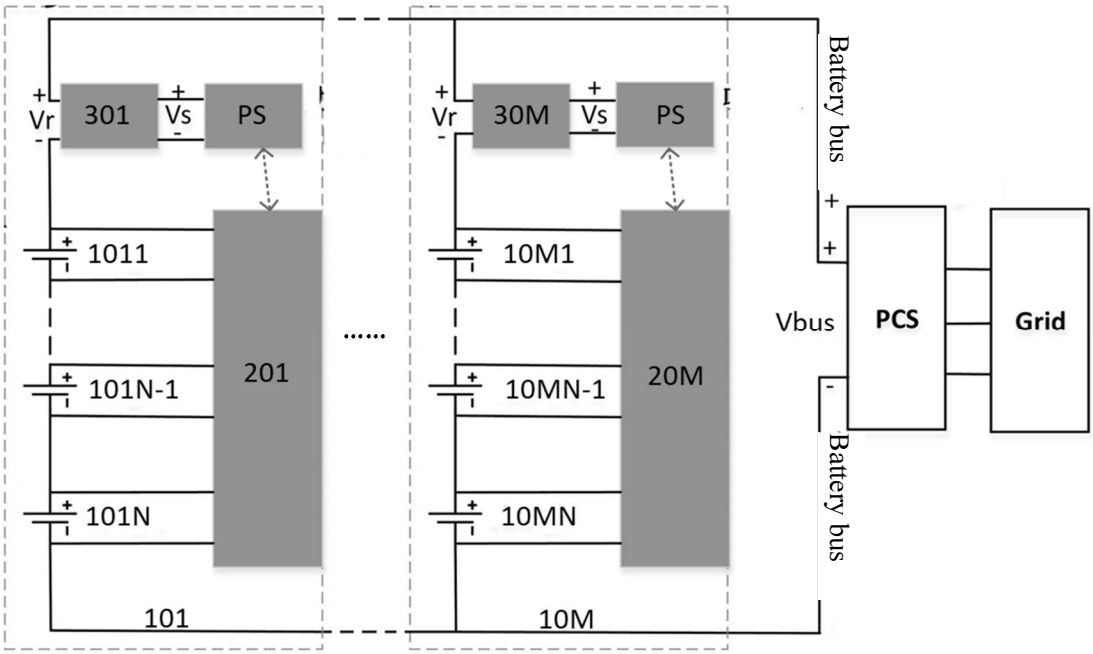

Vr
301
Vs
PS
1011
101N-1
101N
201
101
.....
Vr
30M
Vs
PS
10M1
10MN-1
10MN
20M
10M
Battery bus
Vbus
PCS
Grid
Battery bus

FIG. 1

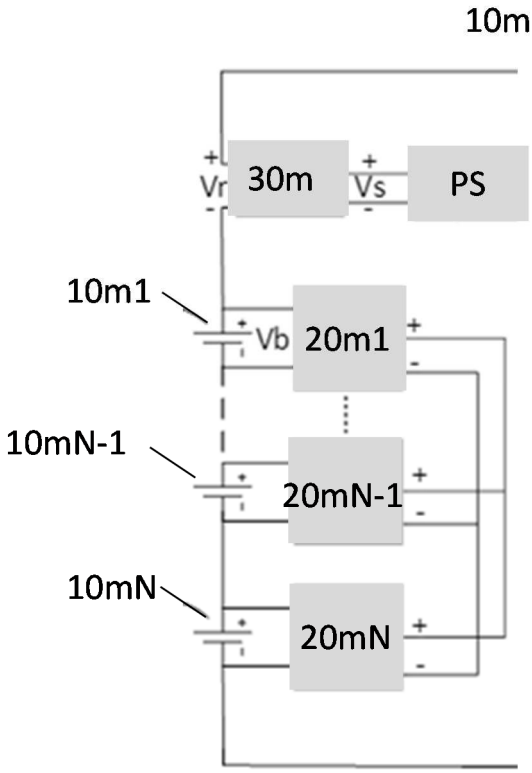

10m
Vr
30m
Vs
PS
10m1
Vb
20m1
10mN-1
20mN-1
10mN
20mN

FIG. 2a

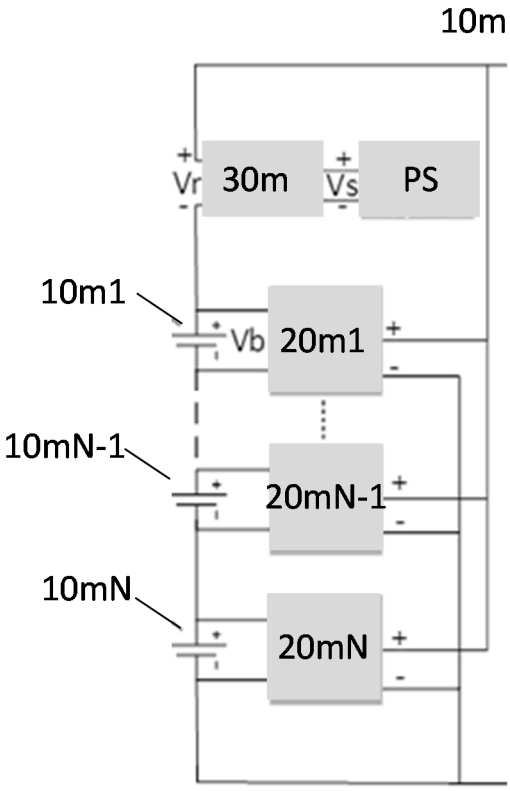

10m
Vr
30m
Vs
PS
10m1
Vb
20m1
10mN-1
20mN-1
10mN
20mN

FIG. 2b

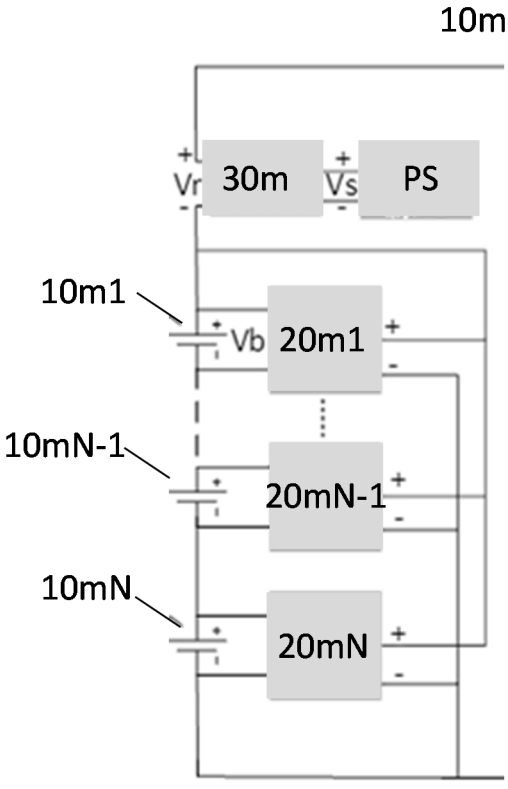

10m
Vr
30m
Vs
PS
10m1
Vb
20m1
10mN-1
20mN-1
10mN
20mN

FIG. 2c

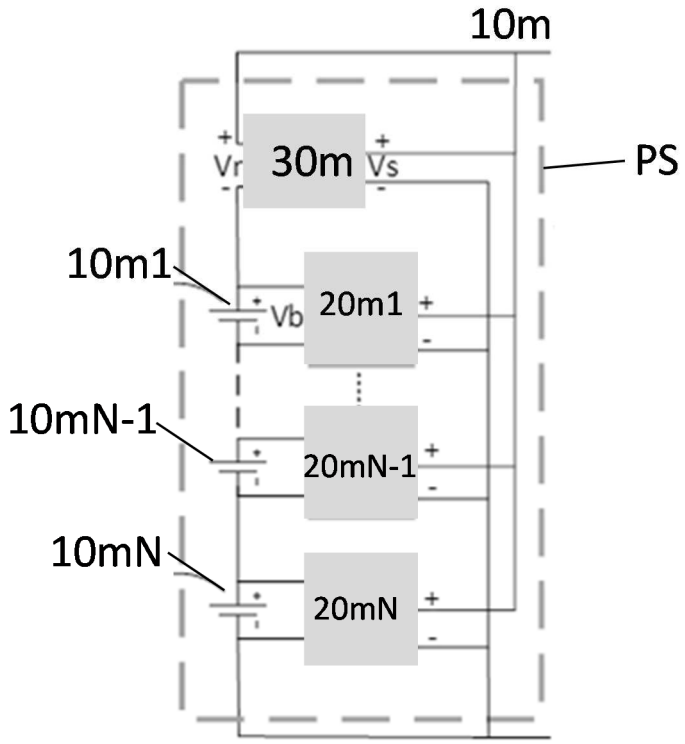

10m
Vr
30m
Vs
PS
10m1
Vb
20m1
10mN-1
20mN-1
10mN
20mN

FIG. 2d

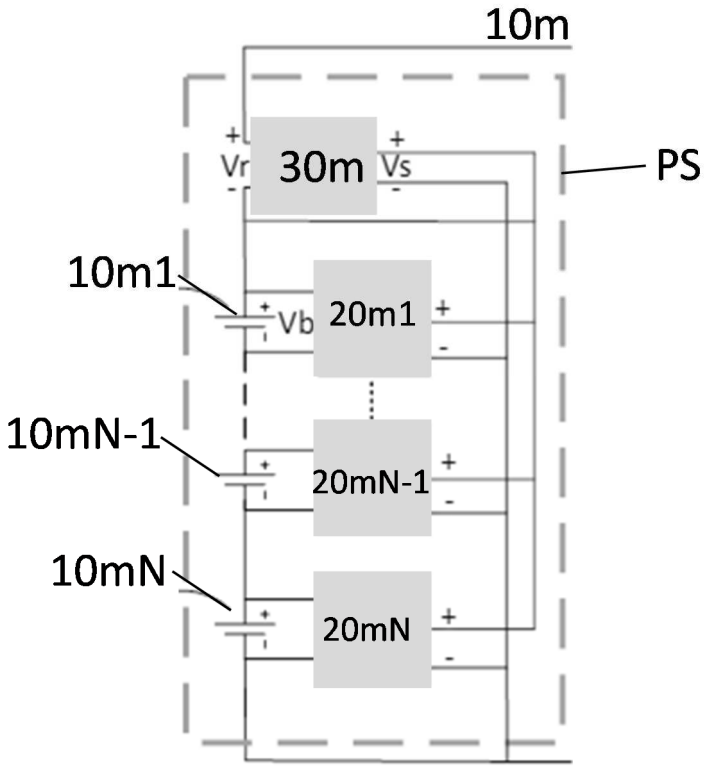

10m
Vr
30m
Vs
PS
10m1
Vb
20m1
10mN-1
20mN-1
10mN
20mN

FIG. 2e

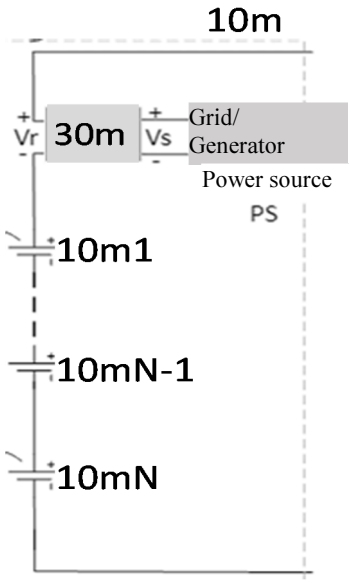

10m
Vr
30m
Vs
Grid/
Generator
Power source
PS
10m1
10mN-1
10mN

FIG. 3a

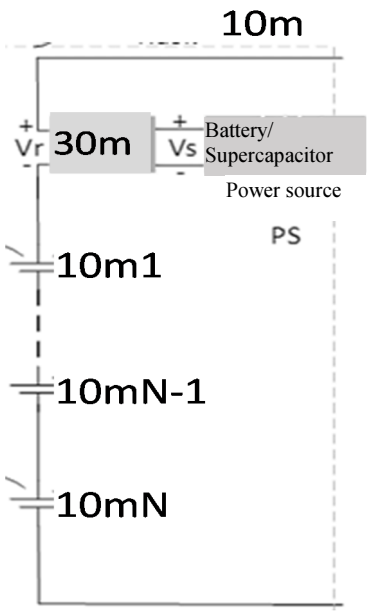

10m
Vr
30m
Vs
Battery/
Supercapacitor
Power source
PS
10m1
10mN-1
10mN

FIG. 3b

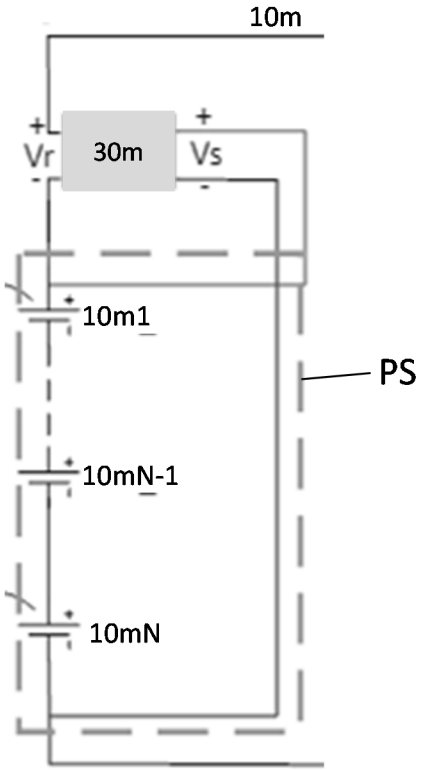

10m
+
Vr
-
30m
+
Vs
-
10m1
PS
10mN-1
10mN

FIG. 3c

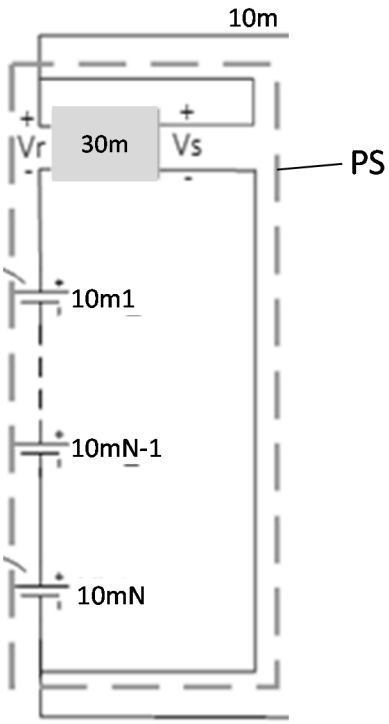

10m
+
Vr
-
30m
+
Vs
-
PS
10m1
10mN-1
10mN

FIG. 3d

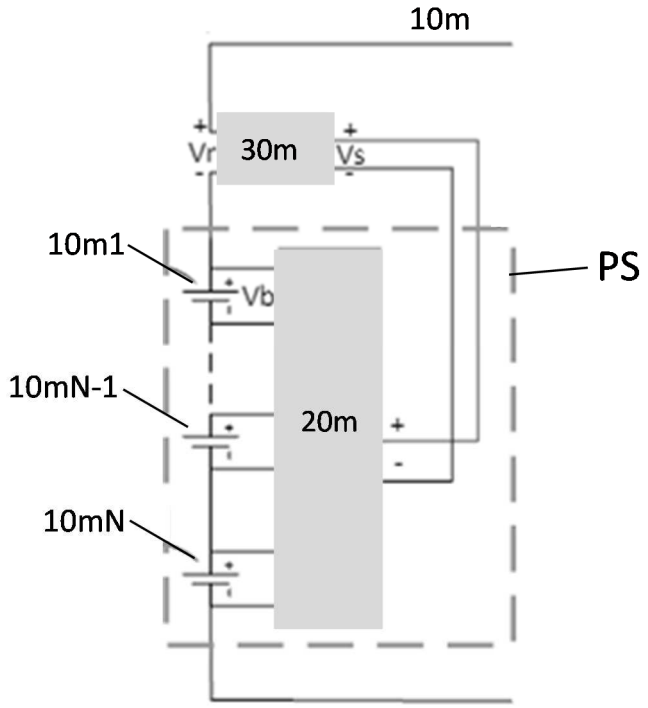

10m
Vr
30m
Vs
10m1
Vb
PS
10mN-1
20m
10mN

FIG. 3e

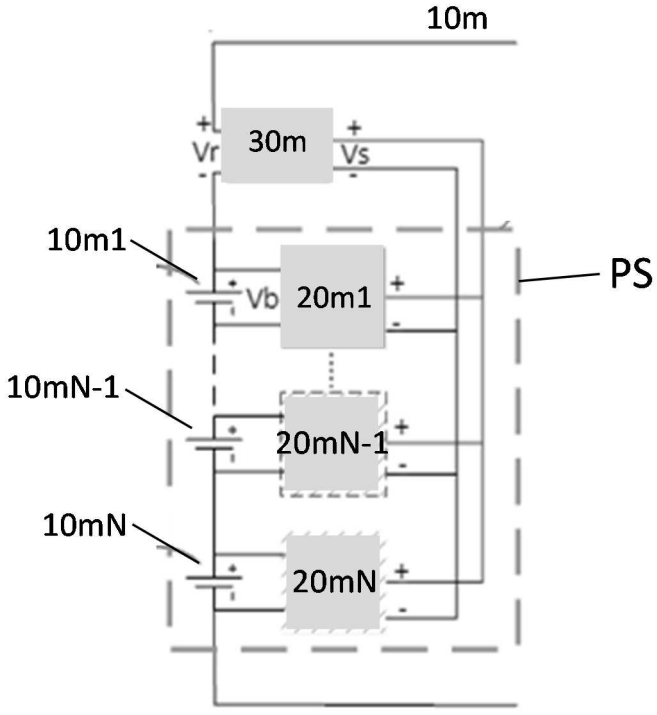

10m
Vr
30m
Vs
10m1
Vb
20m1
PS
10mN-1
20mN-1
10mN
20mN

FIG. 3f

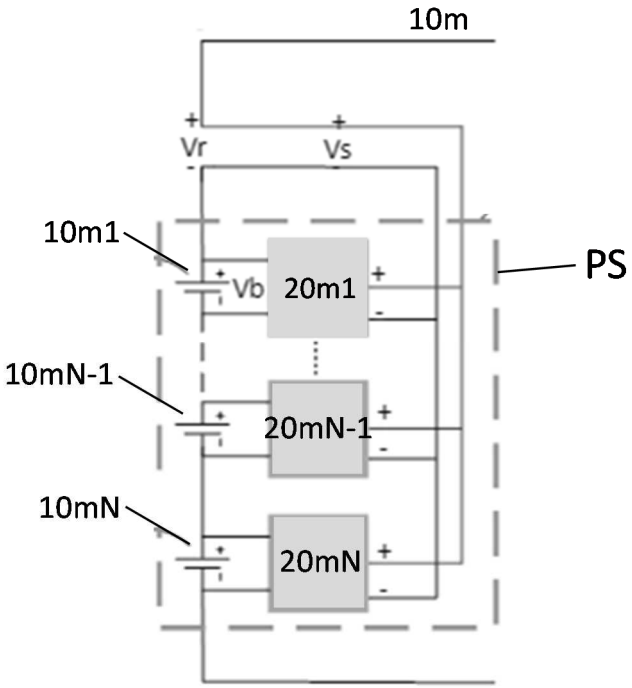

10m
Vr
Vs
10m1
Vb
20m1
PS
10mN-1
20mN-1
10mN
20mN

FIG. 3g

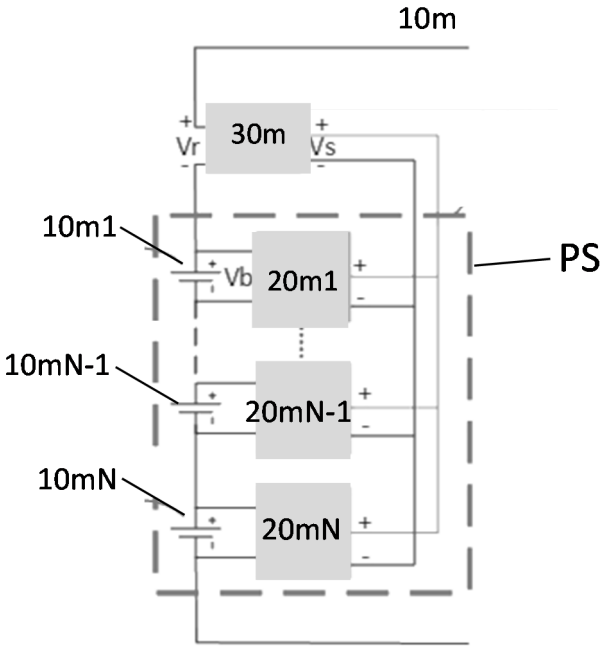

10m
30m
Vr
Vs
10m1
Vb
20m1
PS
10mN-1
20mN-1
10mN
20mN

FIG. 4

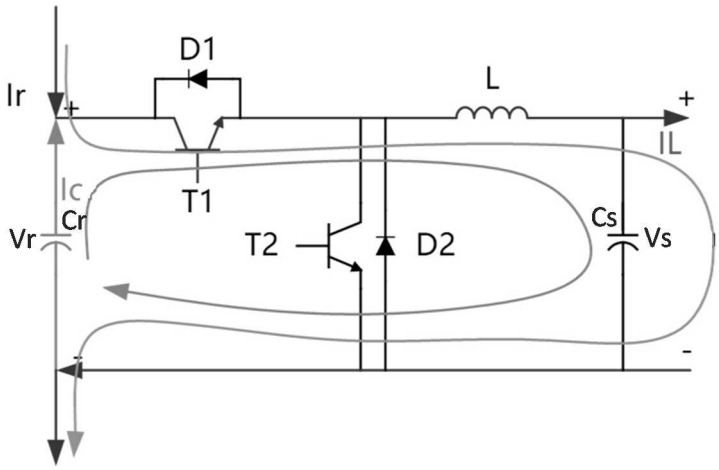


FIG. 5a

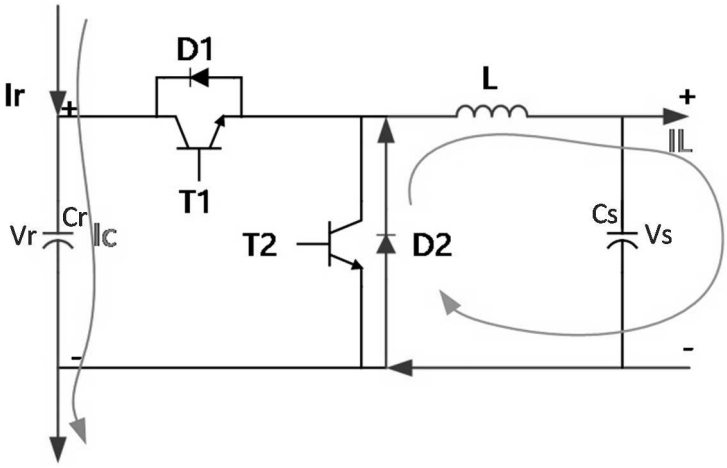


FIG. 5b

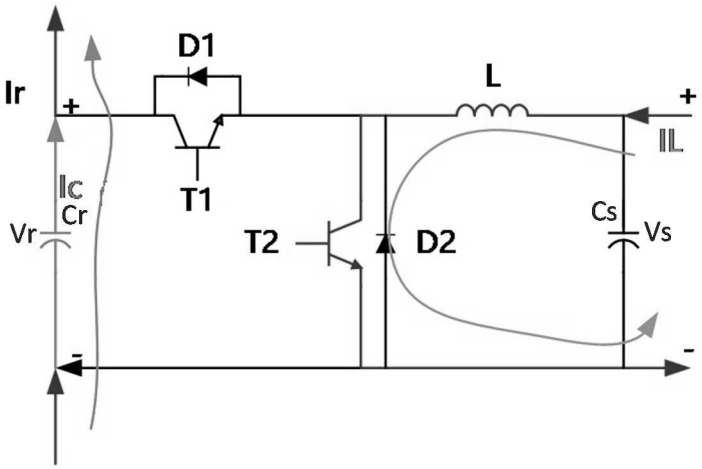


FIG. 5c

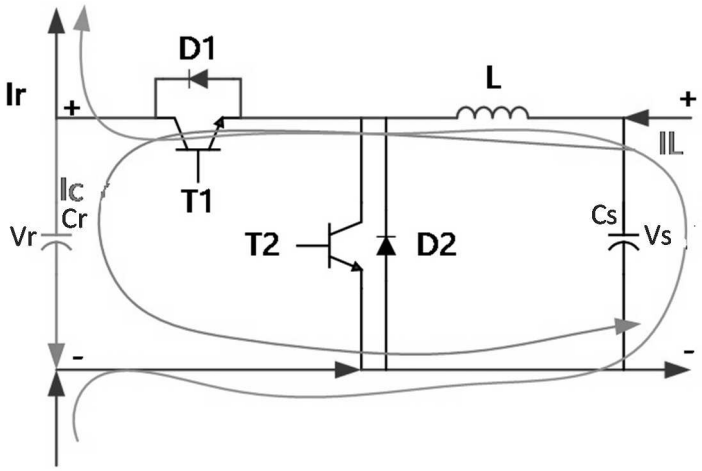


FIG. 5d

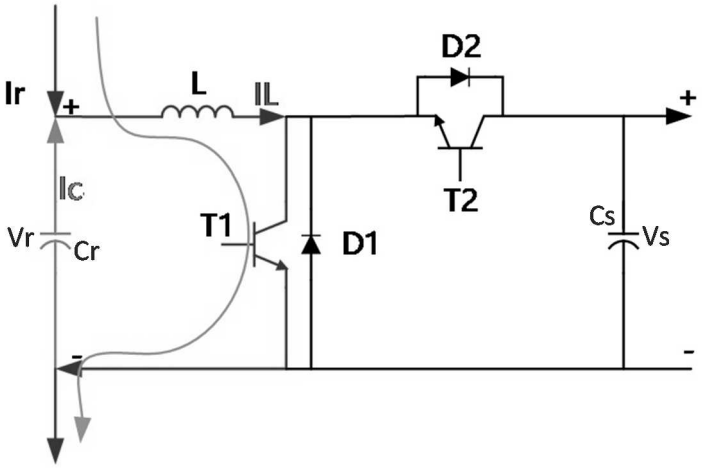


FIG. 6a

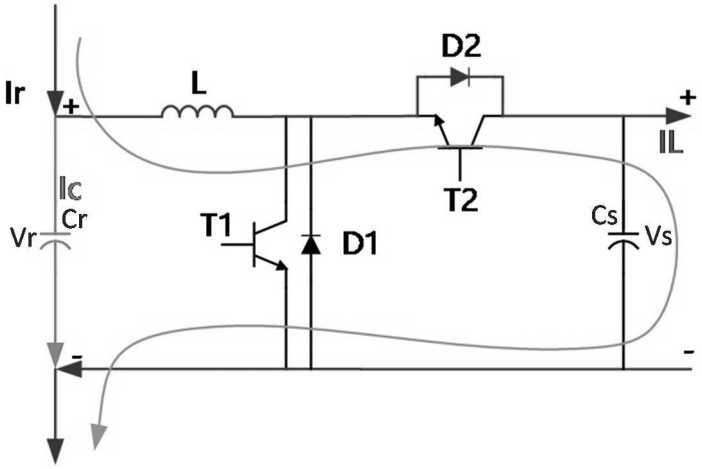


FIG. 6b

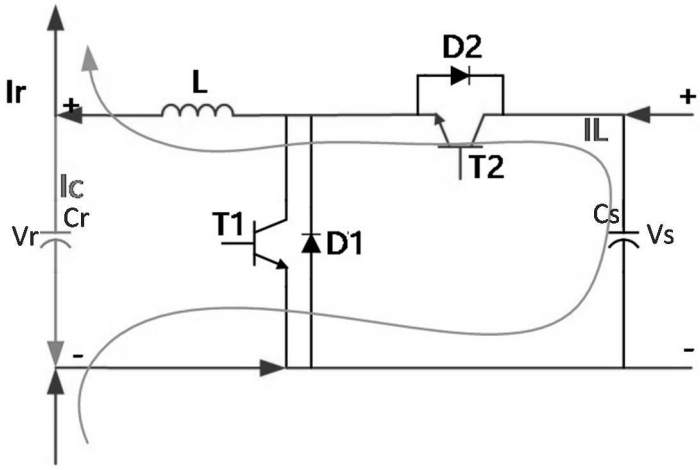


FIG. 6c

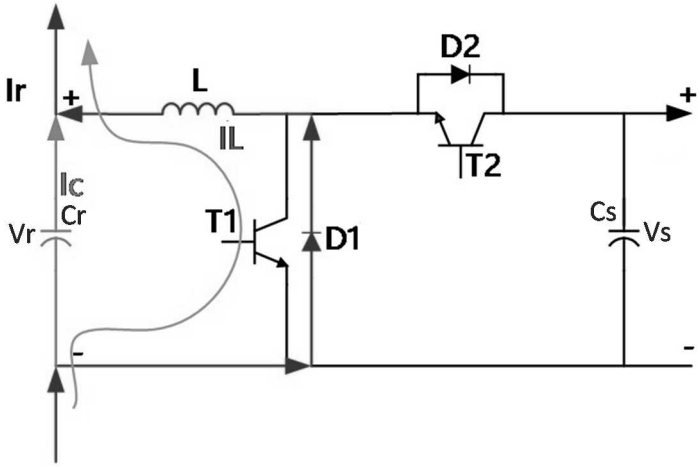


FIG. 6d