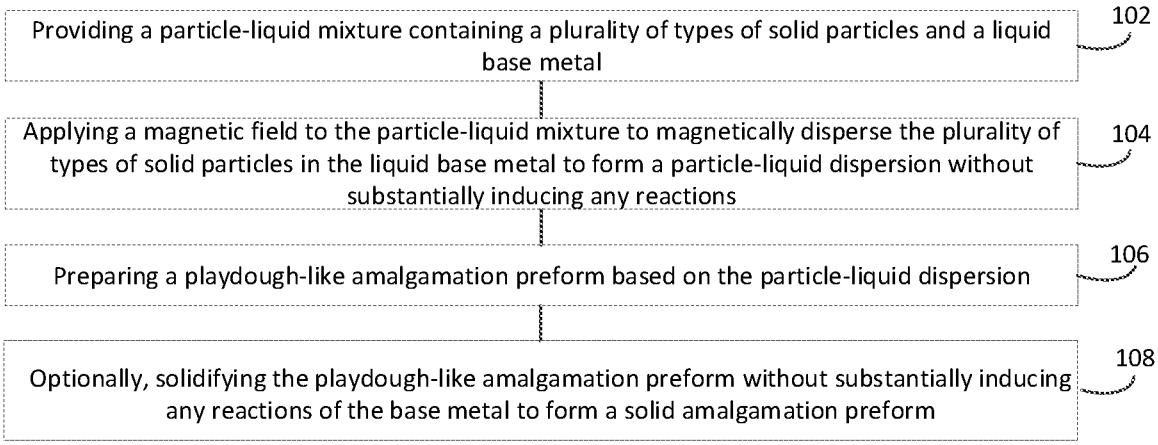

Providing a particle-liquid mixture containing a plurality of types of solid particles and a liquid base metal
102
Applying a magnetic field to the particle-liquid mixture to magnetically disperse the plurality of types of solid particles in the liquid base metal to form a particle-liquid dispersion without substantially inducing any reactions
104
Preparing a playdough-like amalgamation preform based on the particle-liquid dispersion
106
Optionally, solidifying the playdough-like amalgamation preform without substantially inducing any reactions of the base metal to form a solid amalgamation preform
108

FIG. 1A

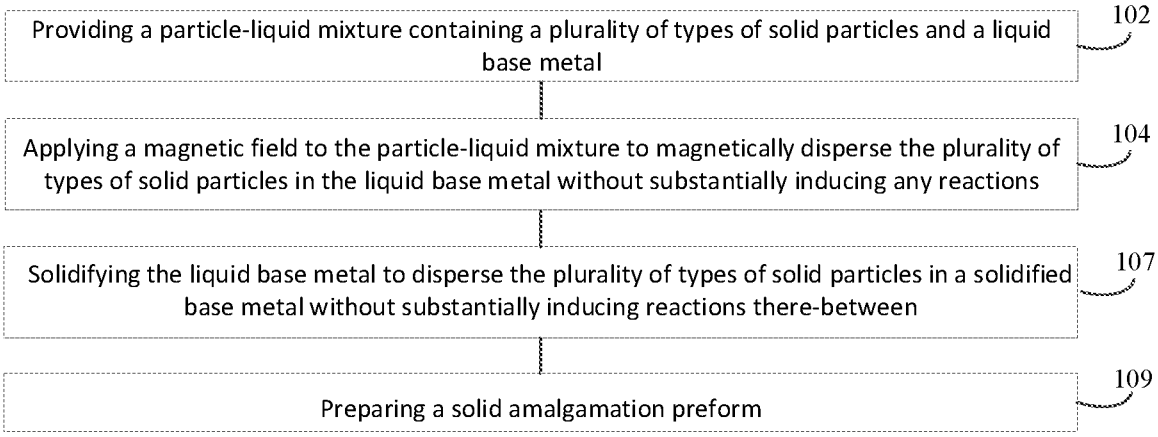

Providing a particle-liquid mixture containing a plurality of types of solid particles and a liquid base metal
102
Applying a magnetic field to the particle-liquid mixture to magnetically disperse the plurality of types of solid particles in the liquid base metal without substantially inducing any reactions
104
Solidifying the liquid base metal to disperse the plurality of types of solid particles in a solidified base metal without substantially inducing reactions there-between
107
Preparing a solid amalgamation preform
109

FIG. 1B

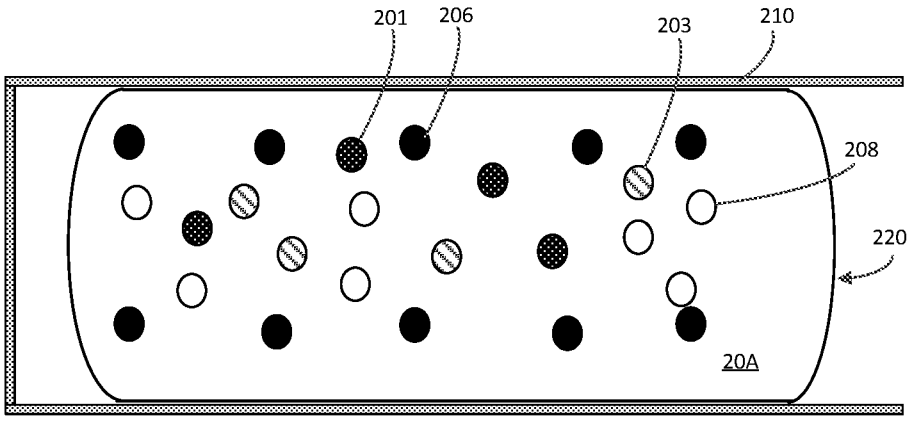

201
206
203
210
208
220
20A

FIG. 2

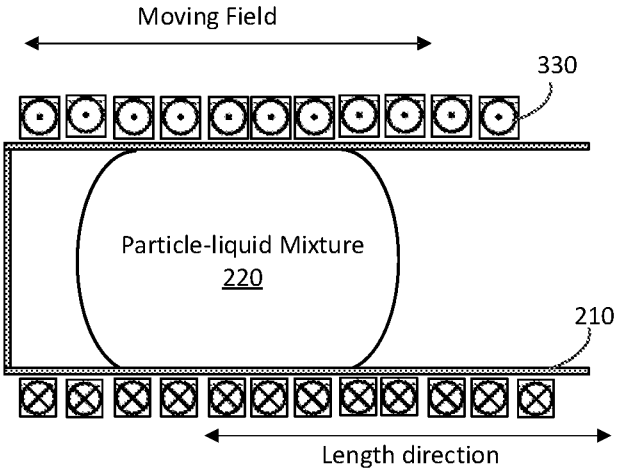

Moving Field
330
Particle-liquid Mixture
220
210
Length direction

FIG. 3

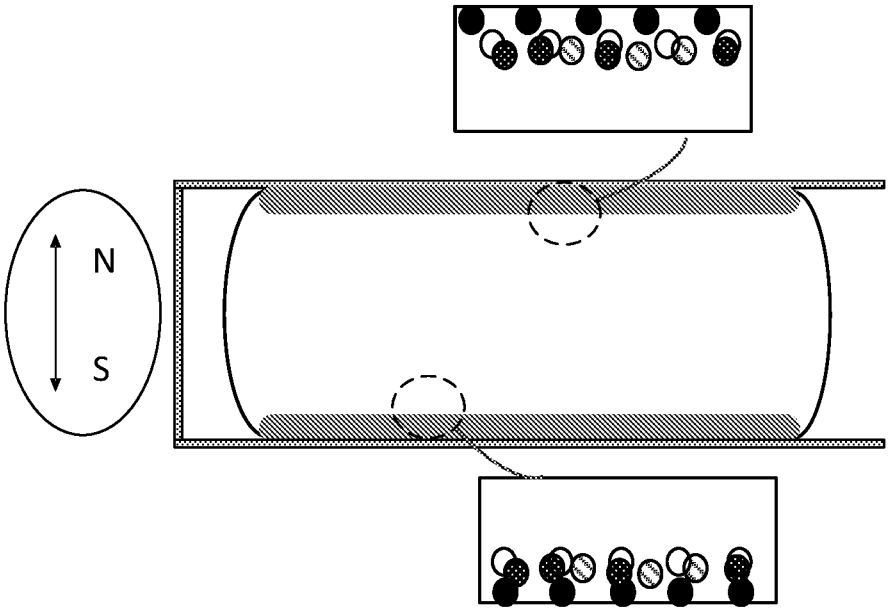


FIG. 4

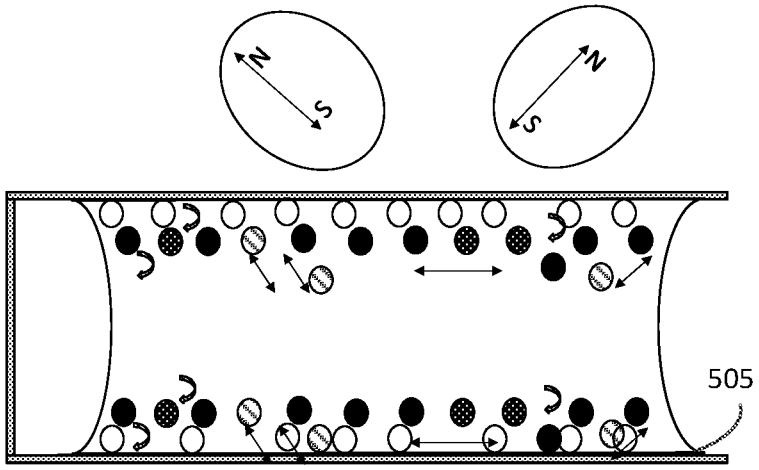


FIG. 5

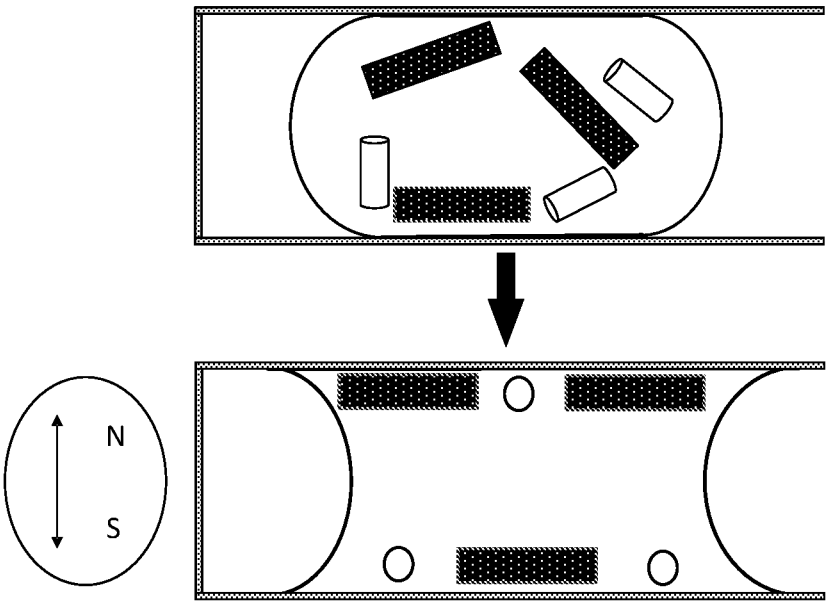


FIG. 6

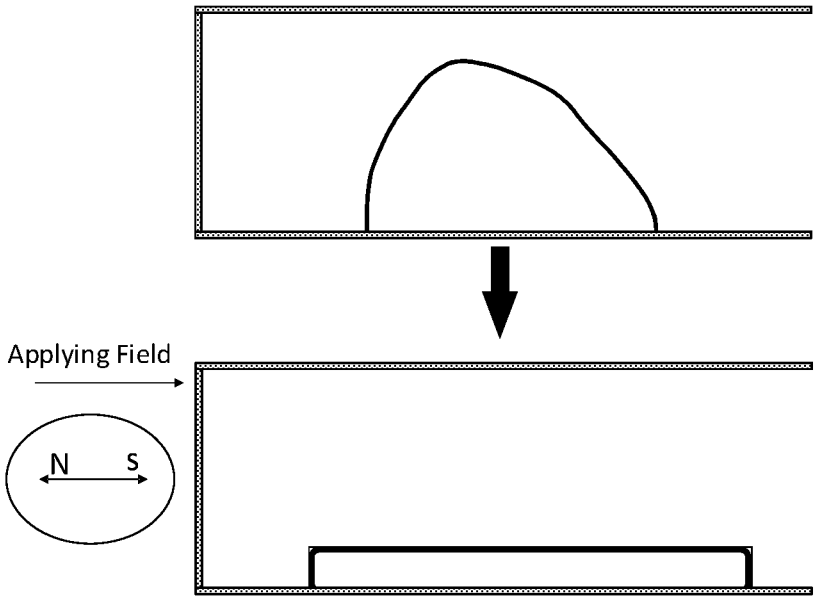


FIG. 7

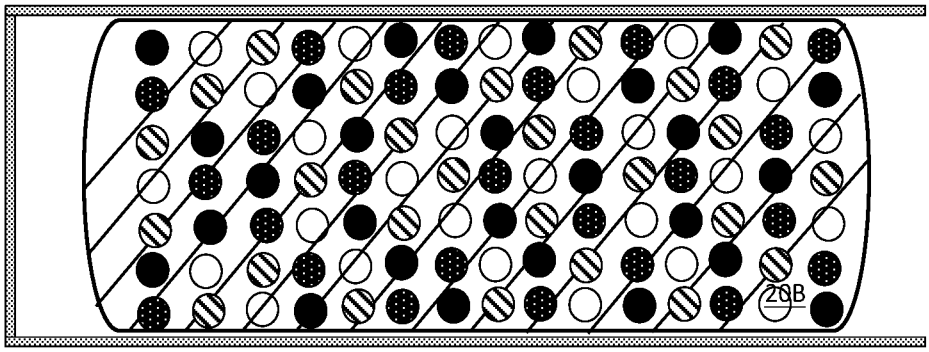

20B

FIG. 8

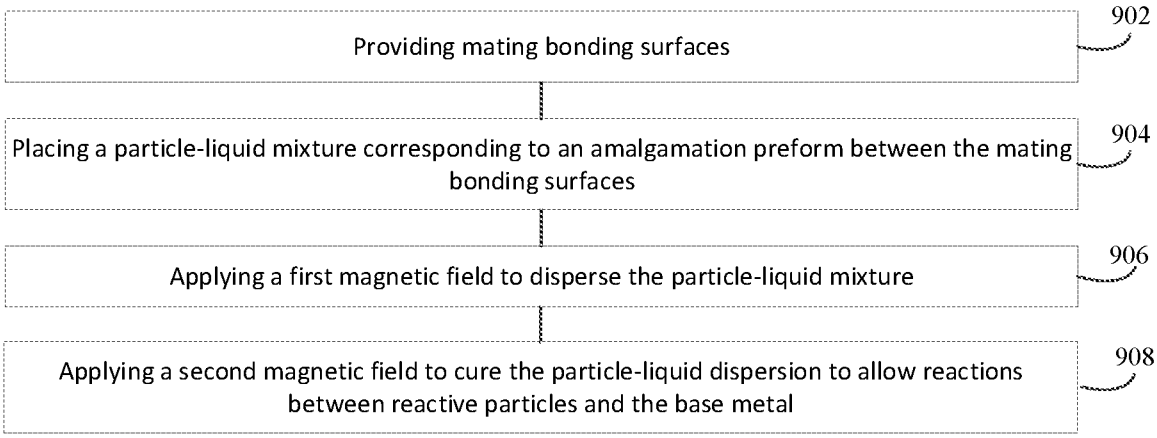

Providing mating bonding surfaces
902
Placing a particle-liquid mixture corresponding to an amalgamation preform between the mating bonding surfaces
904
Applying a first magnetic field to disperse the particle-liquid mixture
906
Applying a second magnetic field to cure the particle-liquid dispersion to allow reactions between reactive particles and the base metal
908

FIG. 9A

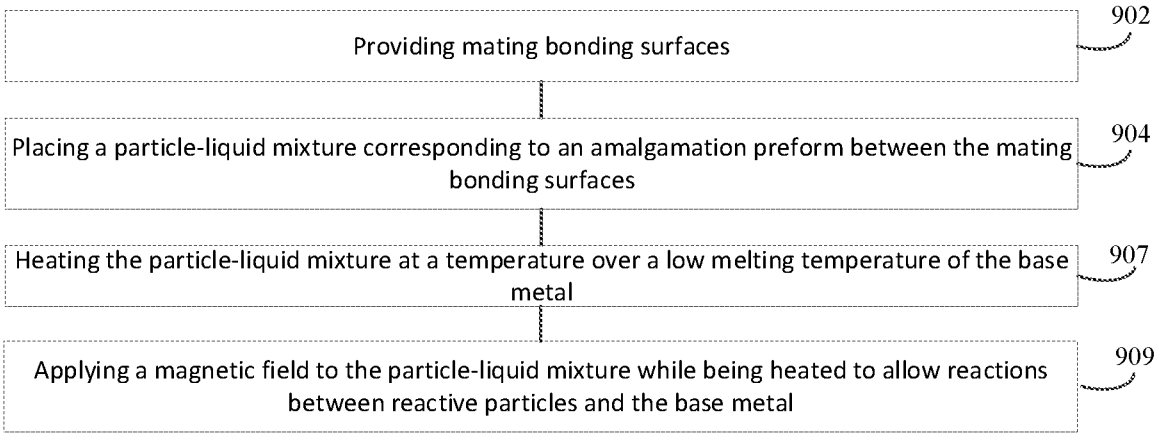

Providing mating bonding surfaces
902
Placing a particle-liquid mixture corresponding to an amalgamation preform between the mating bonding surfaces
904
Heating the particle-liquid mixture at a temperature over a low melting temperature of the base metal
907
Applying a magnetic field to the particle-liquid mixture while being heated to allow reactions between reactive particles and the base metal
909

FIG. 9B

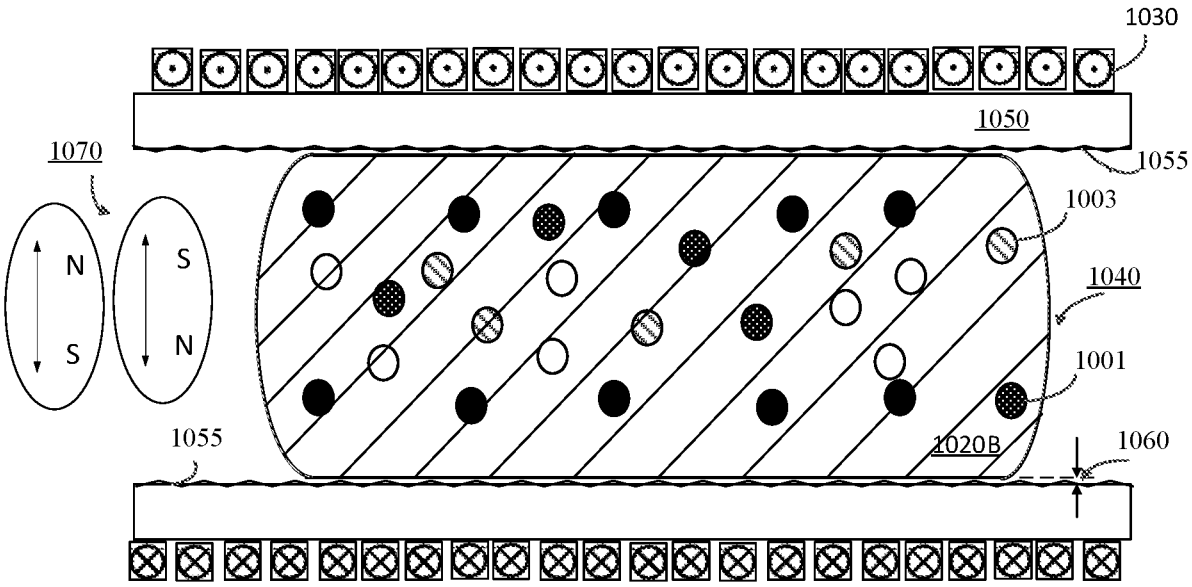

1030
1050
1055
1070
N
S
S
N
1003
1040
1001
1055
1020B
1060

FIG. 10

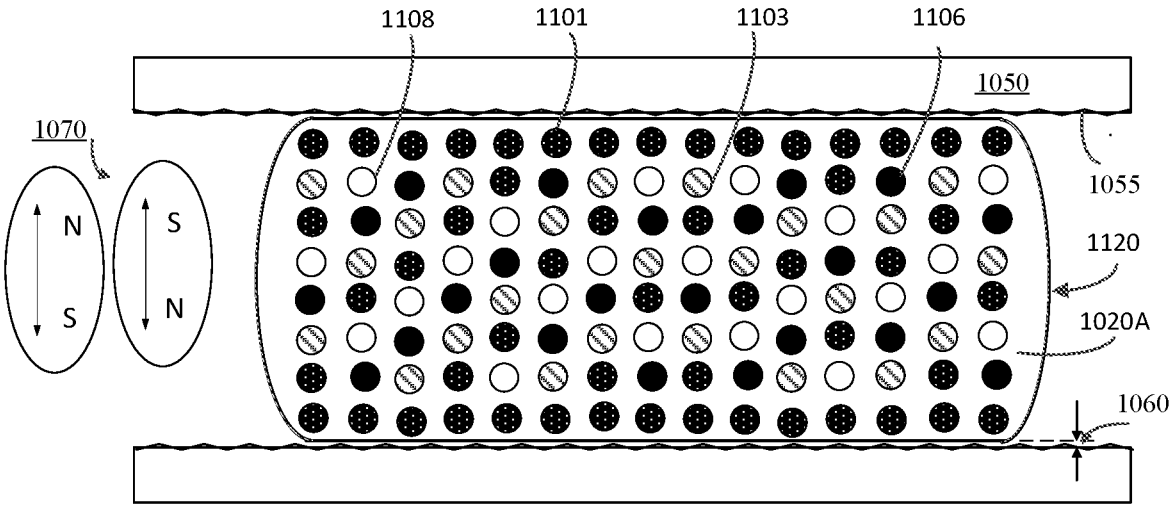

1108
1101
1103
1106
1050
1070
N
S
S
N
1055
1120
1020A
1060

FIG. 11

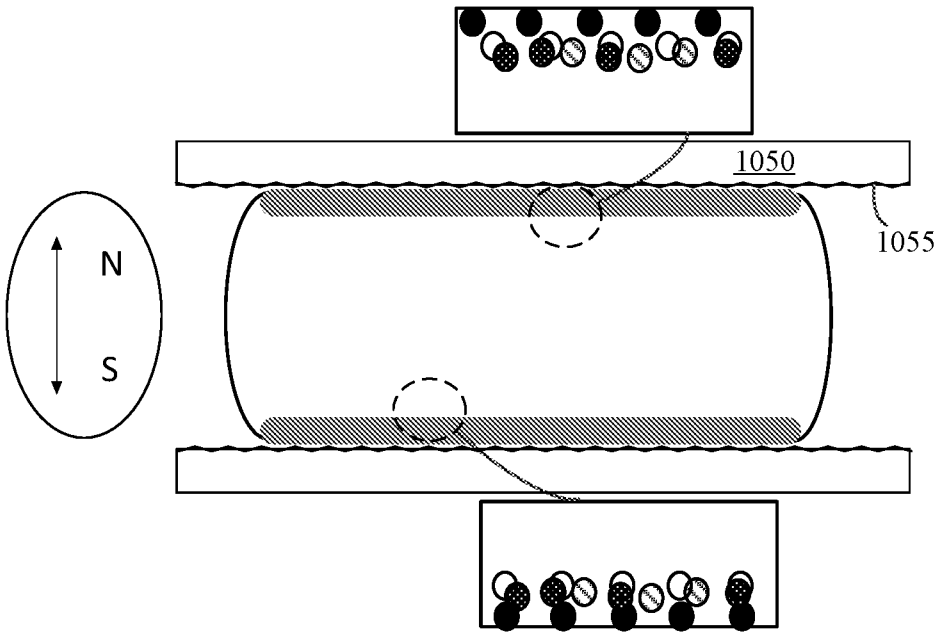

1050
1055
N
S

FIG. 12

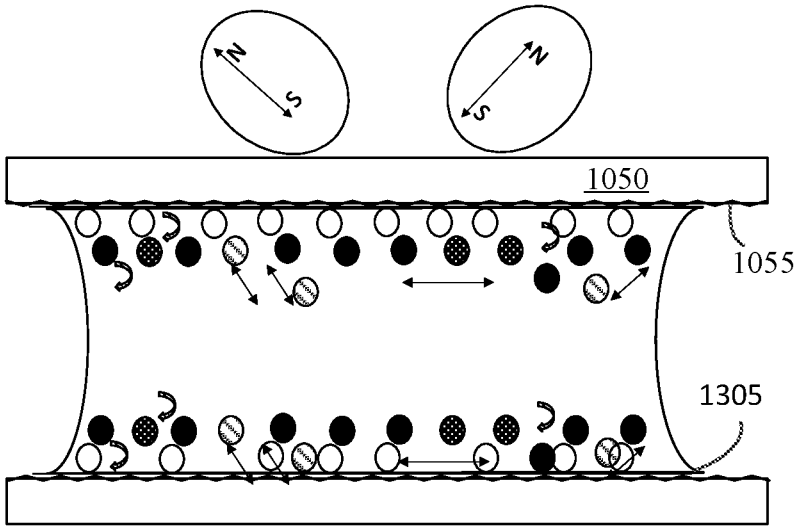


FIG. 13

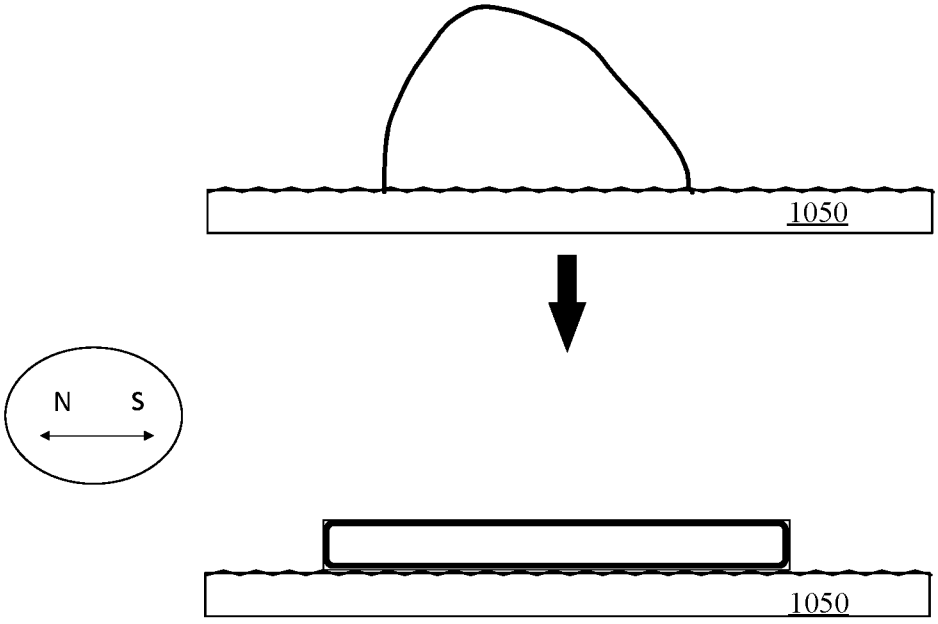


FIG. 14

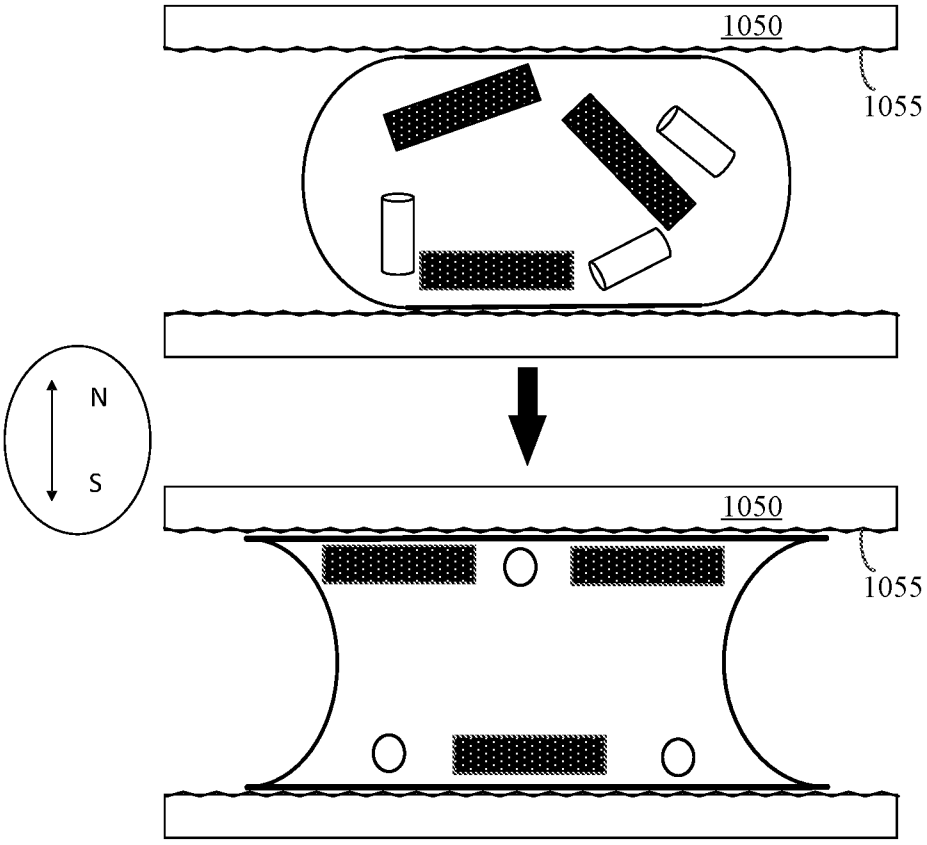


FIG. 15

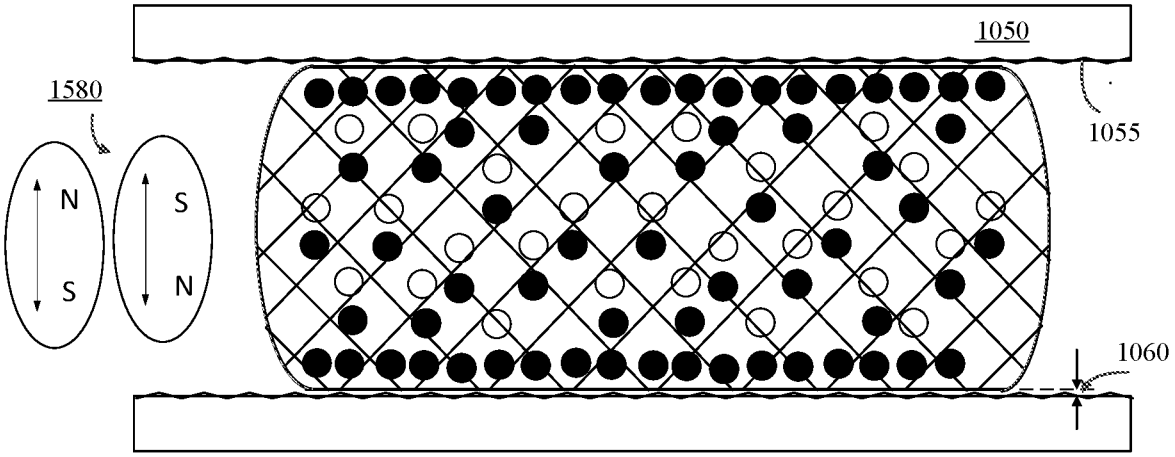


FIG. 16