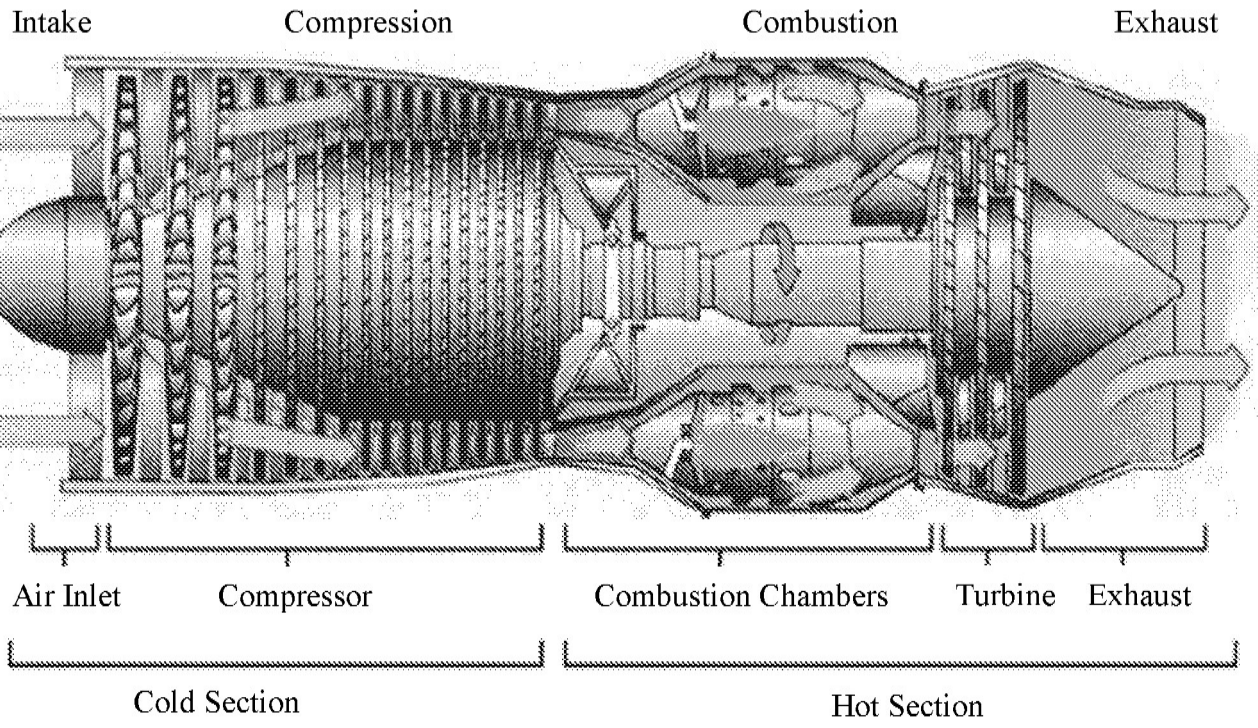
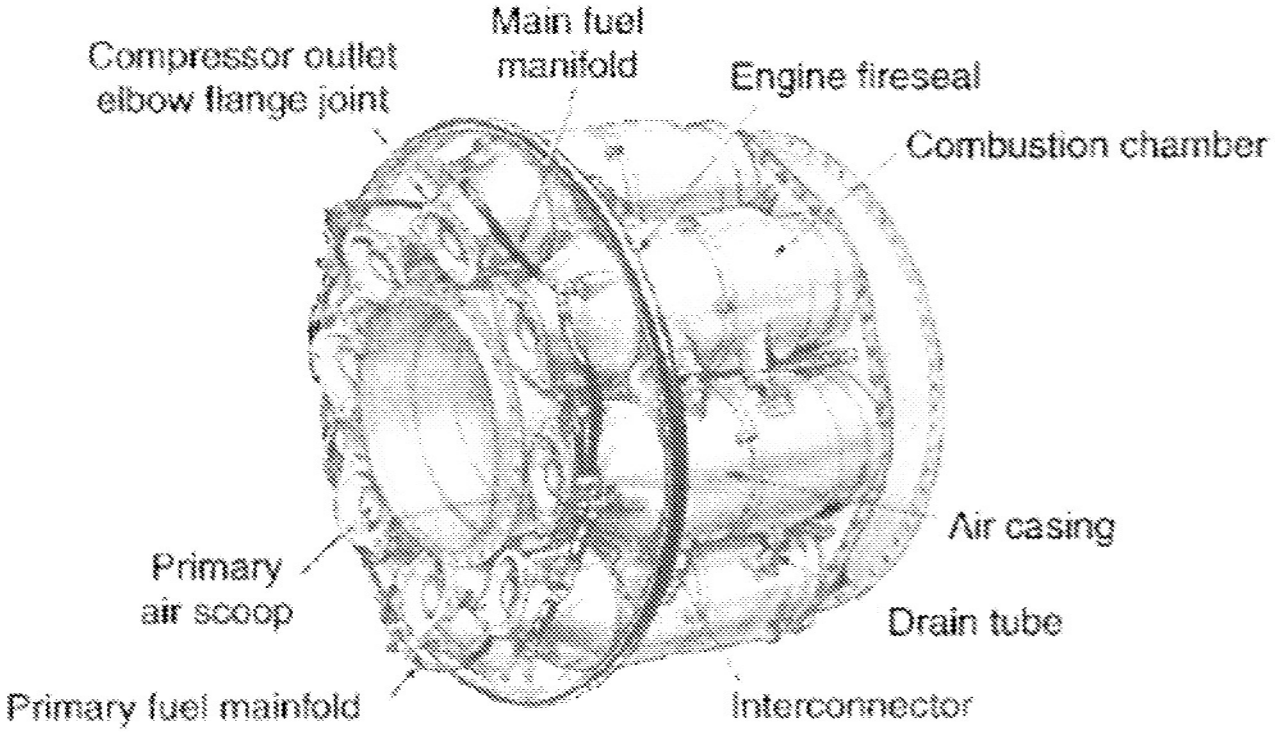


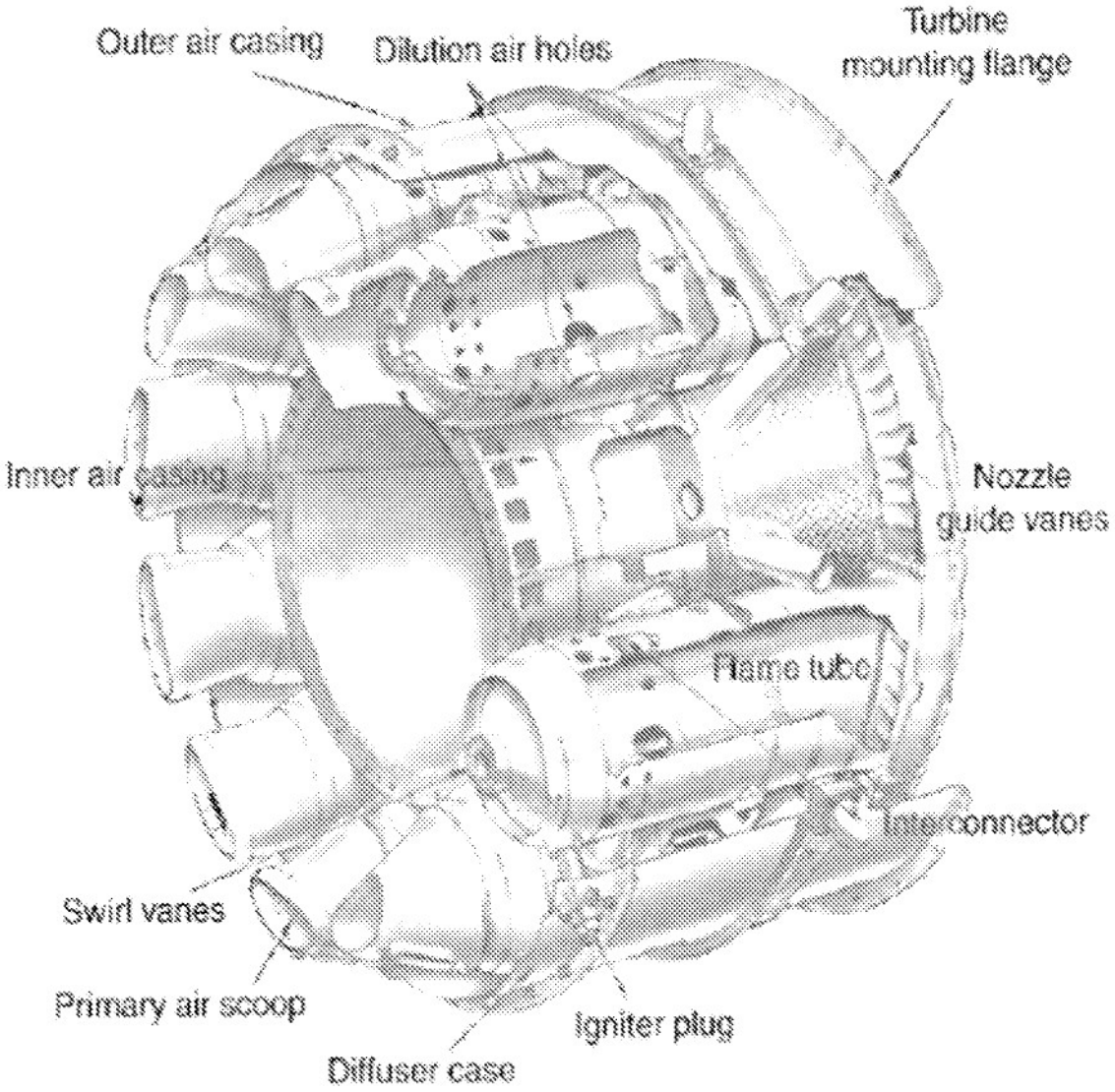
PRIOR ART

FIG. 1



PRIOR ART

FIG. 2



PRIOR ART

FIG. 3

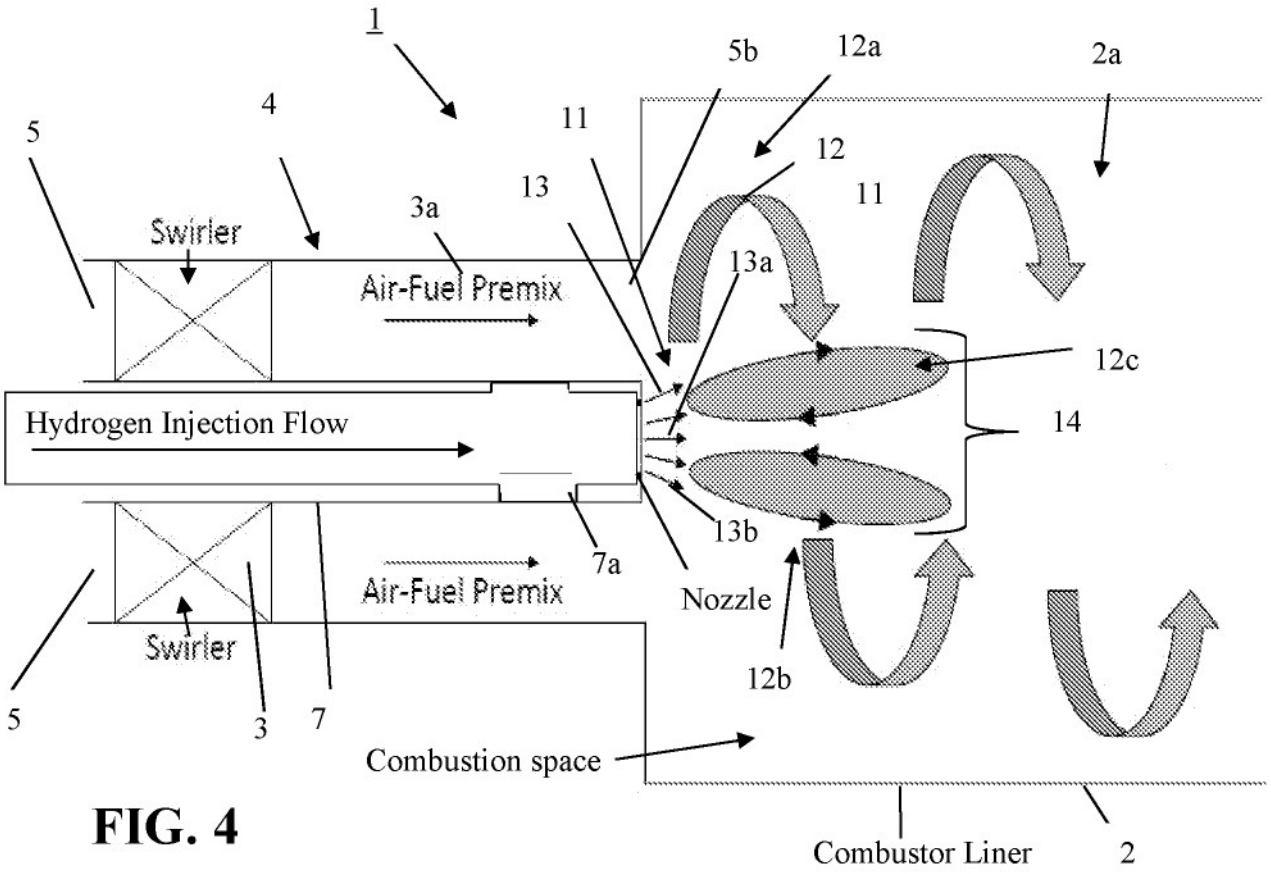

1
5b
12a
2a
4
11
5
12
13
11
3a
Swirler
Air-Fuel Premix
13a
12c
Hydrogen Injection Flow
14
13b
7a
Air-Fuel Premix
Nozzle
Swirler
12b
5
3
7
Combustion space
Combustor Liner
2

FIG. 4

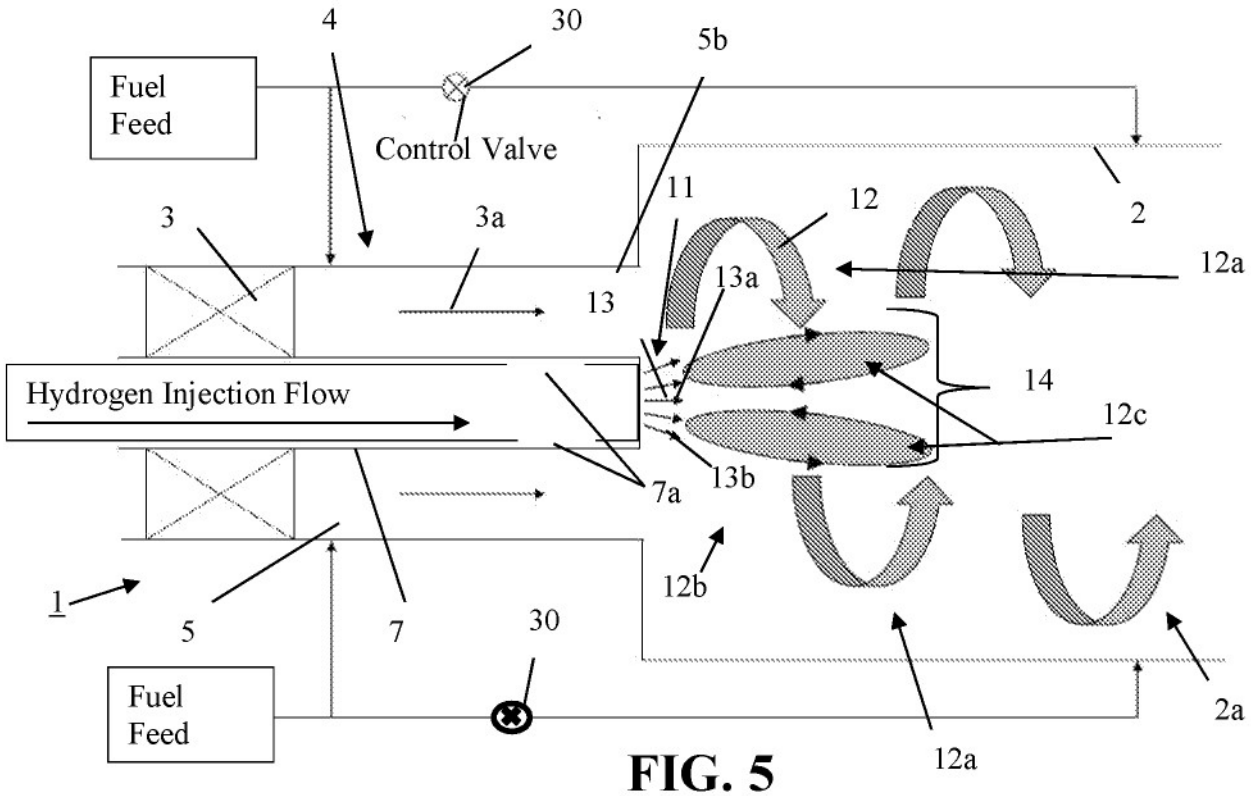

4
30
5b
Fuel Feed
Control Valve
2
11
12
3
3a
12a
13a
13
14
Hydrogen Injection Flow
12c
13b
7a
12b
1
5
7
30
2a
Fuel Feed
12a

FIG. 5

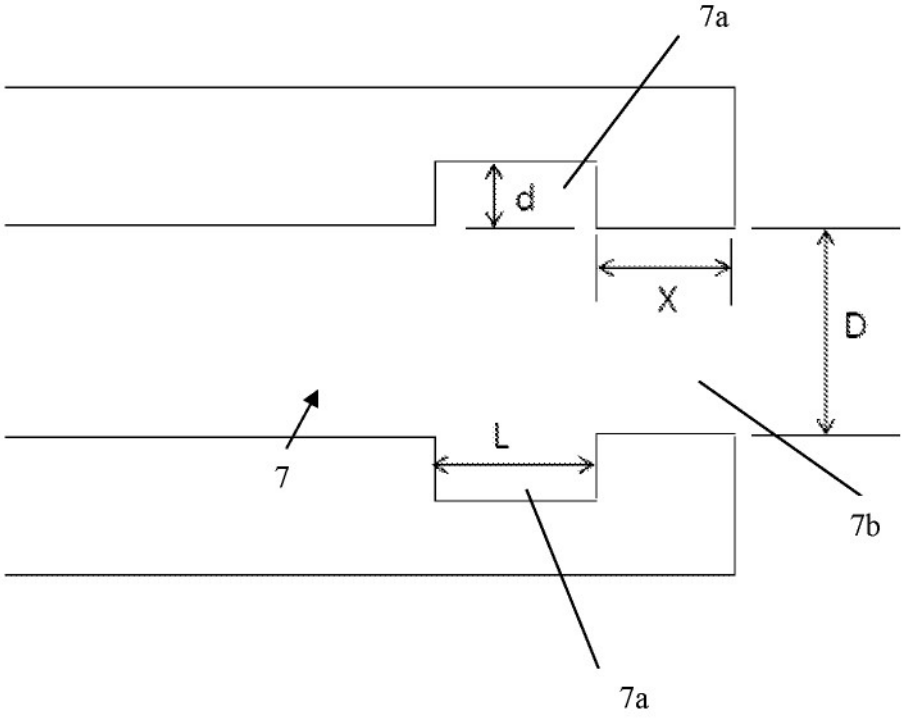


FIG. 6

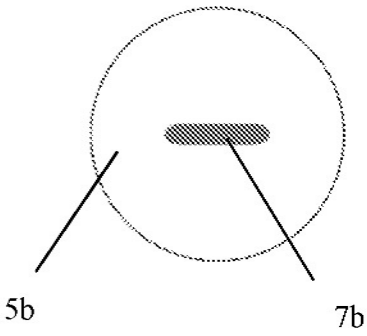


FIG. 7

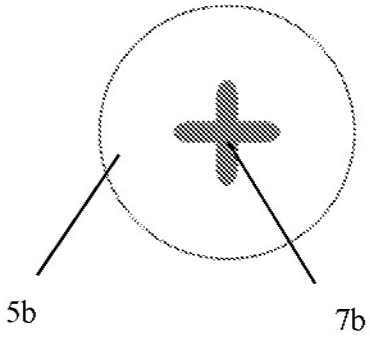


FIG. 8

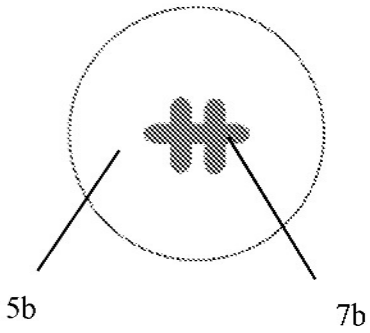


FIG. 9

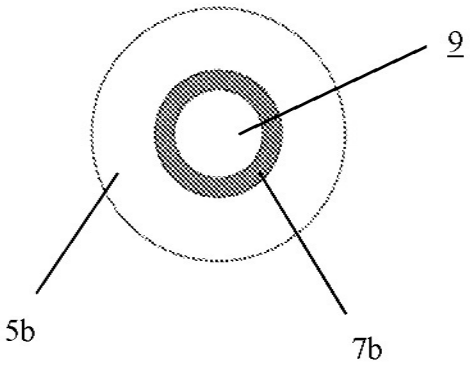


FIG. 10

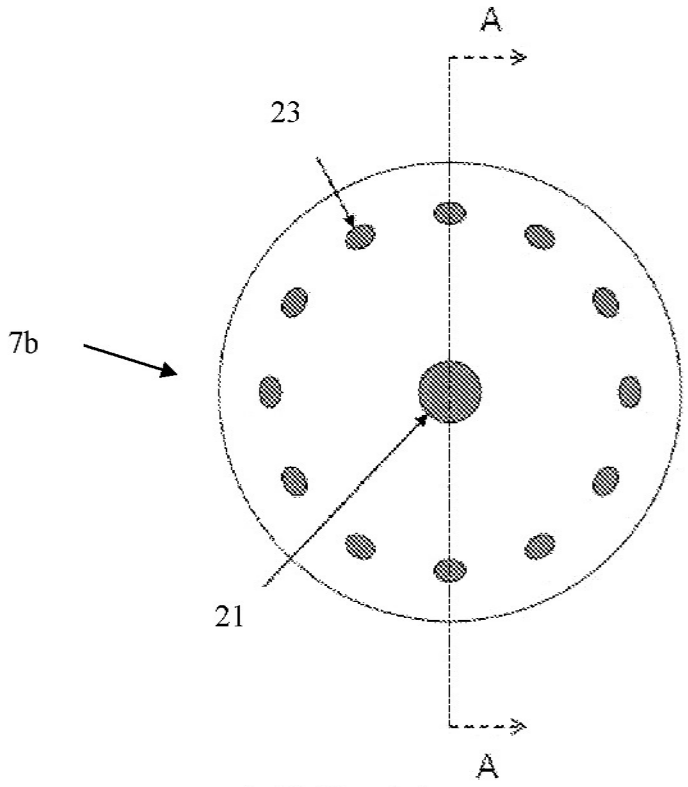


FIG. 11

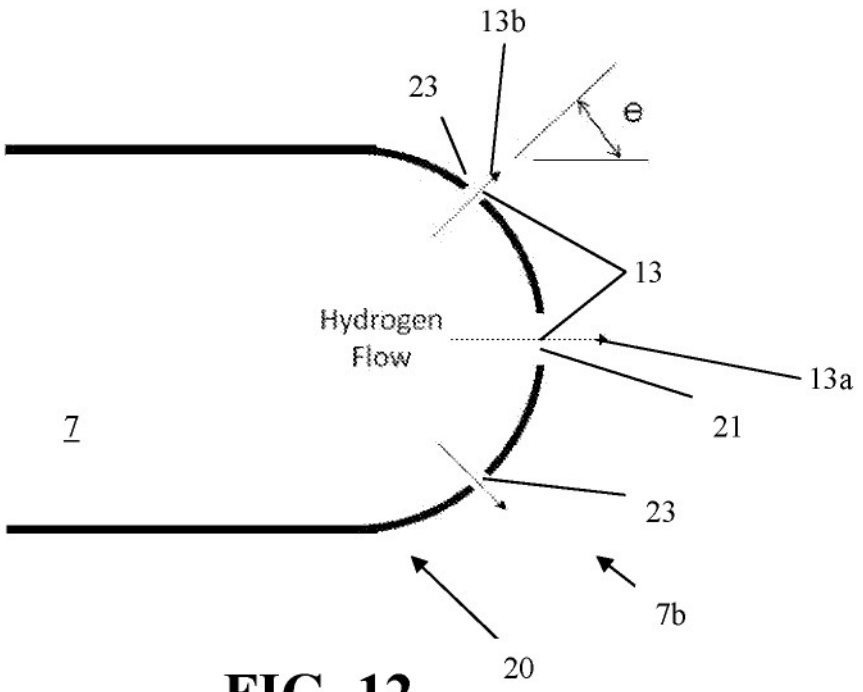

13b
23
θ
13
Hydrogen
Flow
13a
21
7
23
7b
20

FIG. 12

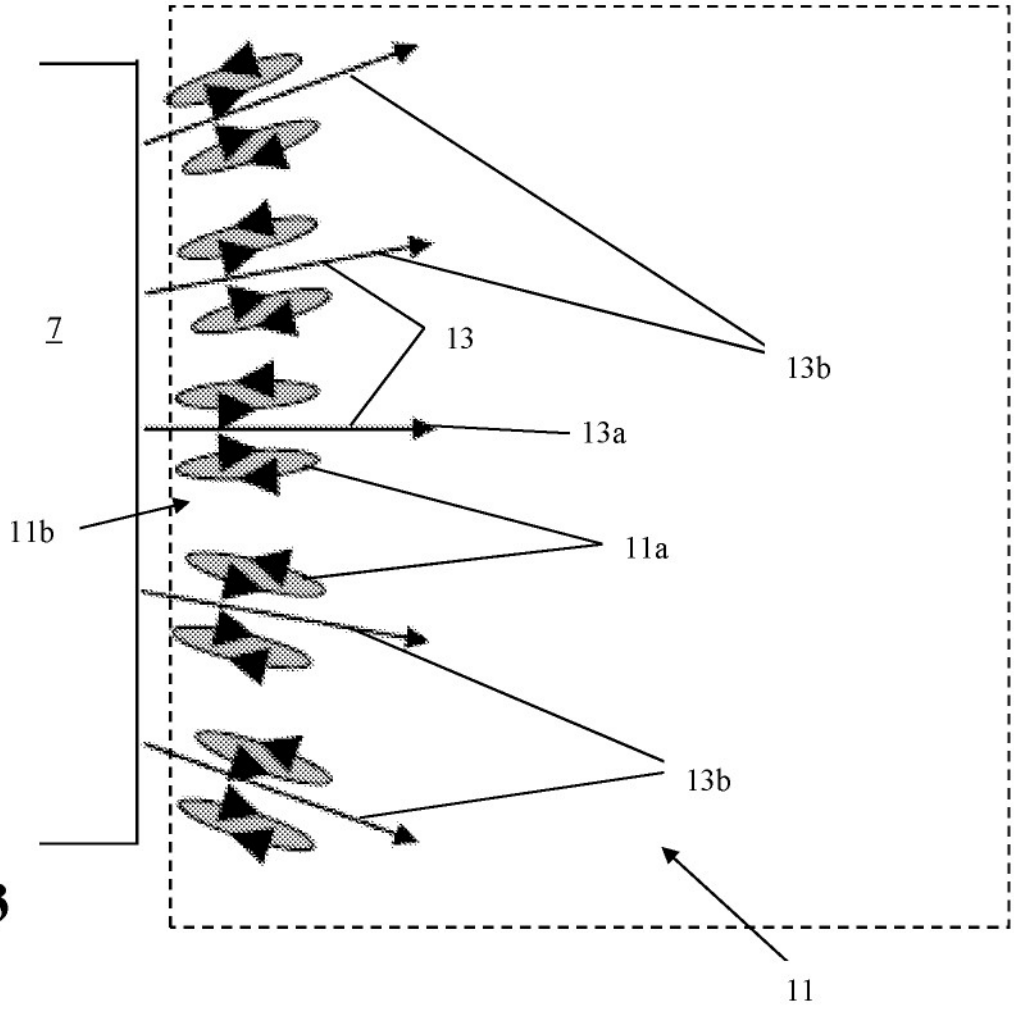

7
13
13b
13a
11b
11a
13b
11

FIG. 13

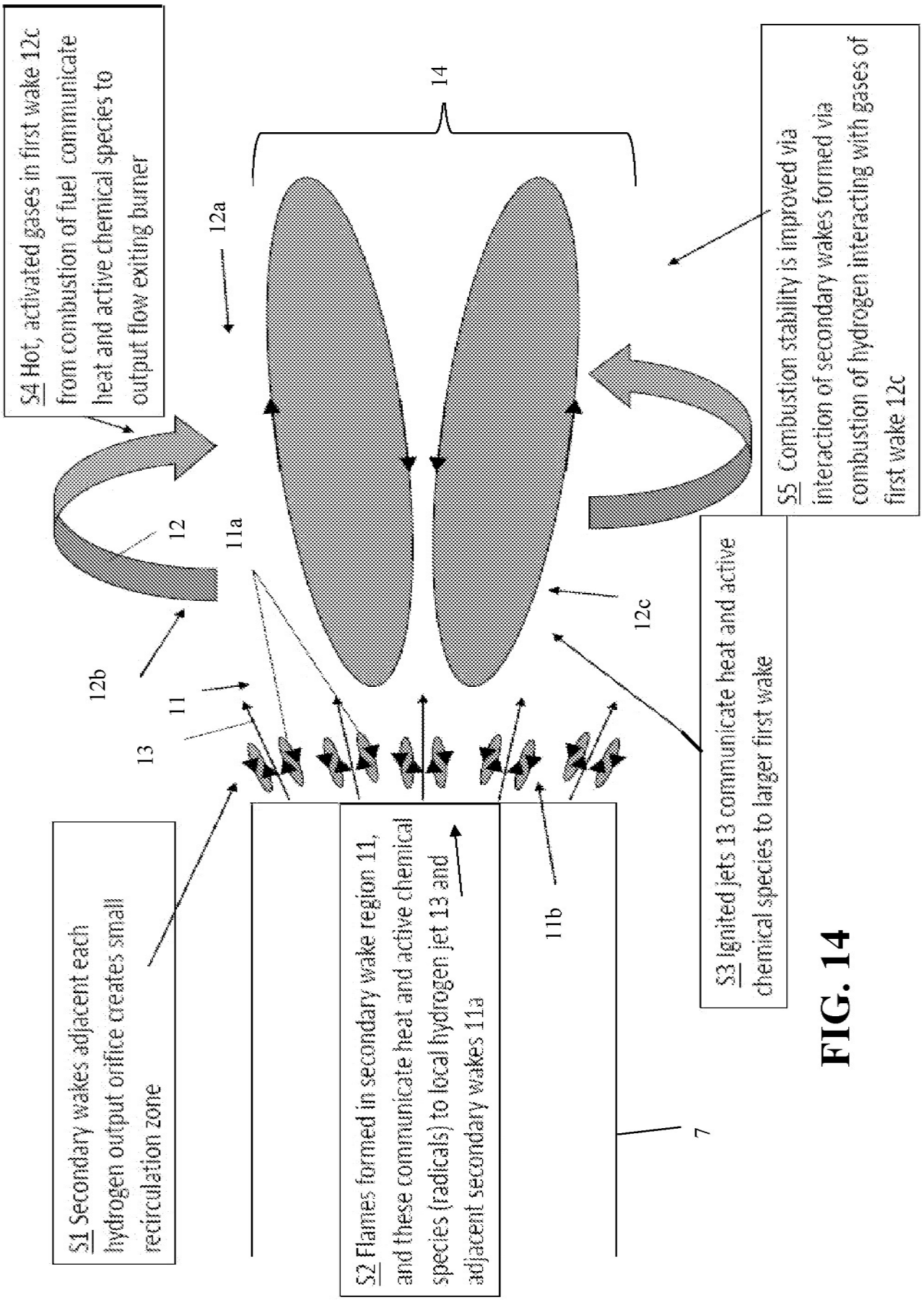

S4 Hot, activated gases in first wake 12c from combustion of fuel communicate heat and active chemical species to output flow exiting burner
14
12a
12
11a
12b
11
13
12c
S5 Combustion stability is improved via interaction of secondary wakes formed via combustion of hydrogen interacting with gases of first wake 12c
S3 Ignited jets 13 communicate heat and active chemical species to larger first wake
S1 Secondary wakes adjacent each hydrogen output orifice creates small recirculation zone
S2 Flames formed in secondary wake region 11, and these communicate heat and active chemical species (radicals) to local hydrogen jet 13 and adjacent secondary wakes 11a
11b
7

FIG. 14