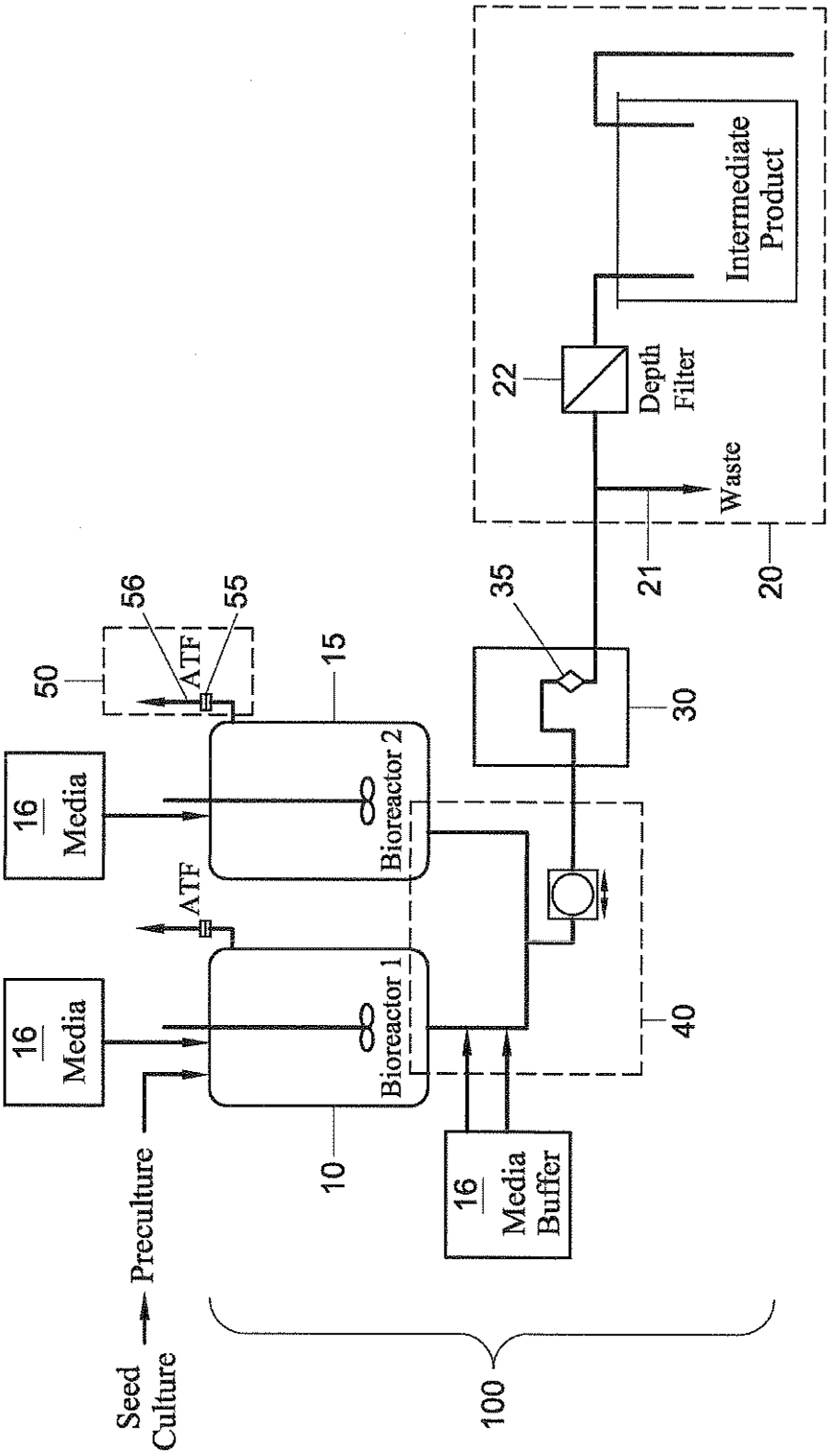

Seed Culture
Preculture
100
10
Bioreactor 1
Bioreactor 2
16 Media
16 Media
16 Media Buffer
ATF
ATF
50
56
55
15
40
30
35
22
Depth Filter
Waste
21
20
Intermediate Product

Fig. 1

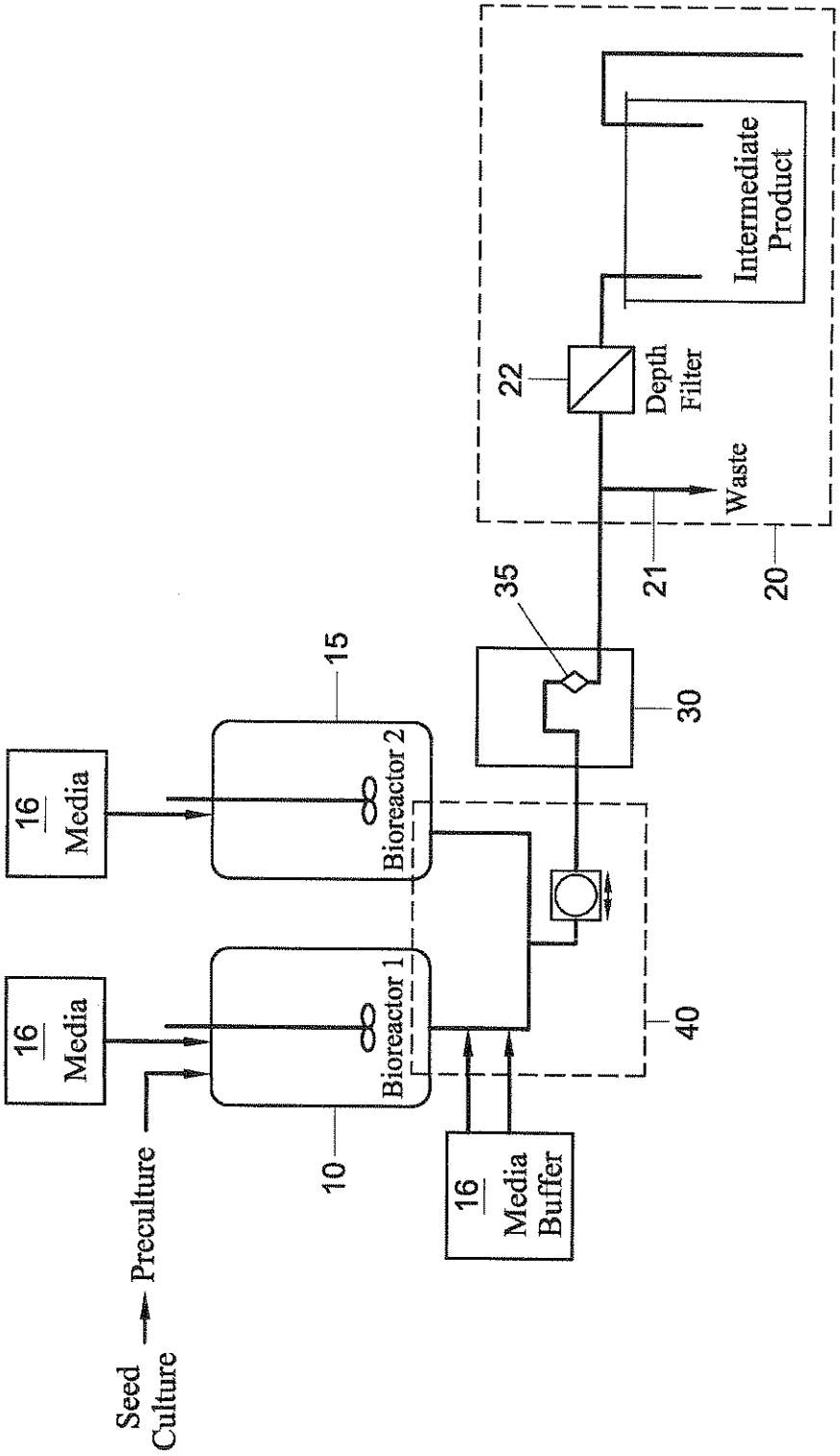

Seed Culture
Preculture
16 Media
16 Media
16 Media Buffer
Bioreactor 1
Bioreactor 2
10
15
40
30
35
22
Depth Filter
Waste
21
20
Intermediate Product

Fig. 2

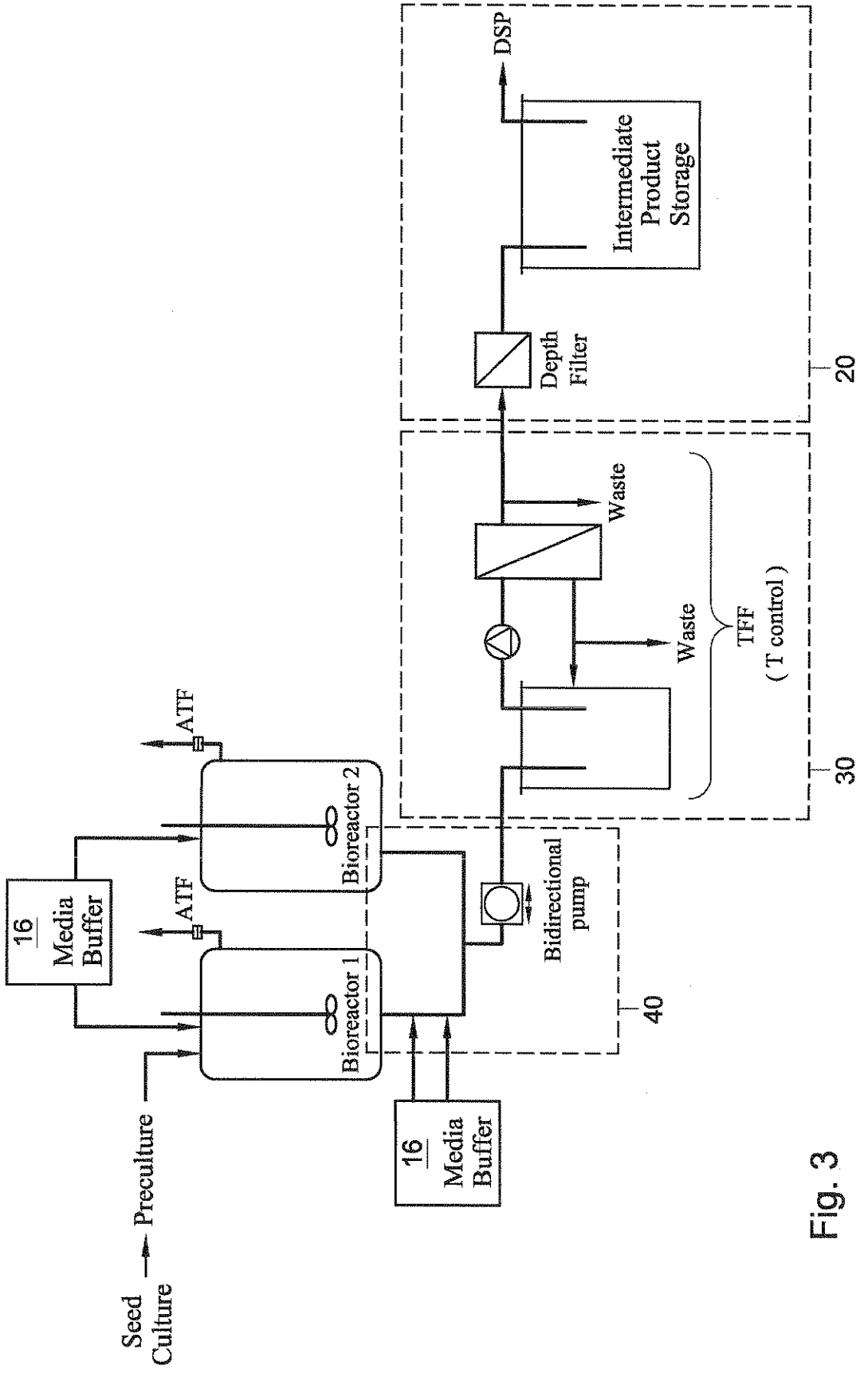

Seed Culture
Preculture
16 Media Buffer
ATF
ATF
Bioreactor 1
Bioreactor 2
Bidirectional pump
40
16 Media Buffer
30
TFF ( T control )
Waste
Waste
20
Depth Filter
Intermediate Product Storage
DSP

Fig. 3