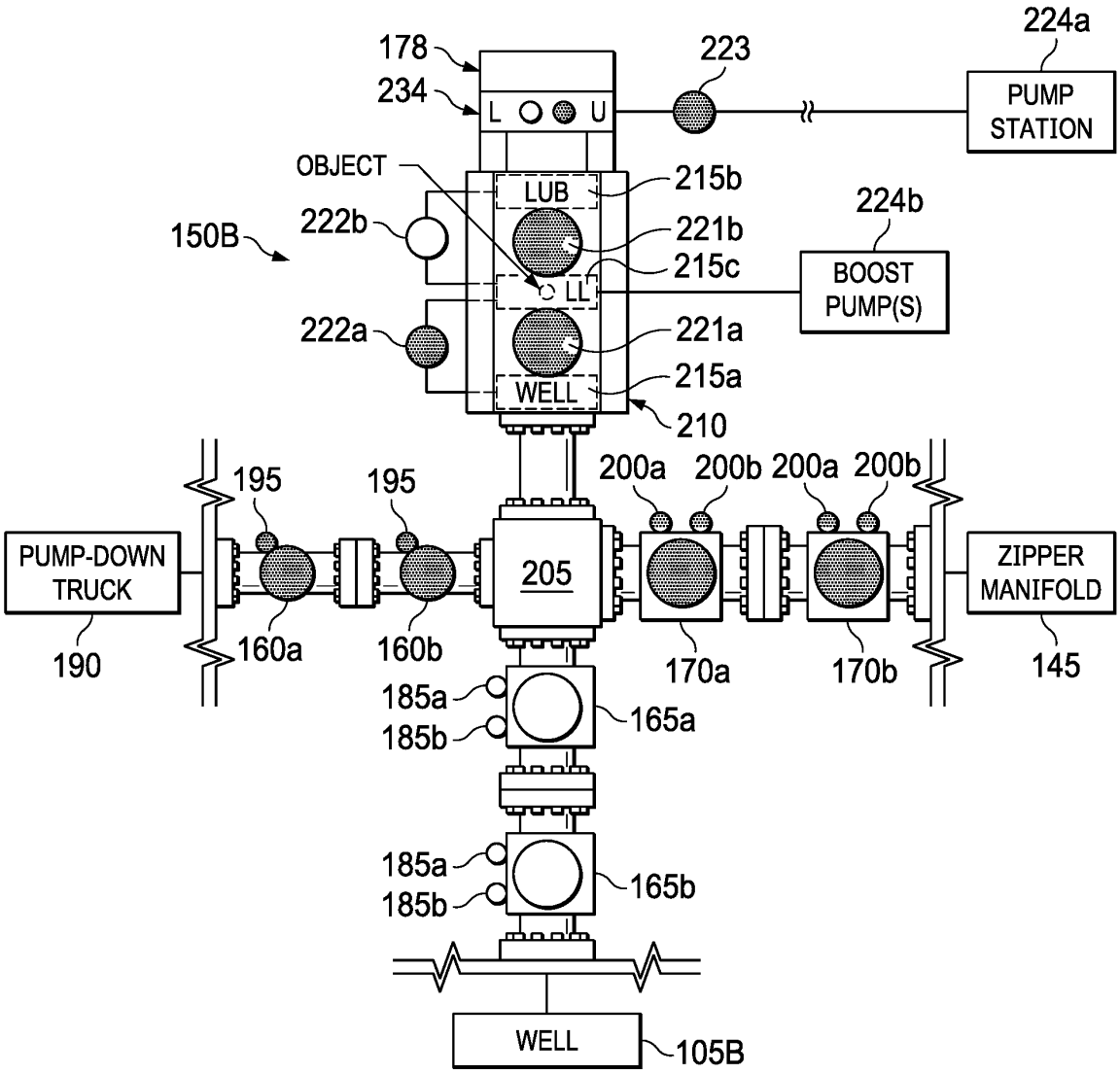

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9C

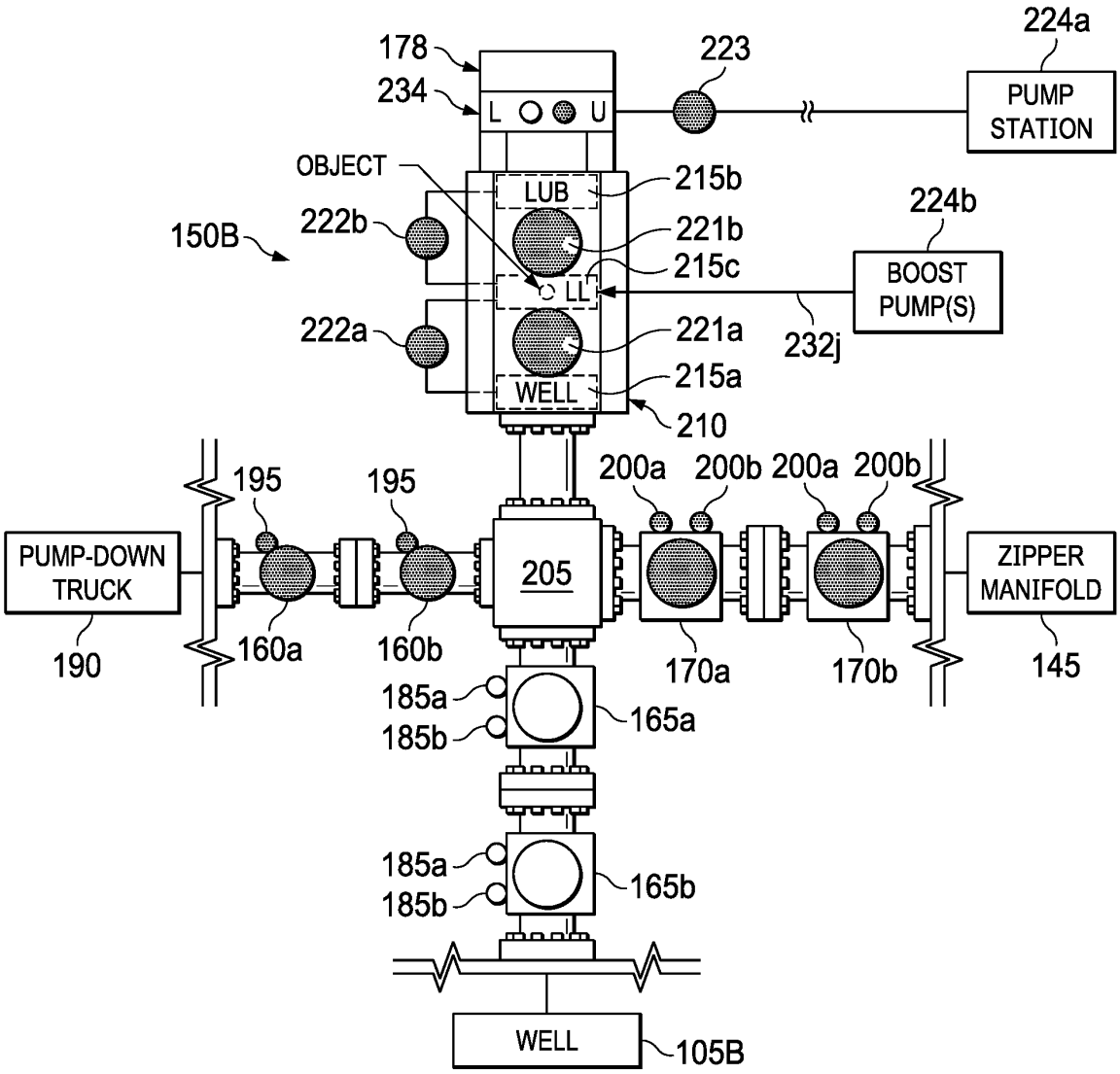

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
LL
224b
BOOST PUMP(S)
222a
221a
232j
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9D

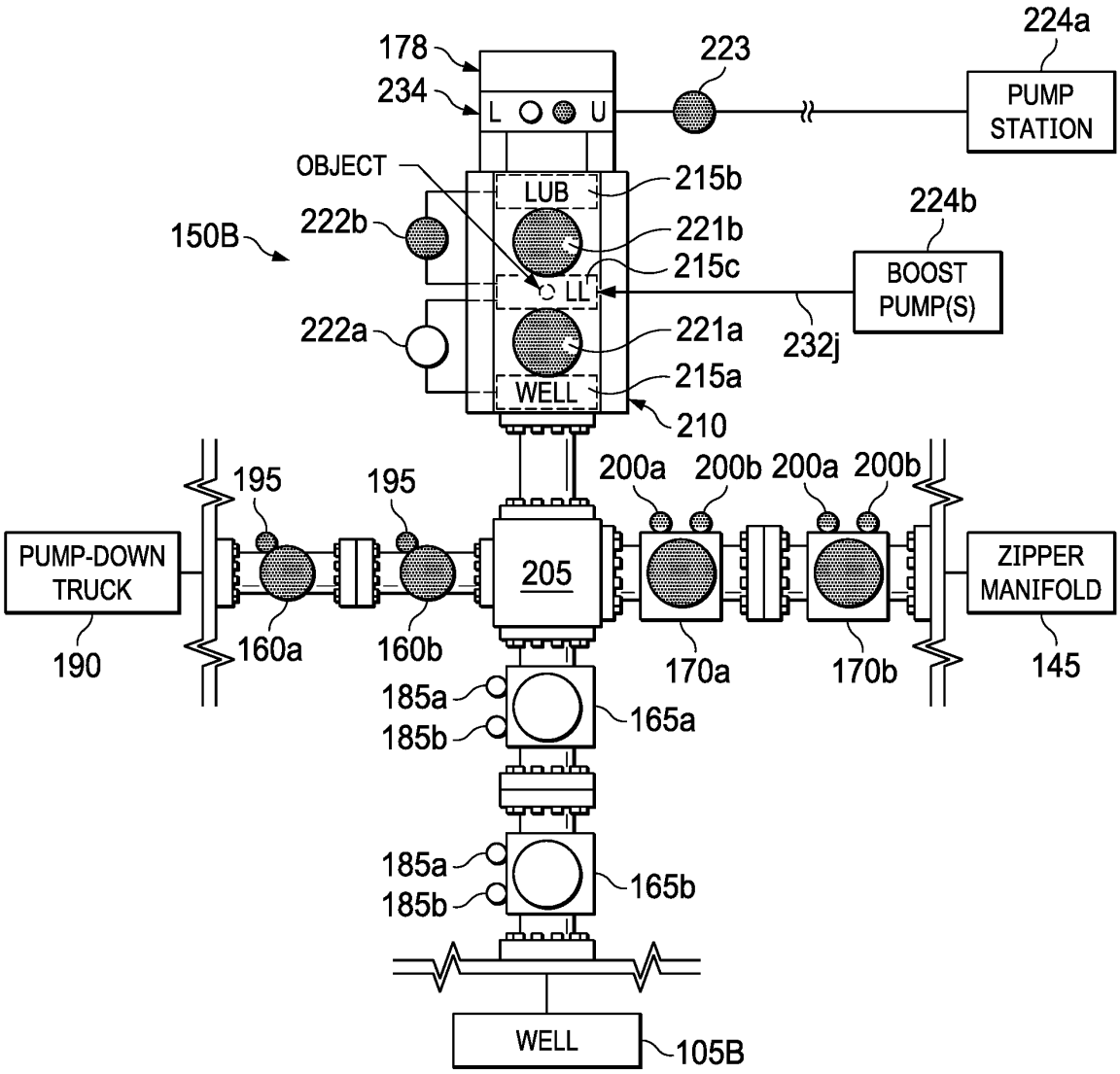

178
234
L
U
223
224a
PUMP STATION
OBJECT
LUB
215b
150B
222b
221b
215c
LL
224b
BOOST PUMP(S)
222a
221a
232j
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9E

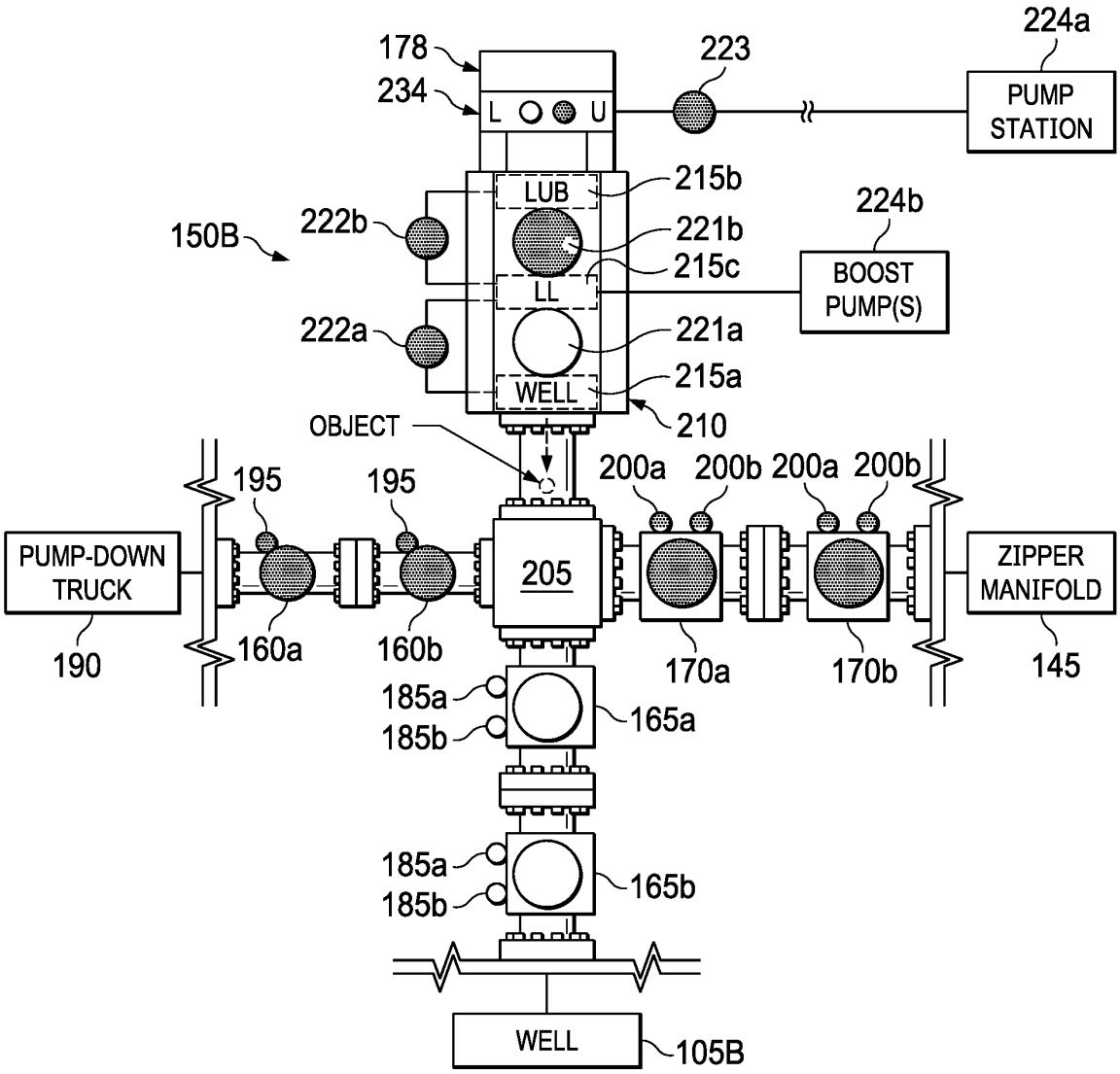

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
OBJECT
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105B

FIG. 9F

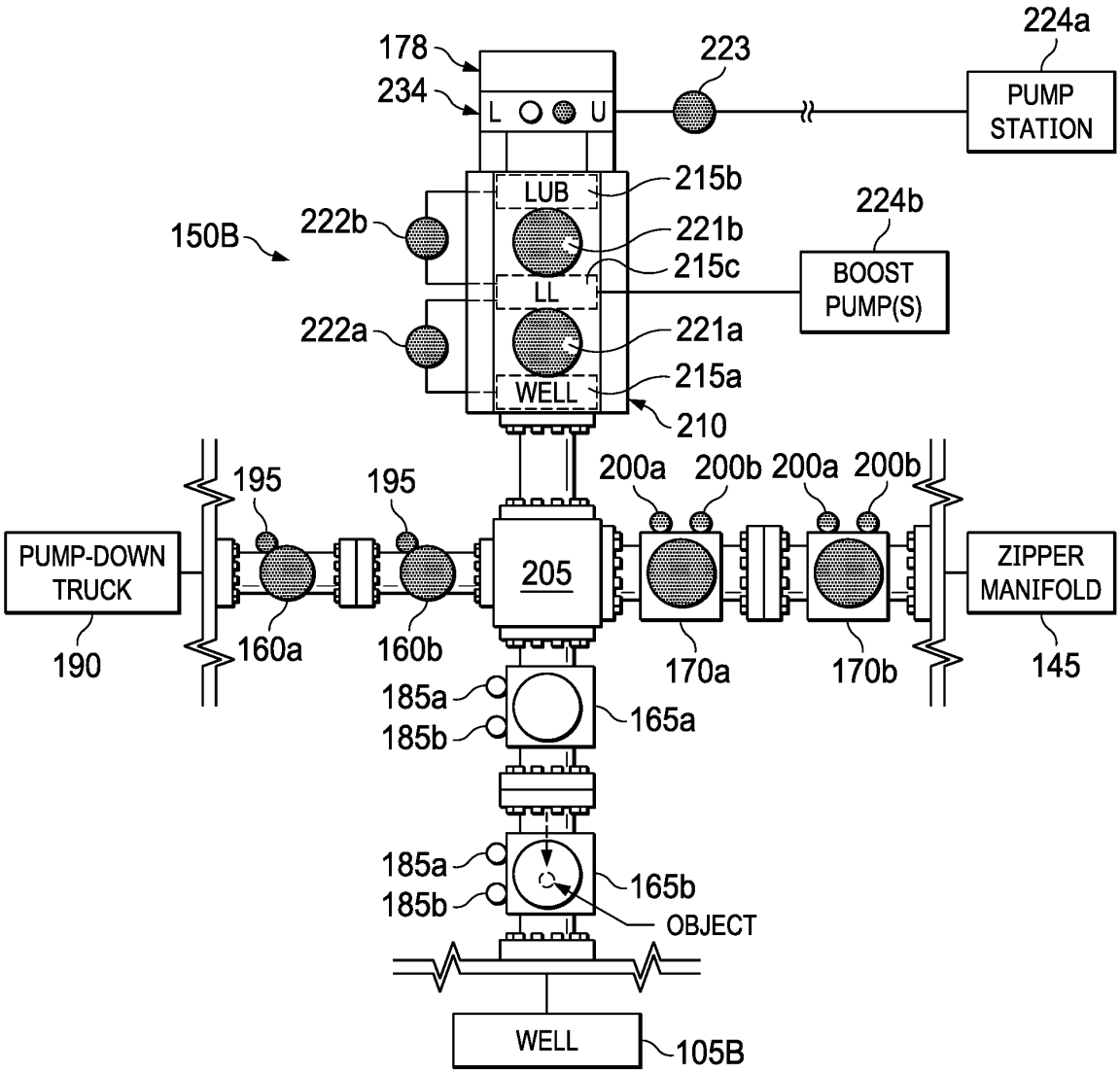

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
OBJECT
WELL
105B

FIG. 9G

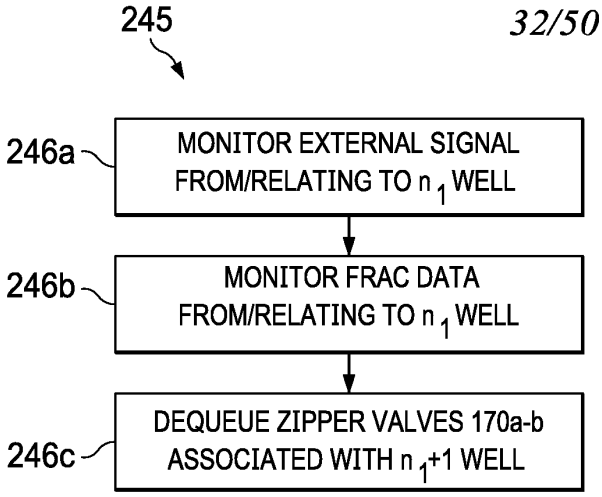


FIG. 10

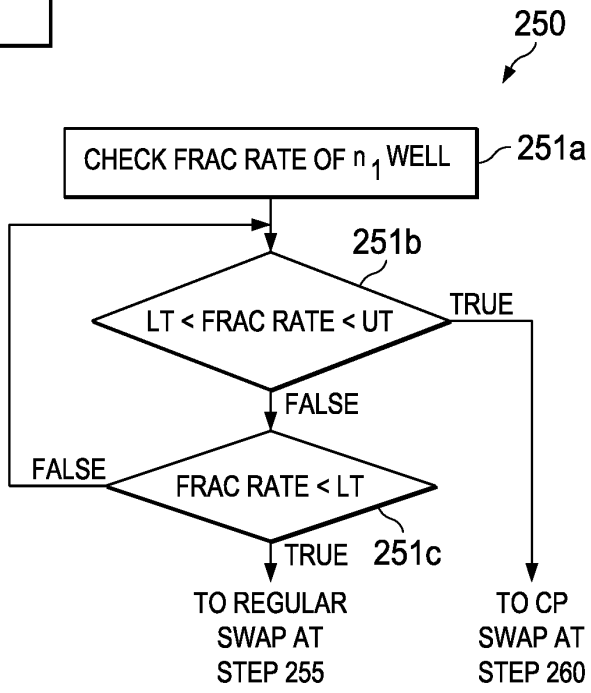


FIG. 12

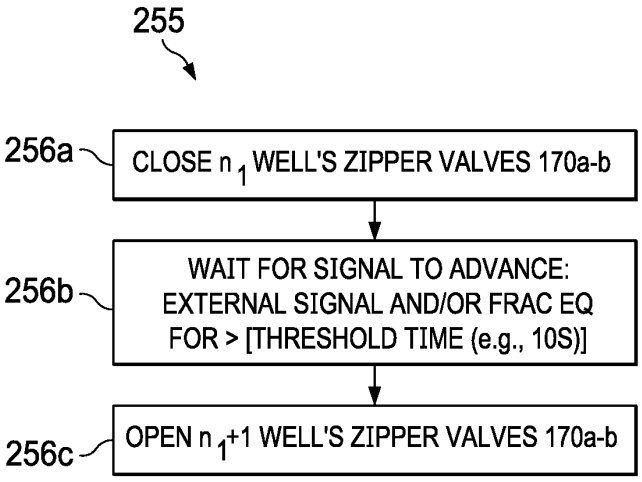


FIG. 13

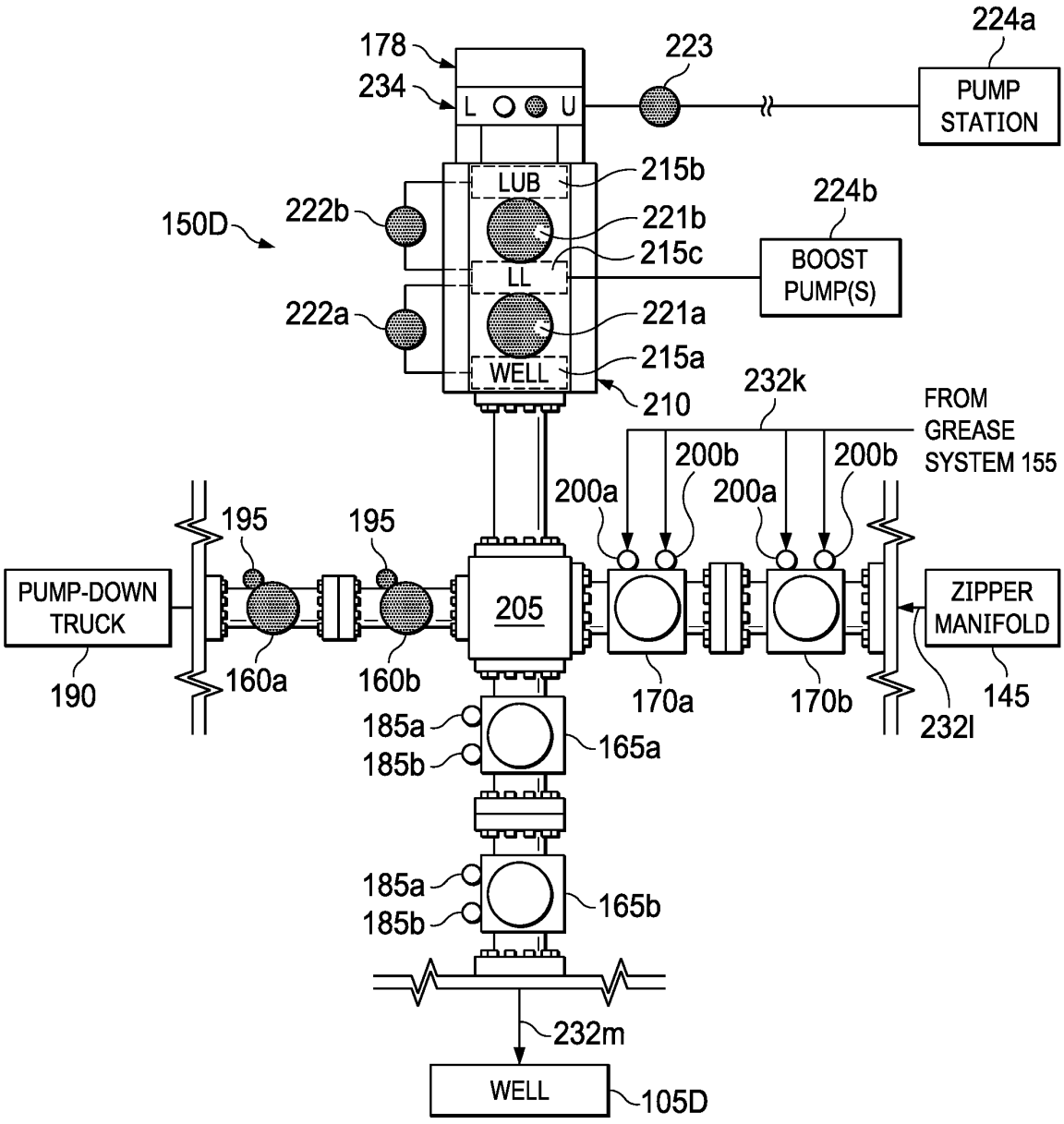

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
232k
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232l
185a
185b
165a
185a
185b
165b
232m
WELL
105D

FIG. 11

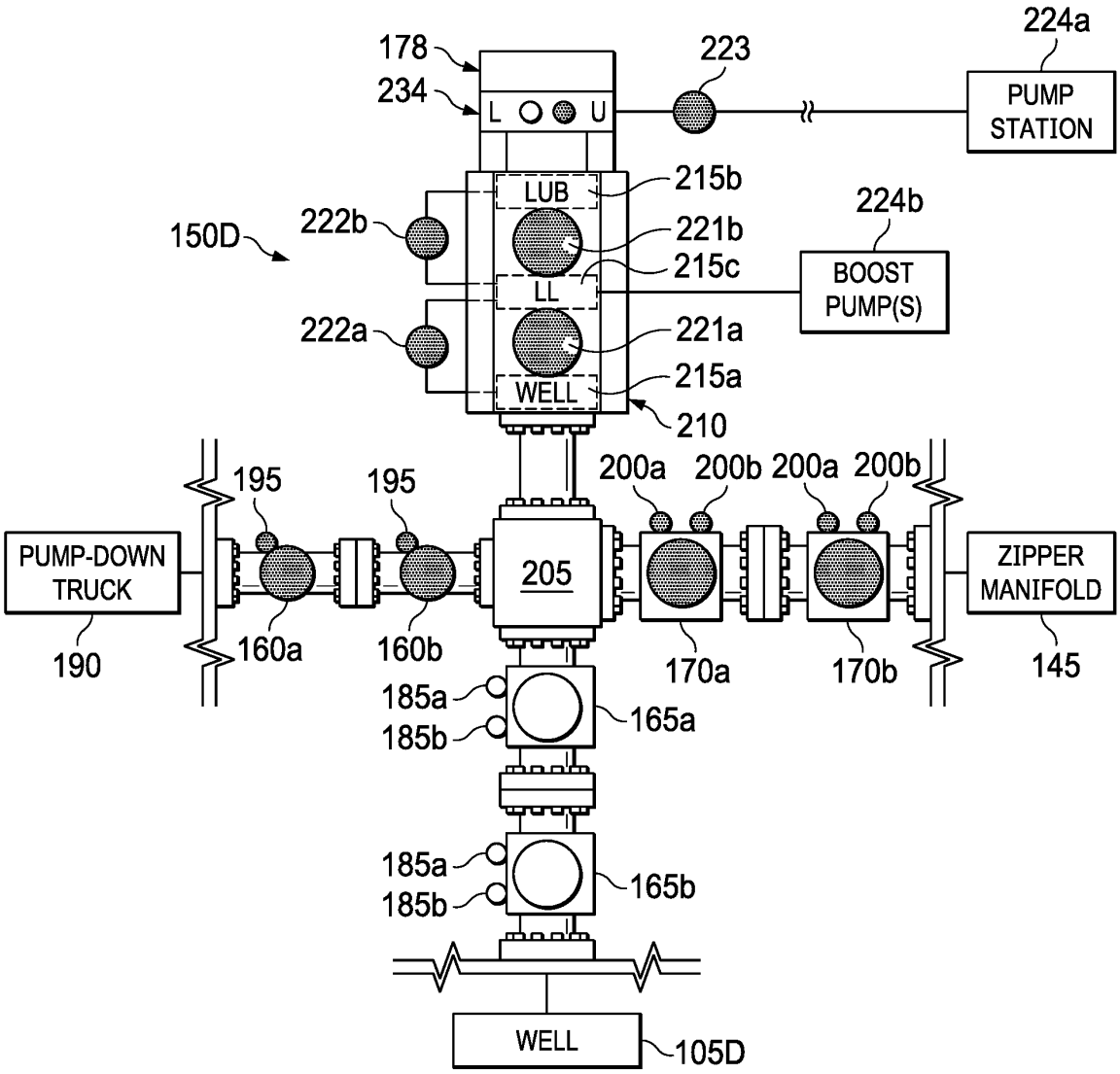

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105D

FIG. 14A

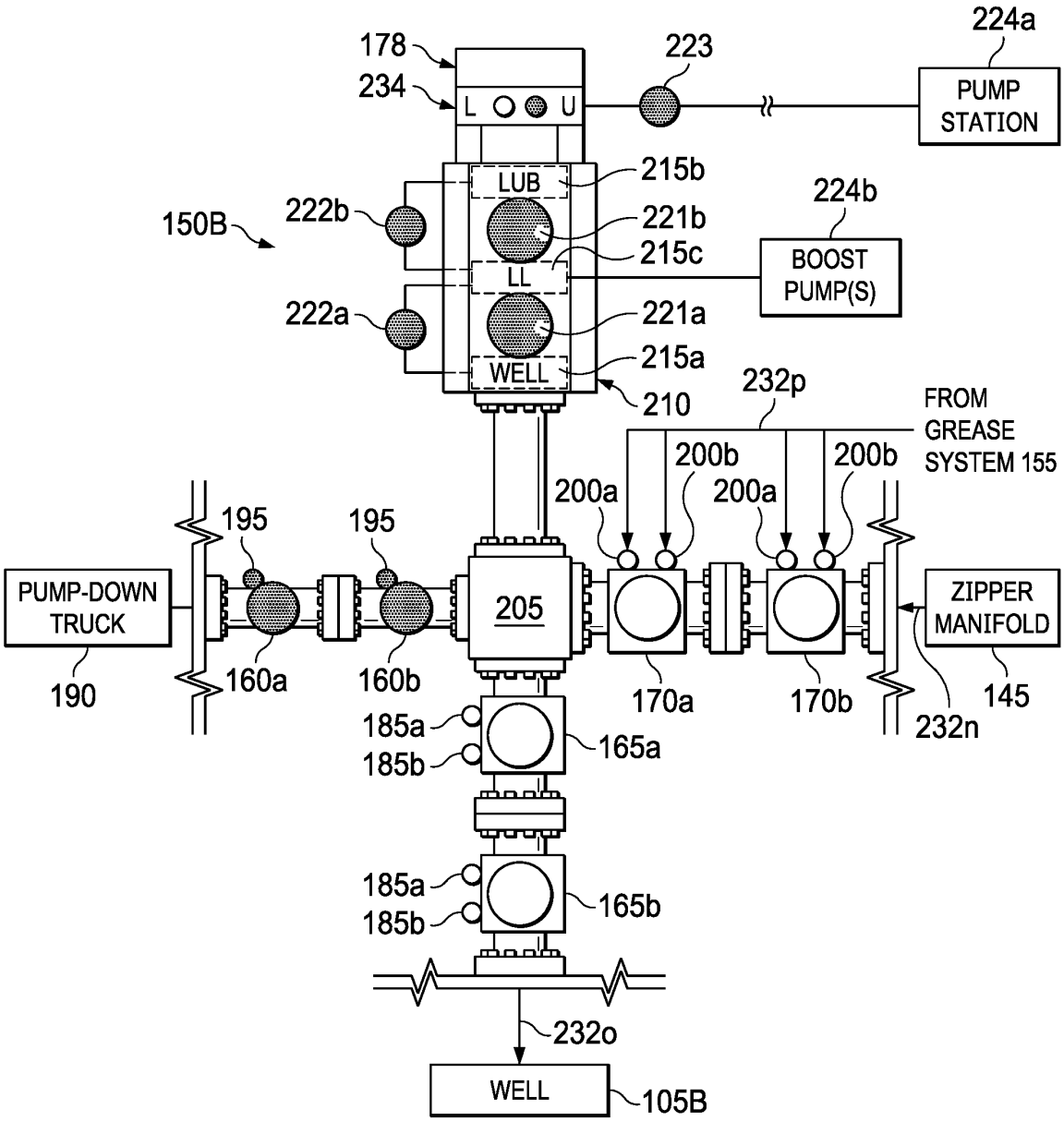

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
232p
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232n
185a
185b
165a
185a
185b
165b
232o
WELL
105B

FIG. 14B

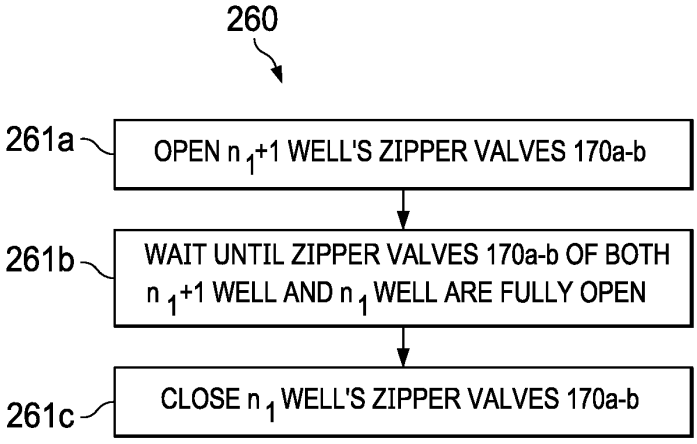


FIG. 15

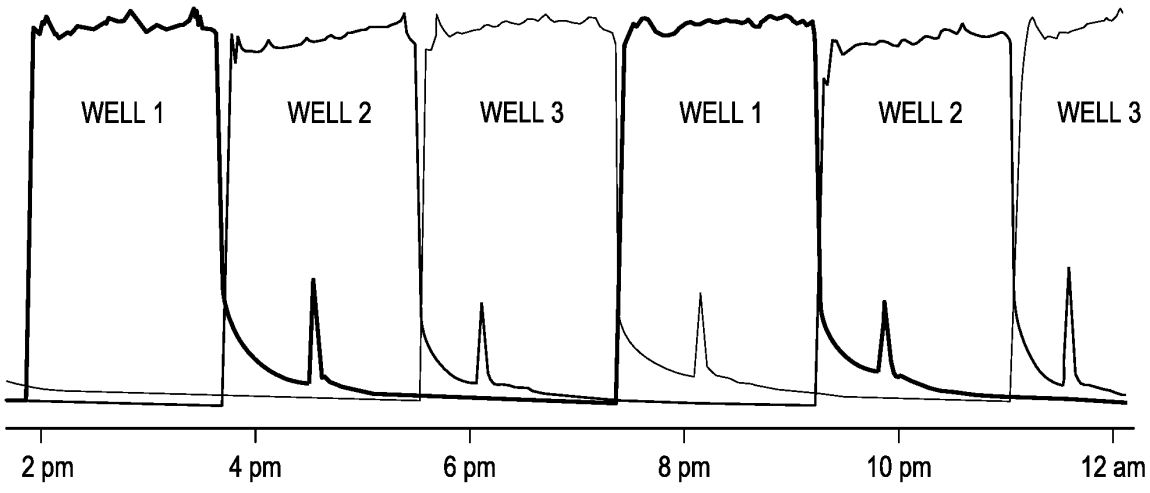


FIG. 16D

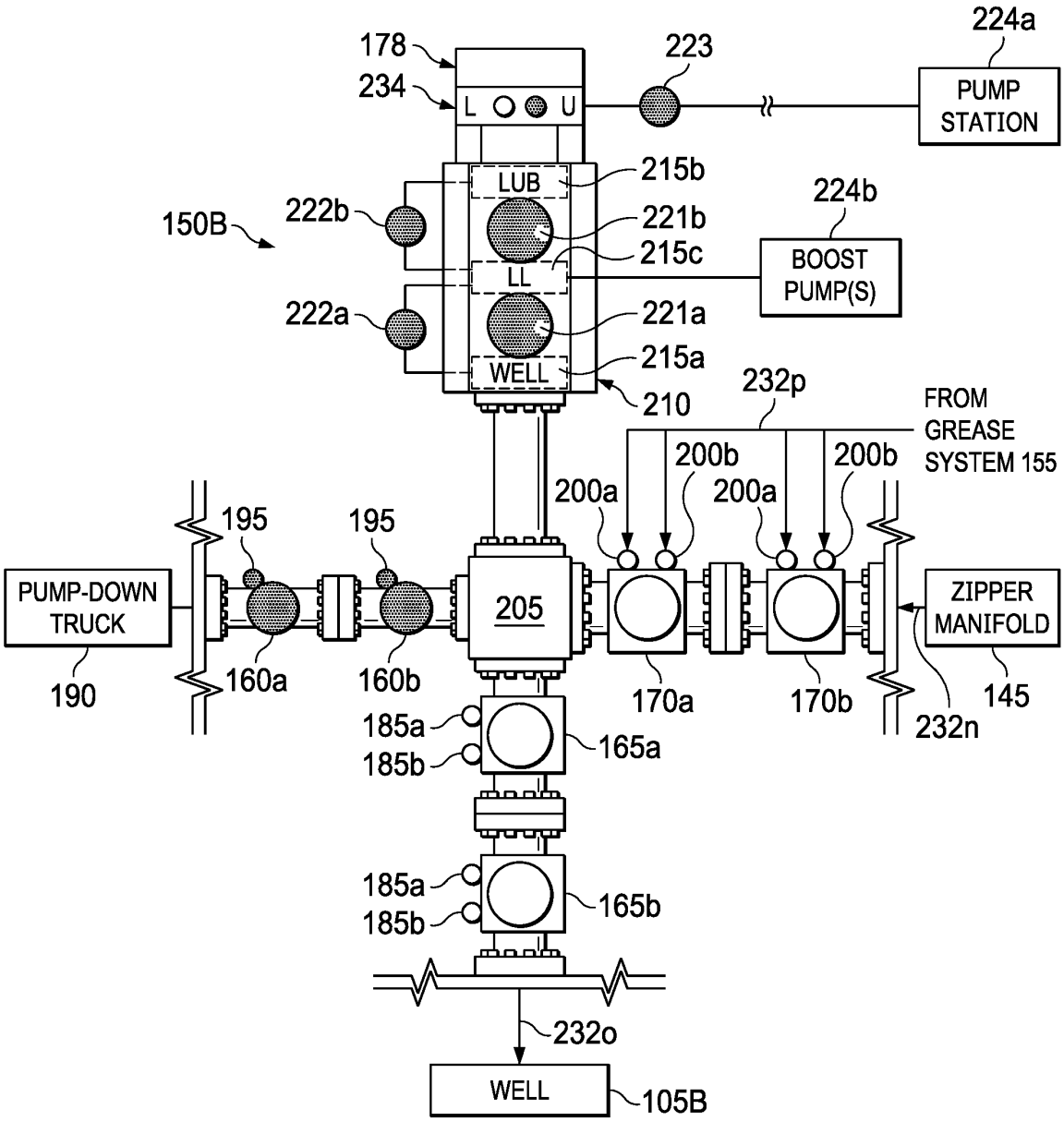

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150B
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
232p
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232n
185a
185b
165a
185a
185b
165b
232o
WELL
105B

FIG. 16A

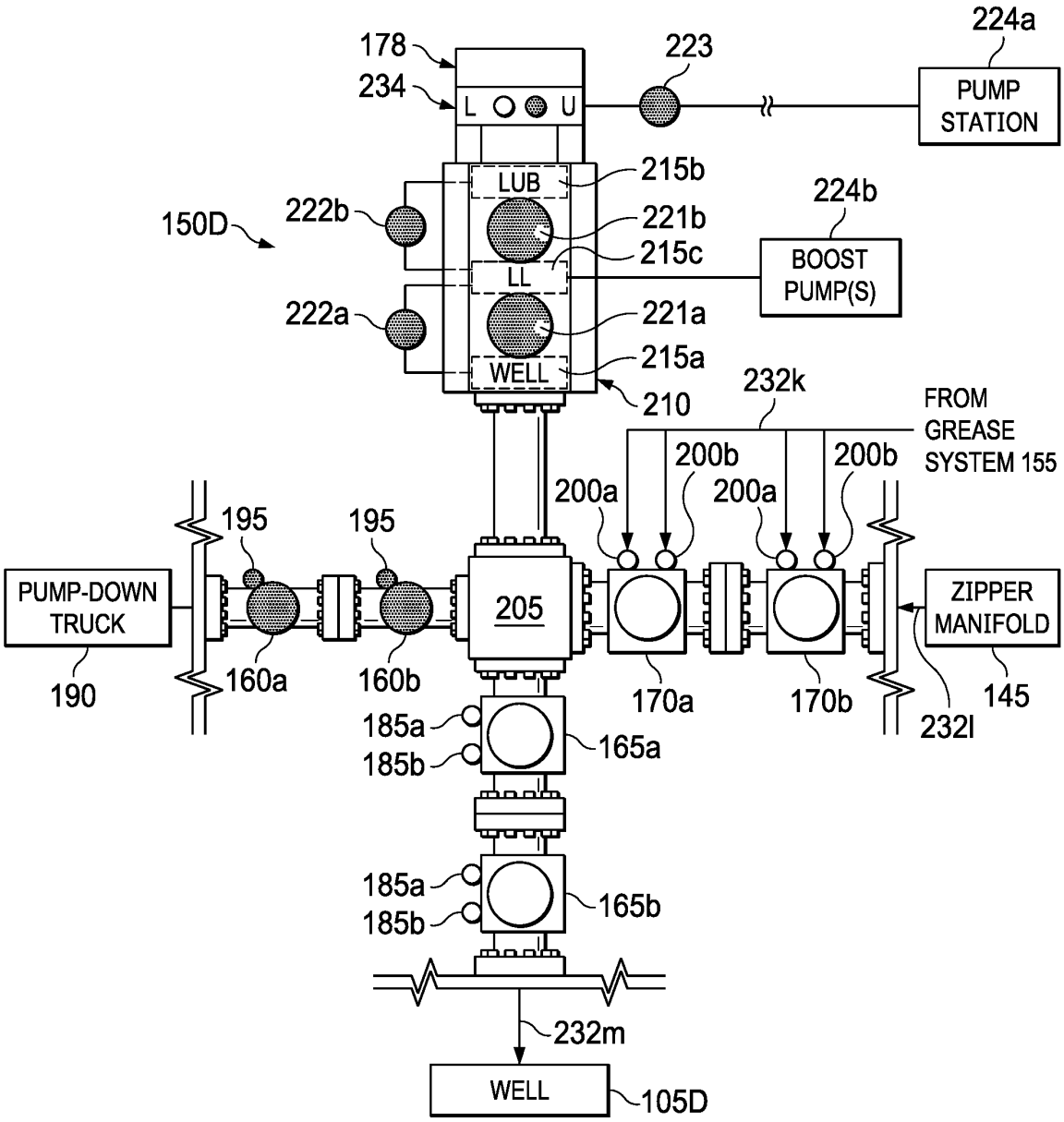

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
232k
FROM GREASE SYSTEM 155
200b
200b
200a
200a
195
195
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
232l
185a
185b
165a
185a
185b
165b
232m
WELL
105D

FIG. 16B

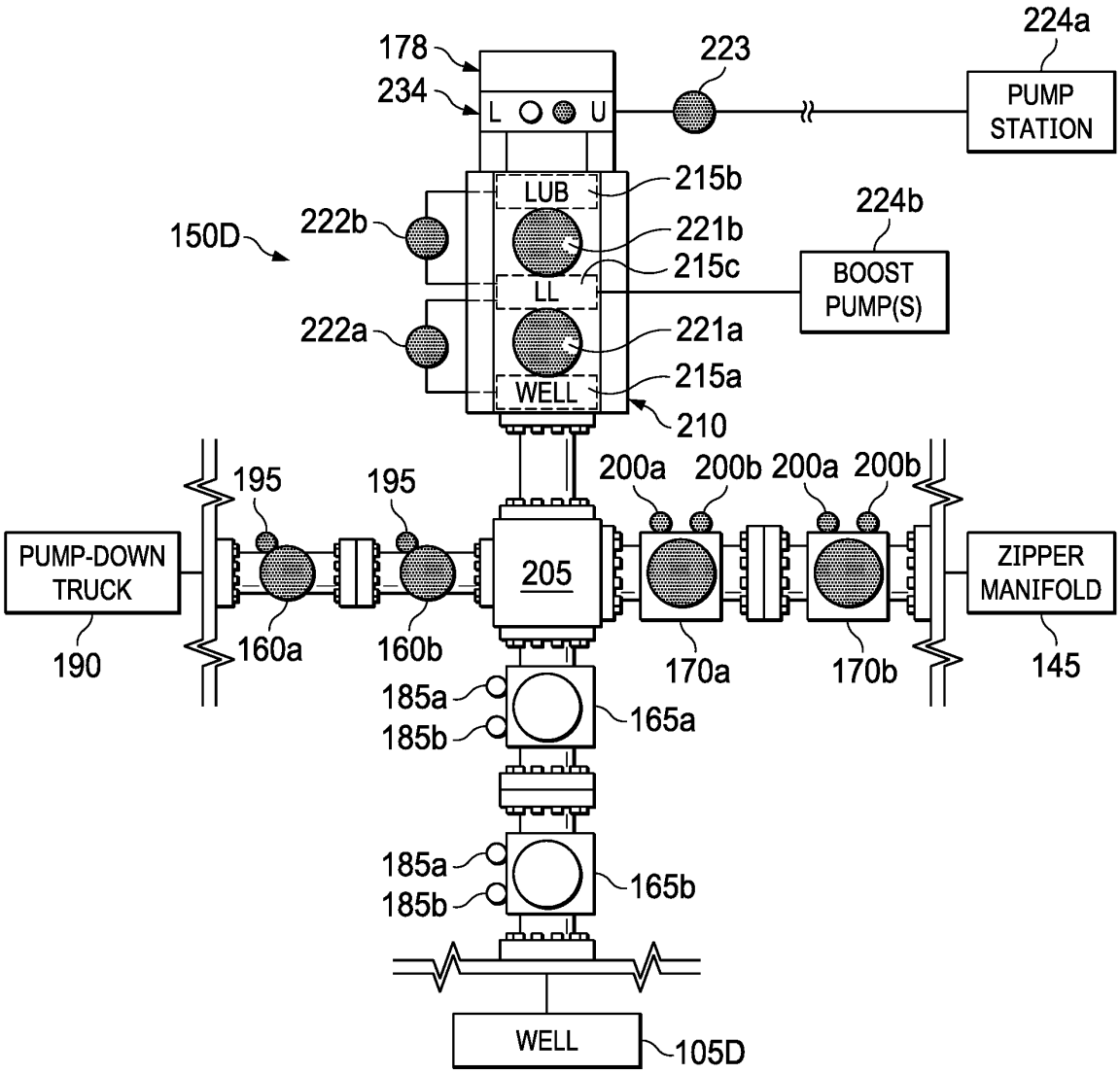

178
234
L
U
223
224a
PUMP STATION
LUB
215b
150D
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105D

FIG. 16C

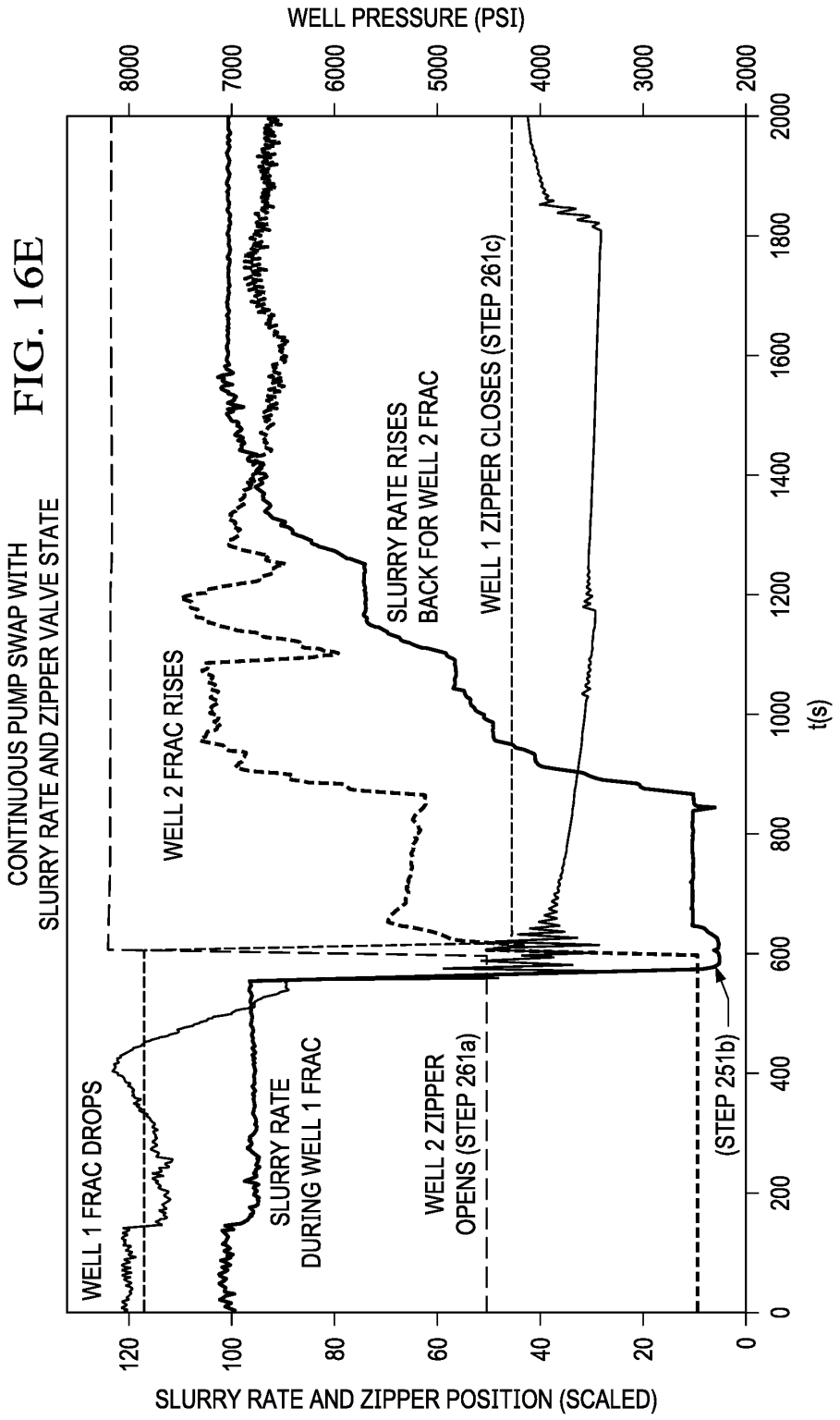

CONTINUOUS PUMP SWAP WITH
SLURRY RATE AND ZIPPER VALVE STATE
WELL PRESSURE (PSI)
8000
7000
6000
5000
4000
3000
2000
WELL 2 FRAC RISES
SLURRY RATE RISES
BACK FOR WELL 2 FRAC
WELL 1 ZIPPER CLOSES (STEP 261c)
WELL 1 FRAC DROPS
SLURRY RATE
DURING WELL 1 FRAC
WELL 2 ZIPPER
OPENS (STEP 261a)
(STEP 251b)
120
100
80
60
40
20
0
SLURRY RATE AND ZIPPER POSITION (SCALED)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
t(s)

FIG. 16E

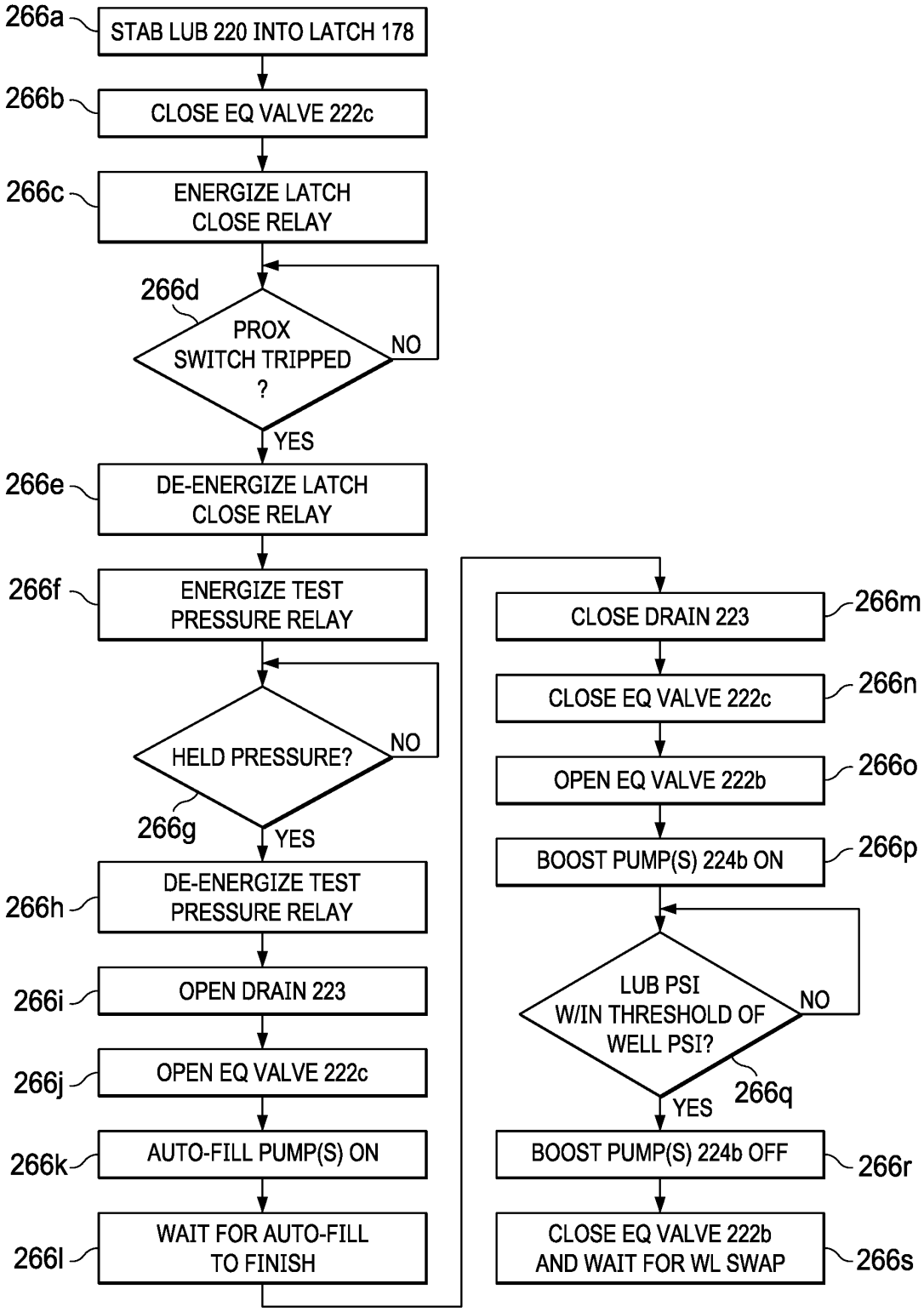

266a
STAB LUB 220 INTO LATCH 178
266b
CLOSE EQ VALVE 222c
266c
ENERGIZE LATCH CLOSE RELAY
266d
PROX SWITCH TRIPPED ?
NO
YES
266e
DE-ENERGIZE LATCH CLOSE RELAY
266f
ENERGIZE TEST PRESSURE RELAY
HELD PRESSURE?
NO
266g
YES
266h
DE-ENERGIZE TEST PRESSURE RELAY
266i
OPEN DRAIN 223
266j
OPEN EQ VALVE 222c
266k
AUTO-FILL PUMP(S) ON
266l
WAIT FOR AUTO-FILL TO FINISH
266m
CLOSE DRAIN 223
266n
CLOSE EQ VALVE 222c
266o
OPEN EQ VALVE 222b
266p
BOOST PUMP(S) 224b ON
LUB PSI W/IN THRESHOLD OF WELL PSI?
NO
YES
266q
266r
BOOST PUMP(S) 224b OFF
266s
CLOSE EQ VALVE 222b AND WAIT FOR WL SWAP

FIG. 17

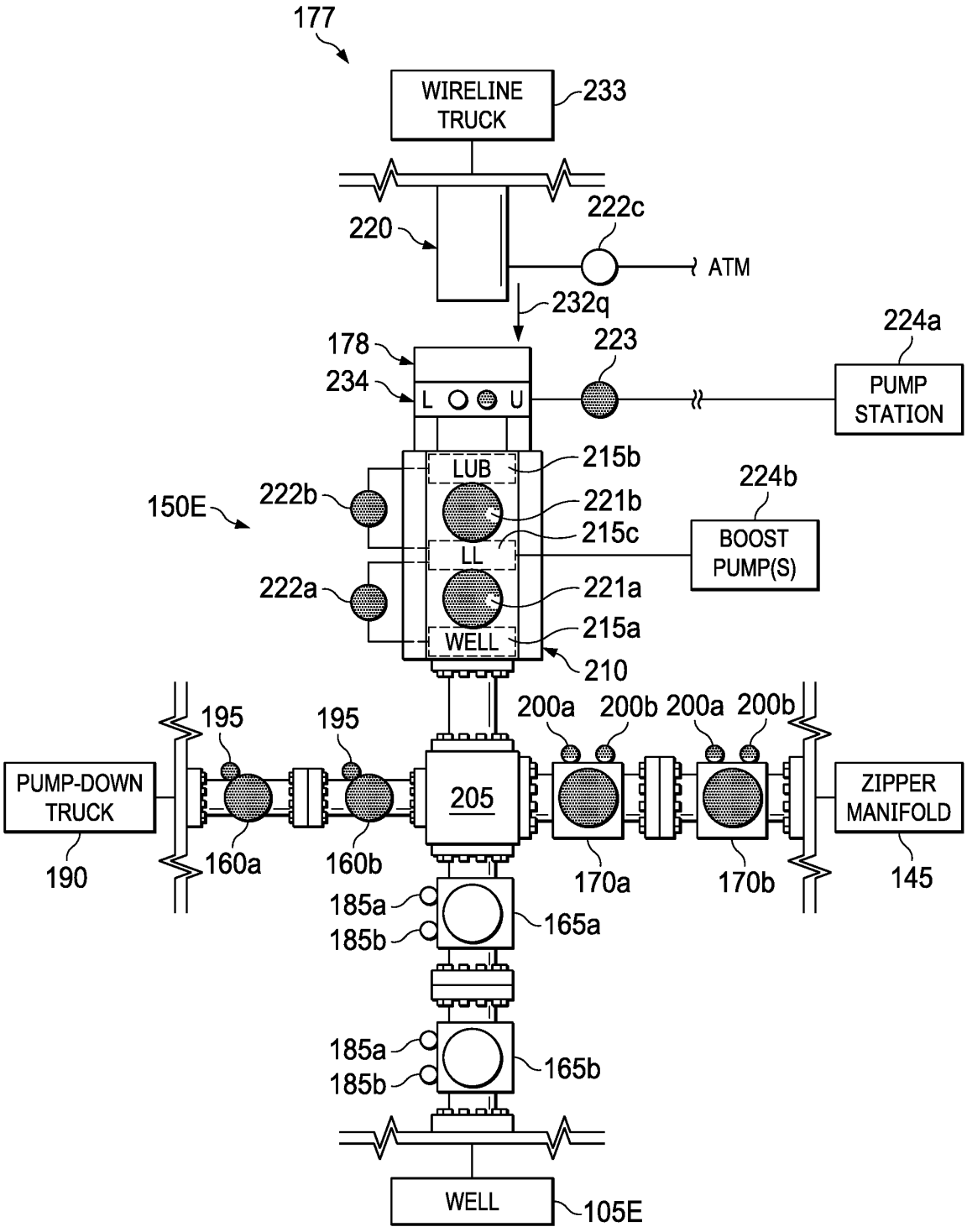

177
WIRELINE TRUCK
233
220
222c
ATM
232q
178
234
L
U
223
224a
PUMP STATION
LUB
215b
150E
222b
221b
215c
224b
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18A

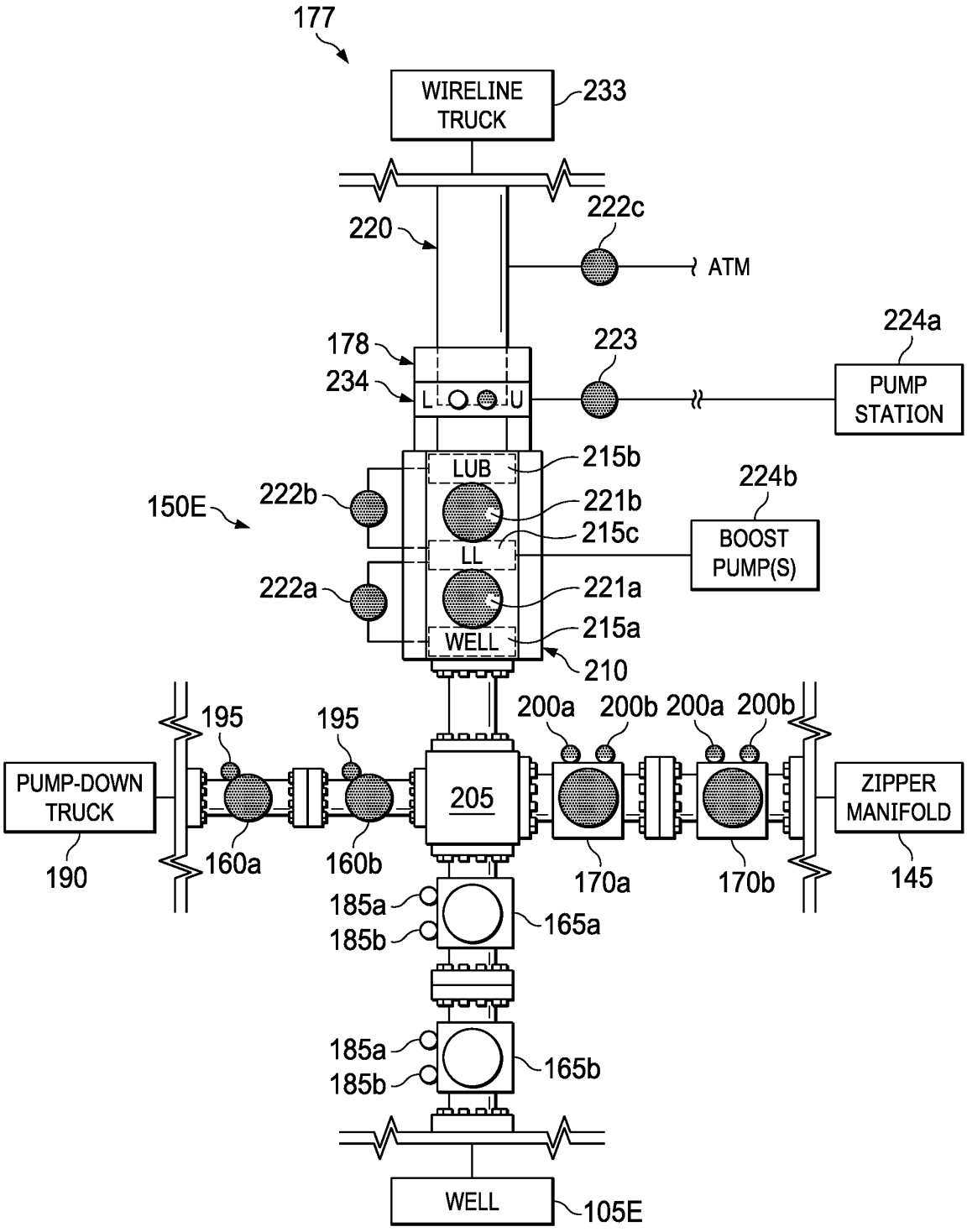

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
WELL
215a
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18B

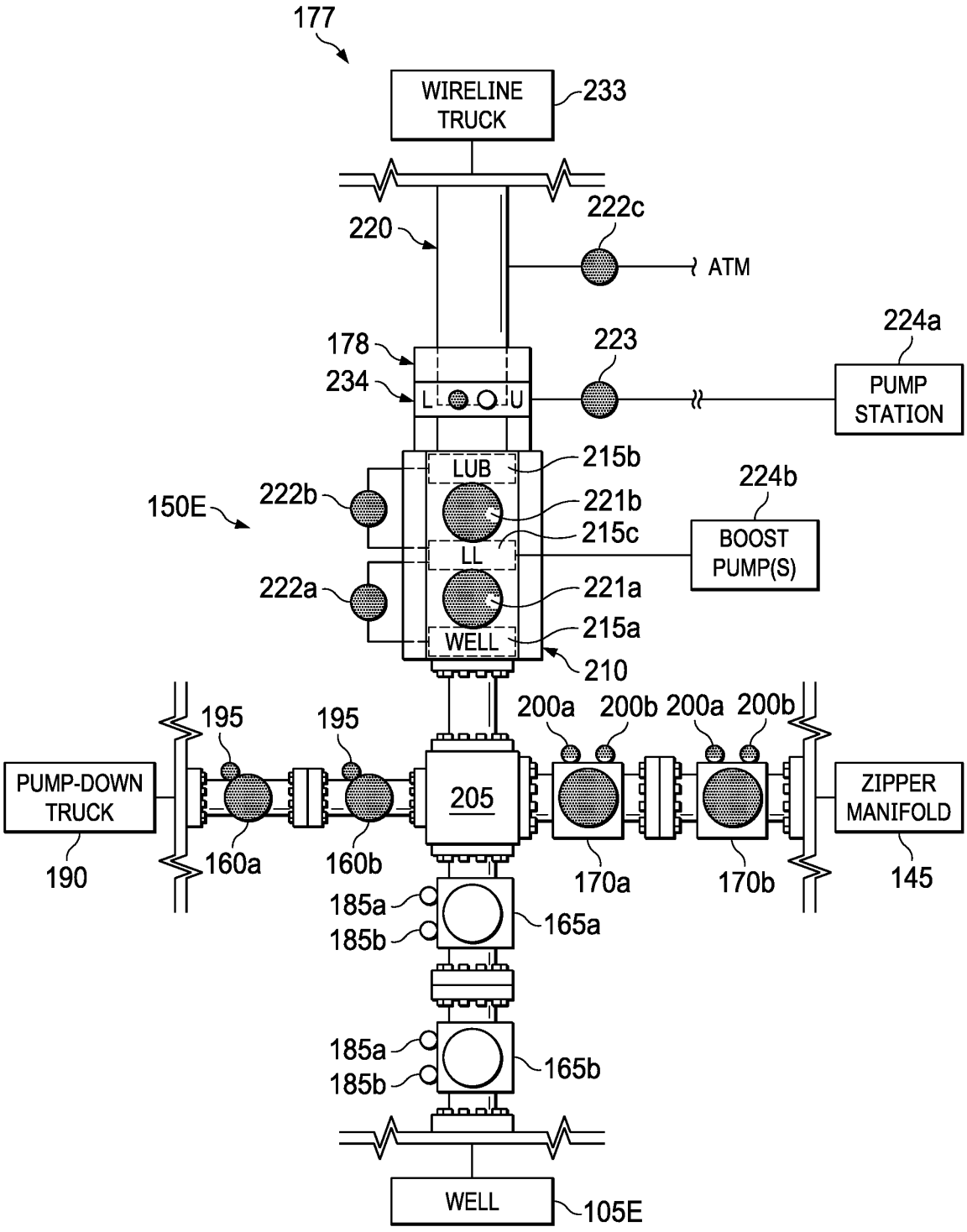

177
WIRELINE TRUCK
233
220
222c
ATM
224a
PUMP STATION
178
234
223
L
U
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18C

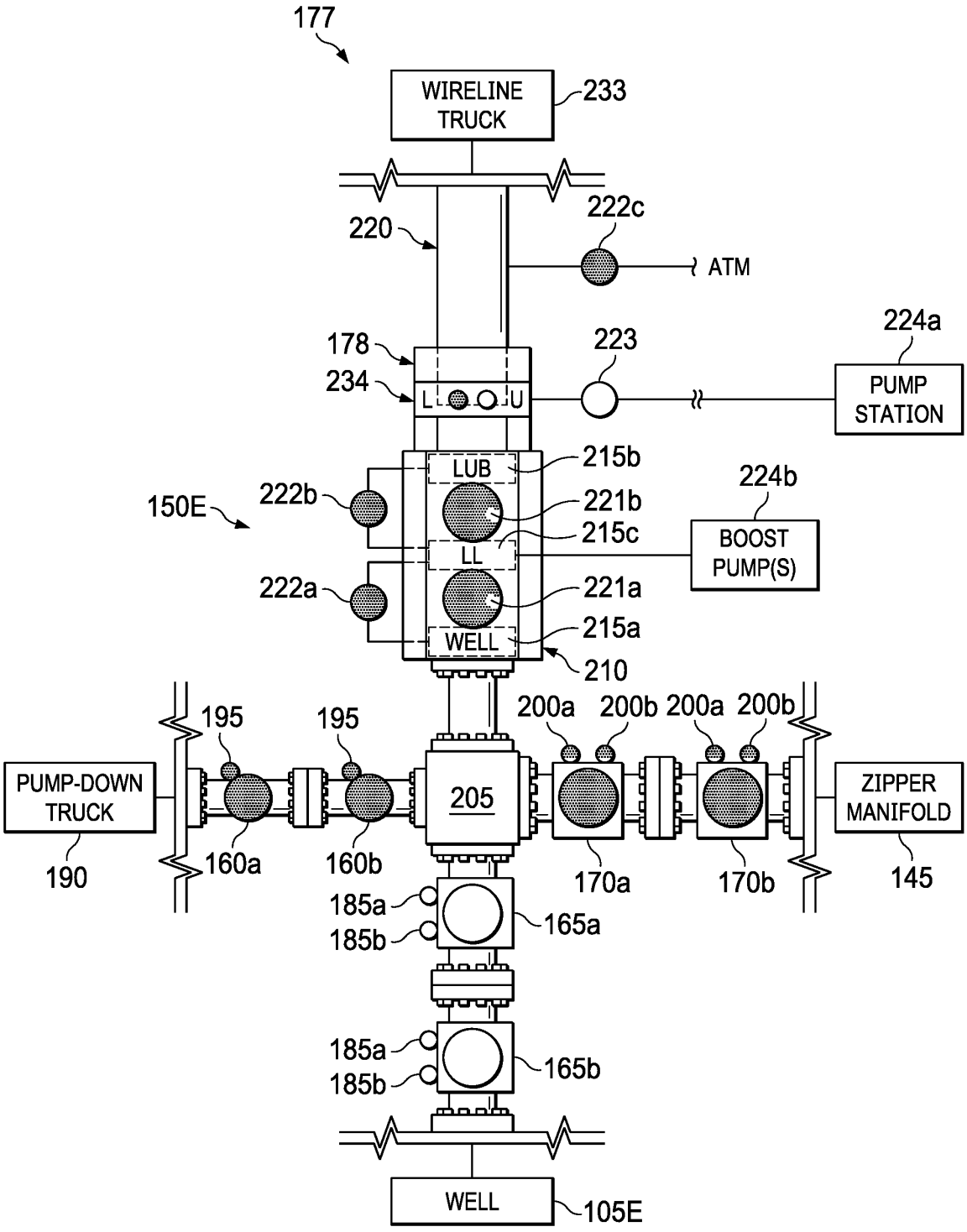

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18D

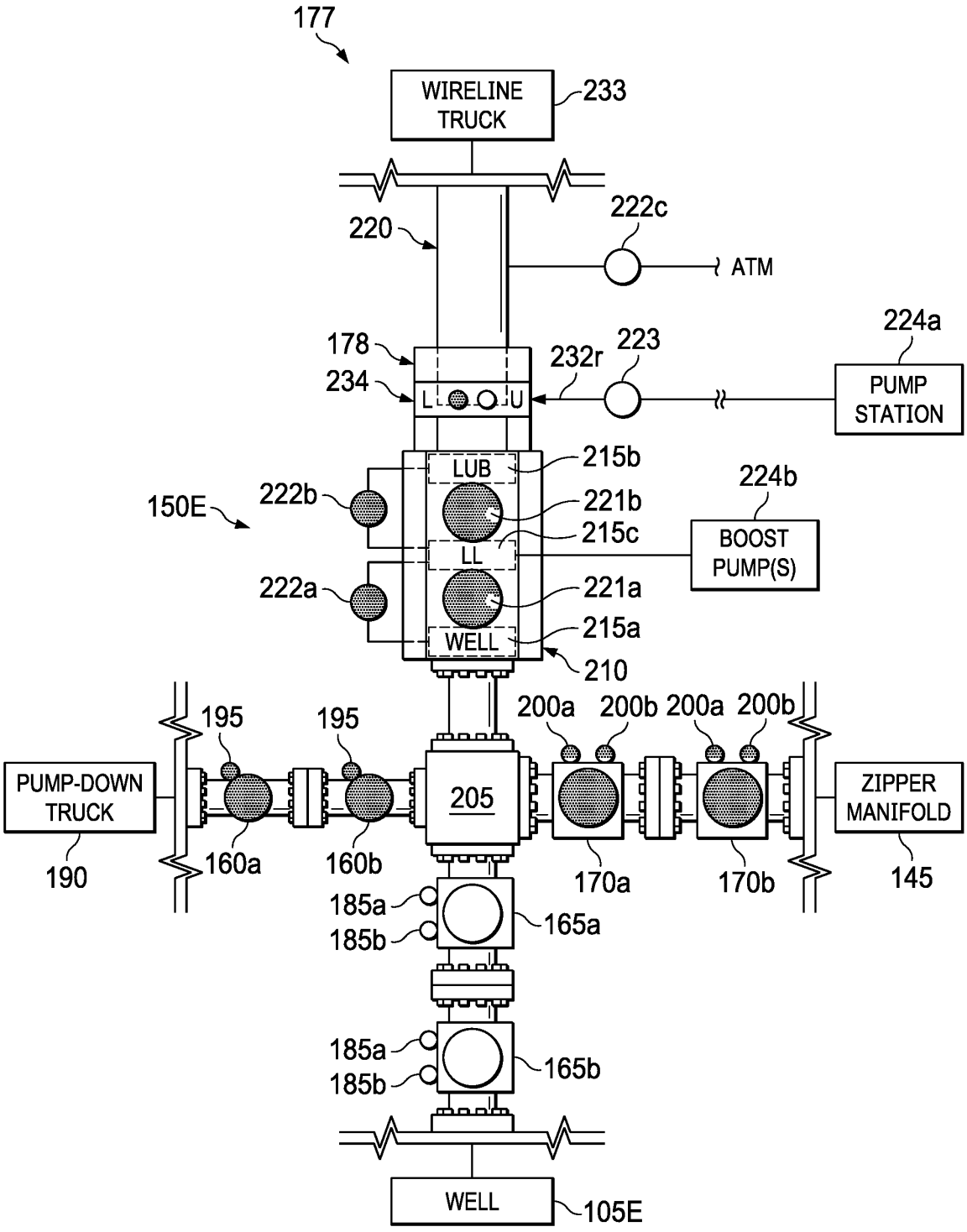

177
WIRELINE TRUCK
233
220
222c
ATM
224a
PUMP STATION
178
234
232r
223
L
U
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18E

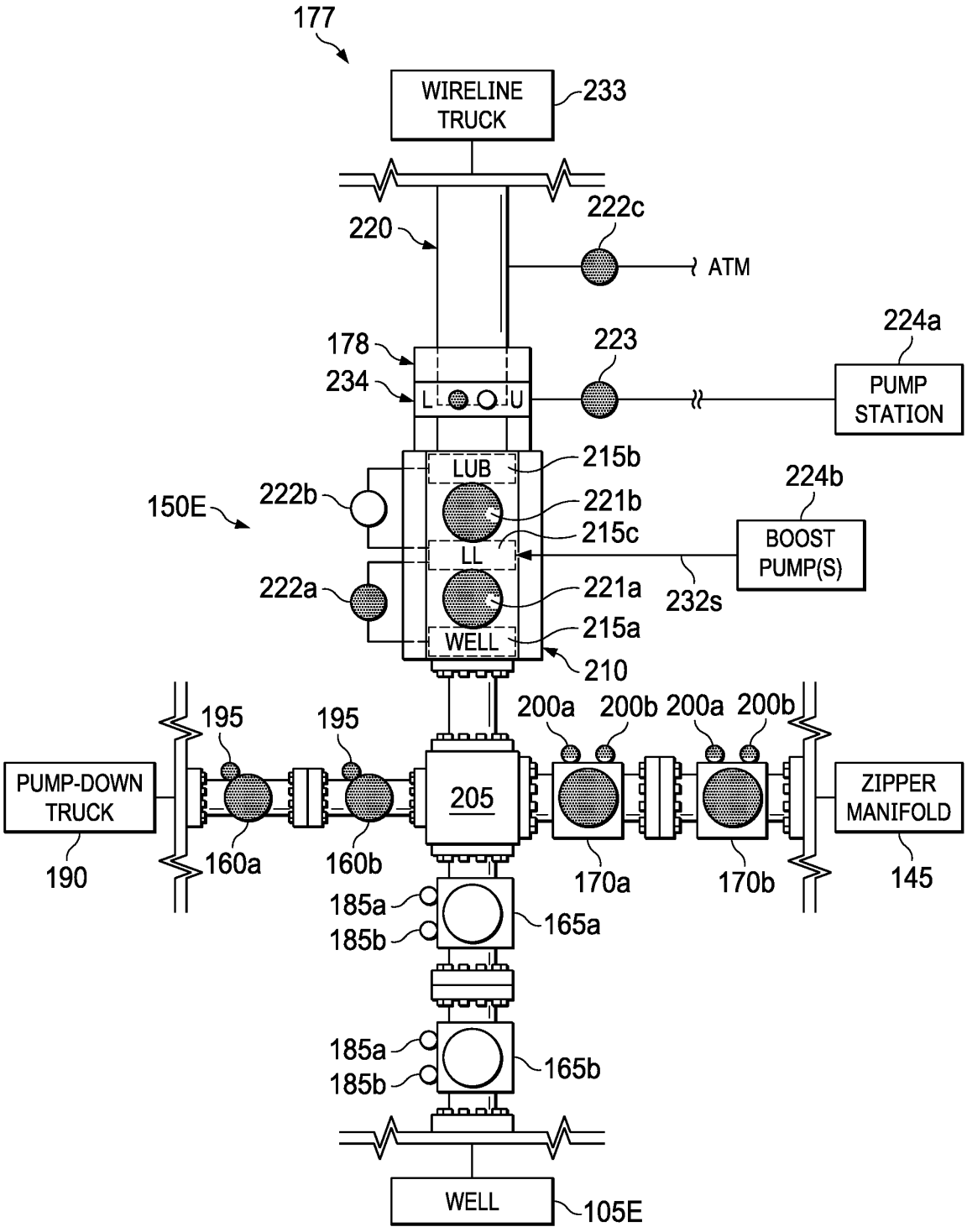

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
223
234
L
U
PUMP STATION
LUB
215b
224b
150E
222b
221b
215c
LL
BOOST PUMP(S)
222a
221a
232s
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18F

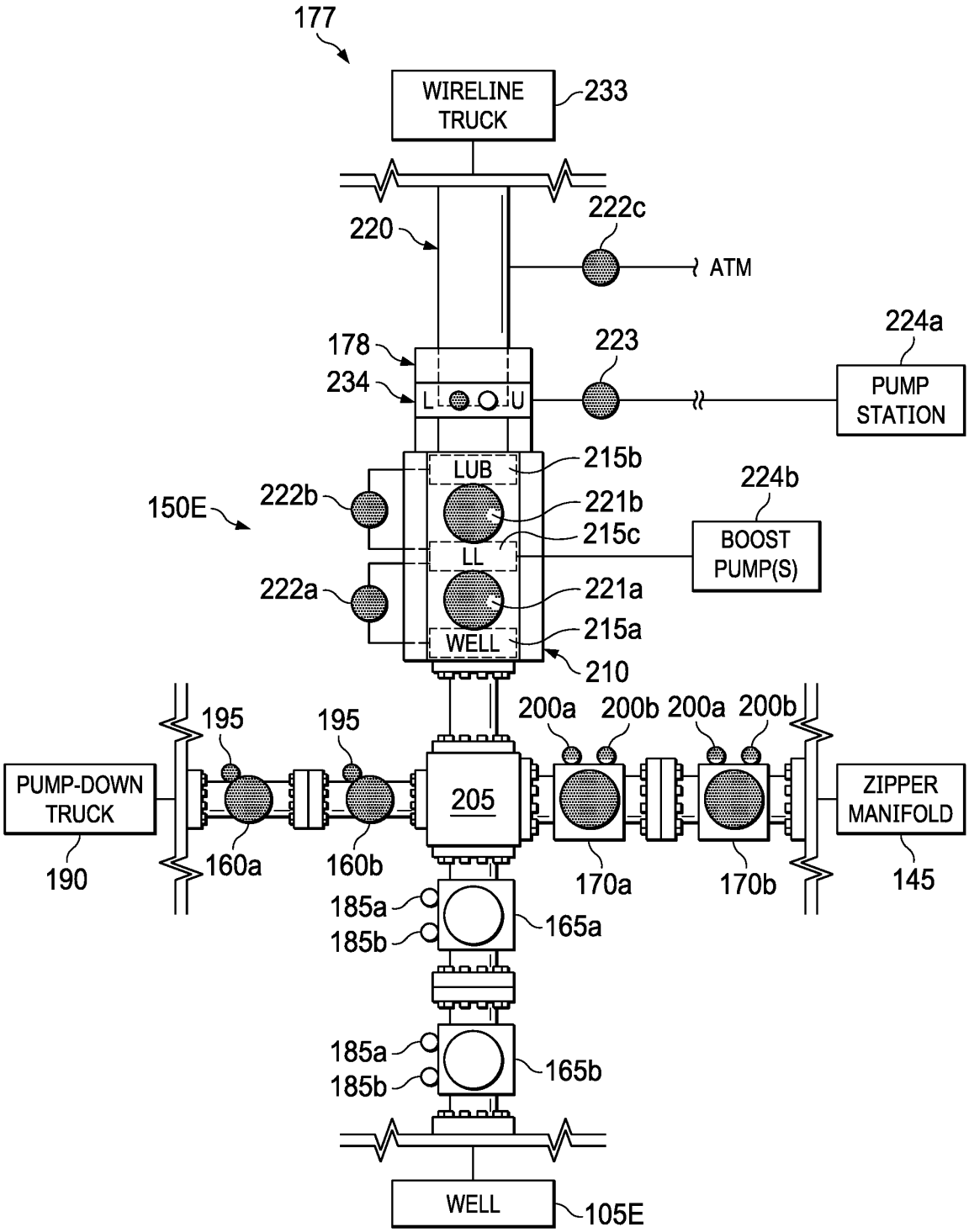

177
WIRELINE TRUCK
233
220
222c
ATM
224a
178
234
223
L
U
PUMP STATION
LUB
215b
224b
150E
222b
221b
215c
BOOST PUMP(S)
LL
222a
221a
215a
WELL
210
195
195
200a
200b
200a
200b
PUMP-DOWN TRUCK
205
ZIPPER MANIFOLD
190
160a
160b
170a
170b
145
185a
185b
165a
185a
185b
165b
WELL
105E

FIG. 18G

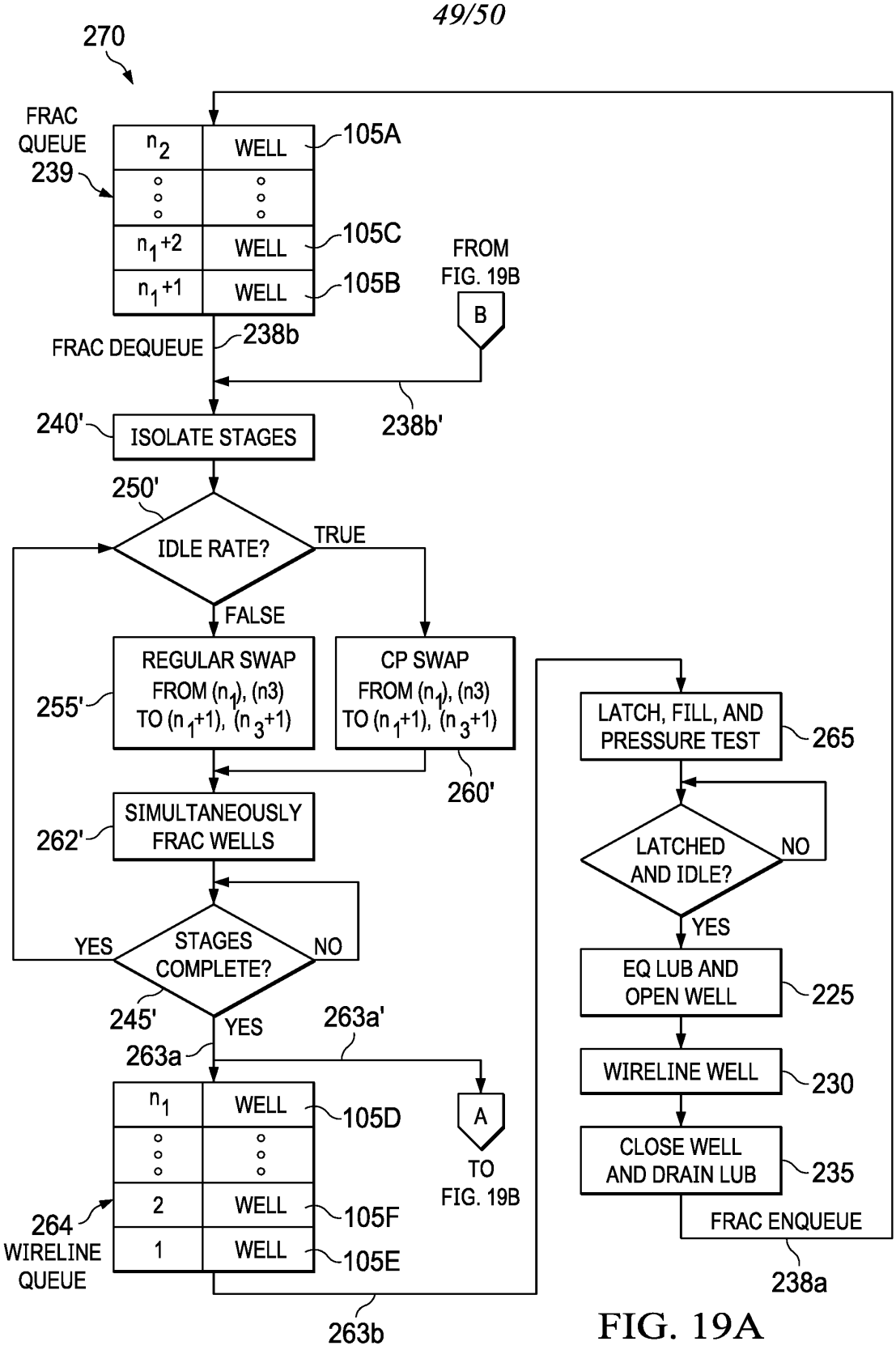

270
FRAC QUEUE
239
n_2
WELL
105A
n_1+2
WELL
105C
n_1+1
WELL
105B
FROM FIG. 19B
B
FRAC DEQUEUE
238b
238b'
240'
ISOLATE STAGES
250'
IDLE RATE?
TRUE
FALSE
255'
REGULAR SWAP FROM (n_1), (n3) TO (n_1+1), (n_3+1)
CP SWAP FROM (n_1), (n3) TO (n_1+1), (n_3+1)
260'
262'
SIMULTANEOUSLY FRAC WELLS
YES
STAGES COMPLETE?
NO
245'
YES
263a'
263a
n_1
WELL
105D
A
TO FIG. 19B
264
WIRELINE QUEUE
2
WELL
105F
1
WELL
105E
263b
LATCH, FILL, AND PRESSURE TEST
265
LATCHED AND IDLE?
NO
YES
EQ LUB AND OPEN WELL
225
WIRELINE WELL
230
CLOSE WELL AND DRAIN LUB
235
FRAC ENQUEUE
238a

FIG. 19A

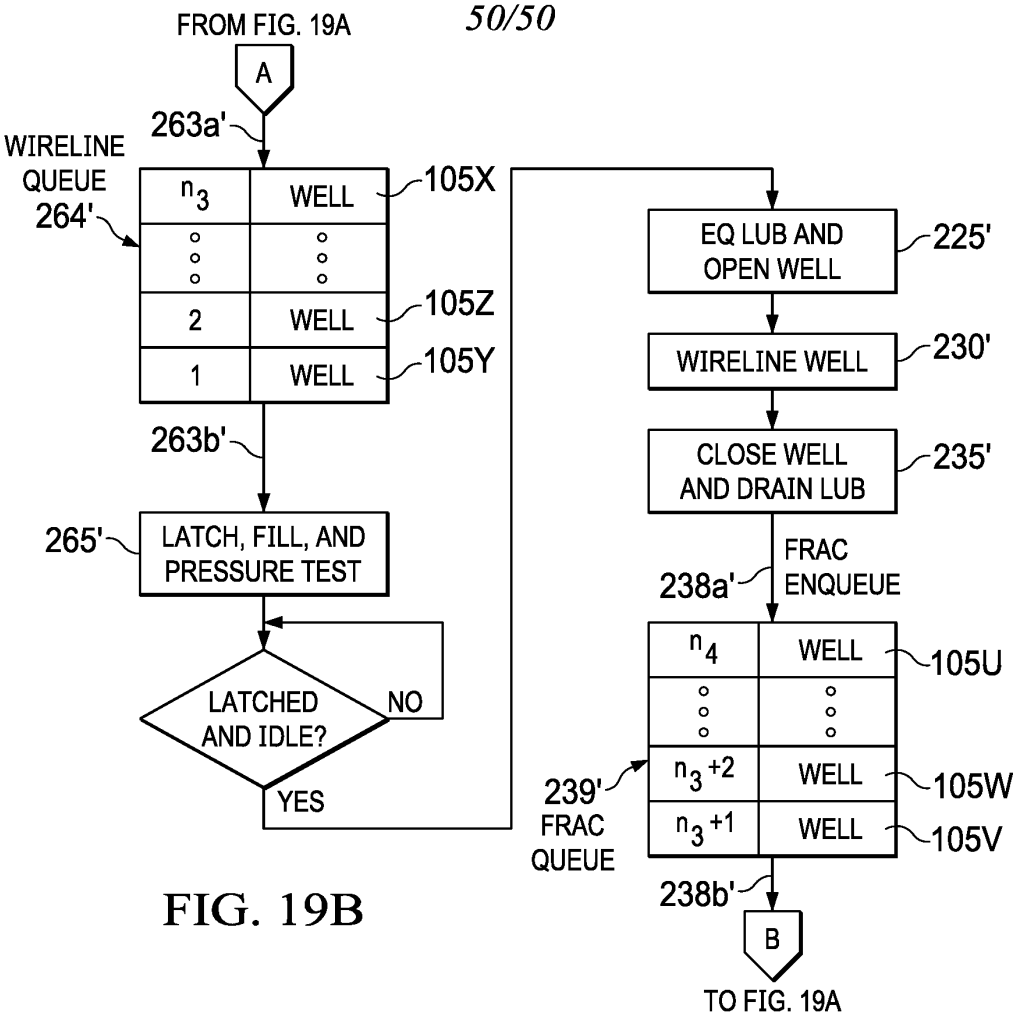


FIG. 19B

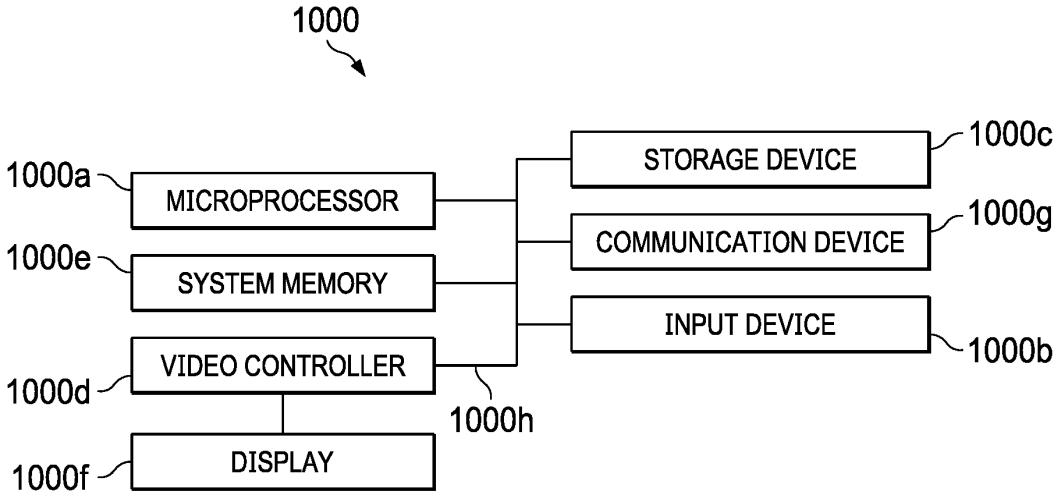


FIG. 20

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Filer:	Zachary Arnold Halbur/Q Dismuke
Attorney Docket Number:	57959.12US01

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2100	2100
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	10	50	500
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	1	240	240

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous-Filing:				
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**3740**

Electronic Acknowledgement Receipt	
EFS ID:	43380588
Application Number:	17388716
International Application Number:	
Confirmation Number:	9925
Title of Invention:	HYDRAULIC FRACTURING PLAN AND EXECUTION OF SAME
First Named Inventor/Applicant Name:	Jordan Kuehn
Customer Number:	27683
Filer:	Zachary Arnold Halbur/Q Dismuke
Filer Authorized By:	Zachary Arnold Halbur
Attorney Docket Number:	57959.12US01
Receipt Date:	29-JUL-2021
Filing Date:	
Time Stamp:	15:50:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3740
RAM confirmation Number	E20217SF54321902
Deposit Account	081394
Authorized User	Q Dismuke
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	57959-12US01-Track-1-Request.pdf	123294 4fb0aa5470b16091320f9ae9a7e69c44eaf067e3	no	2
Warnings:					
Information:					
2	Application Data Sheet	57959-12US01-ADS.pdf	1257225 6c15fc984527760d4954b68a7ed7a00e049d427d	no	11
Warnings:					
Information:					
3		57959-12US01-Application.pdf	217221 683c9e5c8b3d6084d4a913afd54246f94b4c67c6	yes	46

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	35
Claims	36	45
Abstract	46	46

Warnings:					
Information:					
4	Drawings-only black and white line drawings	57959-12US01-Drawings.pdf	2477314 9095cb3cc31a3b7168a7051b0d42346493850aa4	no	50
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	55255 7e9fa8571474b4553c8f3afee8c3ac8043c14746	no	2

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
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