FIG.1

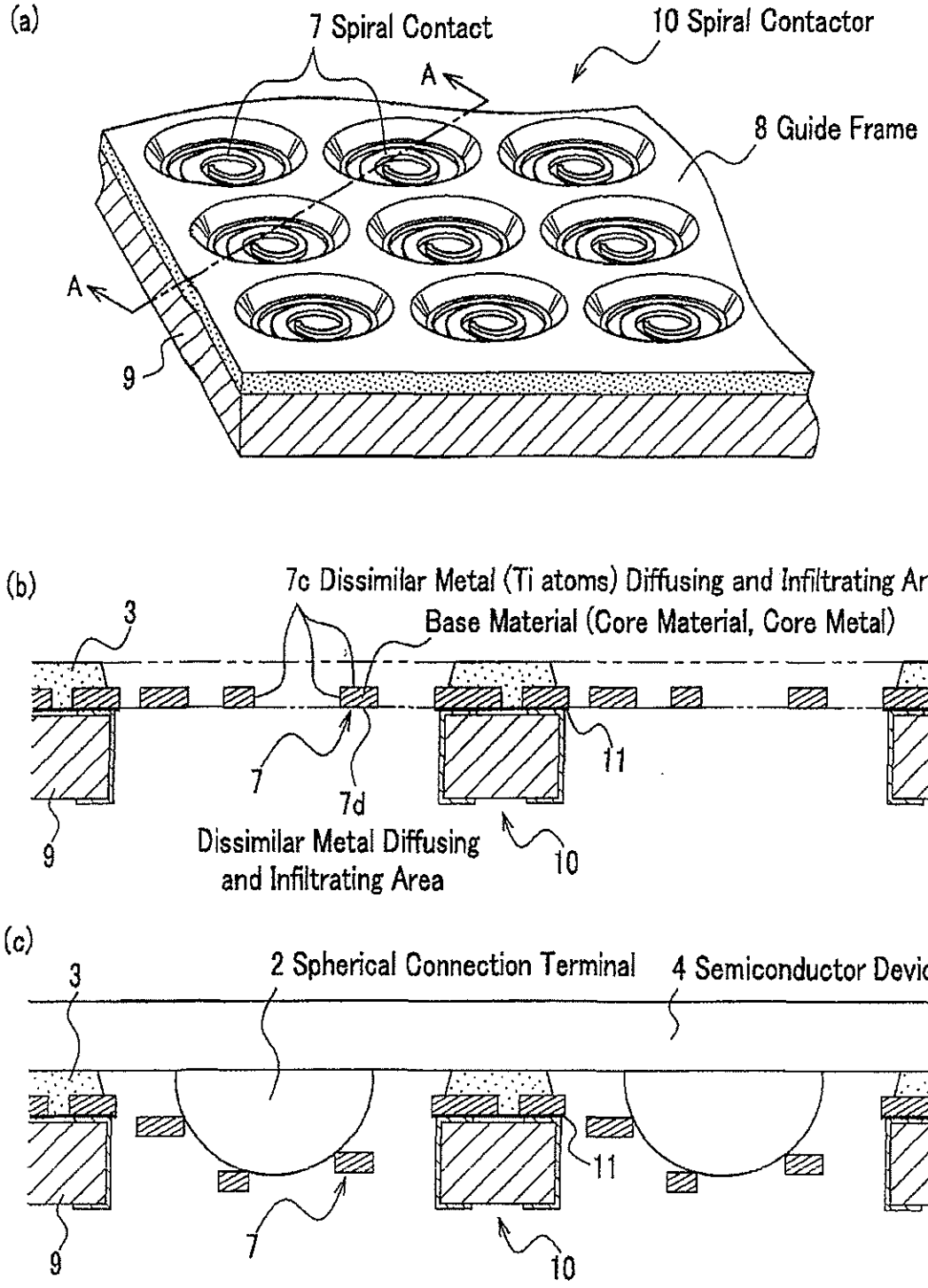

(a)
7 Spiral Contact
10 Spiral Contactor
A
8 Guide Frame
A
9
(b)
7c Dissimilar Metal (Ti atoms) Diffusing and Infiltrating Area
Base Material (Core Material, Core Metal)
3
11
7
7d
9
Dissimilar Metal Diffusing
and Infiltrating Area
10
(c)
3
2 Spherical Connection Terminal
4 Semiconductor Device
11
9
7
10

FIG.2

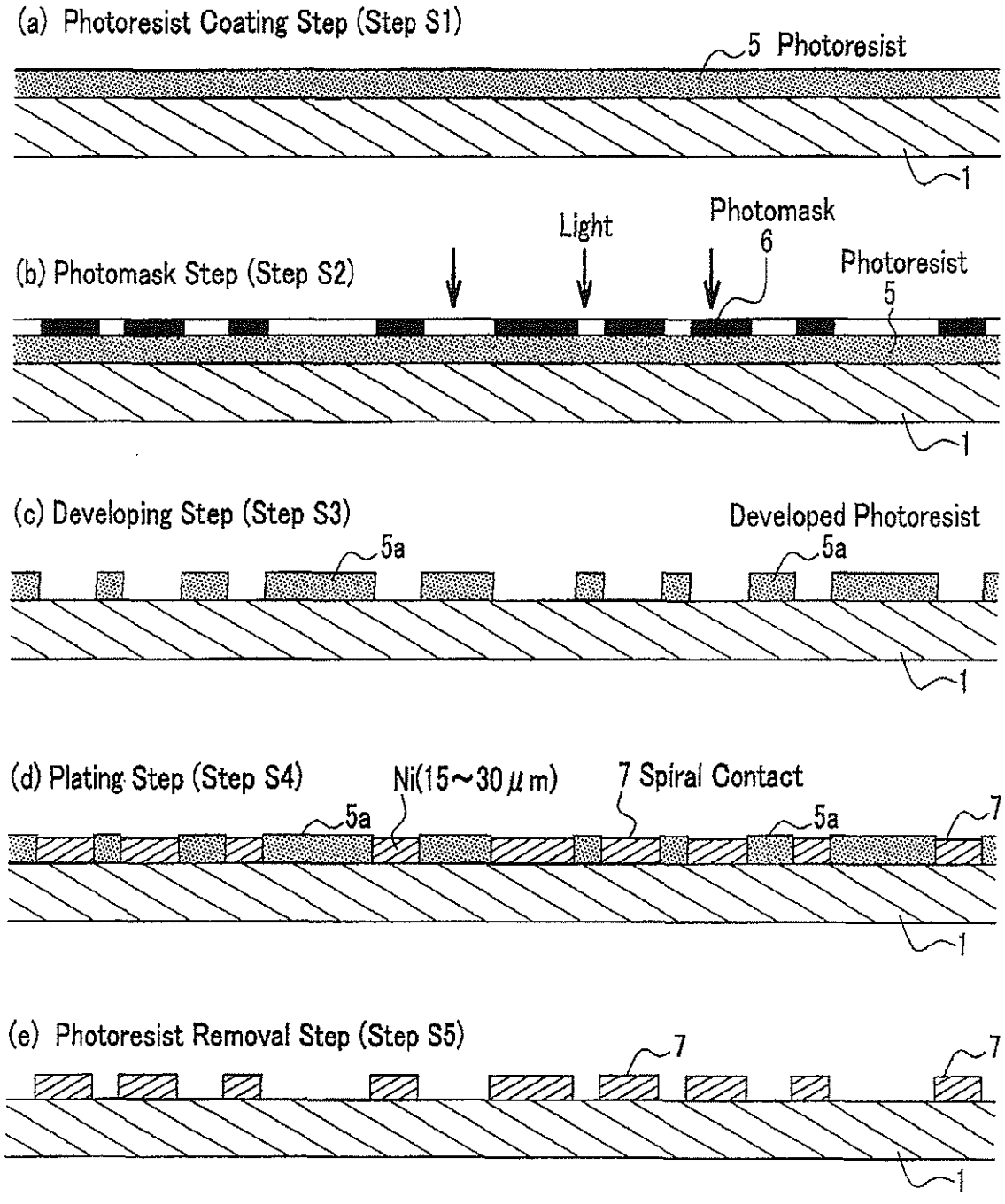

(a) Photoresist Coating Step (Step S1)
5 Photoresist
1
(b) Photomask Step (Step S2)
Light
Photomask
6
Photoresist
5
1
(c) Developing Step (Step S3)
Developed Photoresist
5a
5a
1
(d) Plating Step (Step S4)
Ni(15~30 μm)
7 Spiral Contact
5a
5a
7
1
(e) Photoresist Removal Step (Step S5)
7
7
1

FIG.3

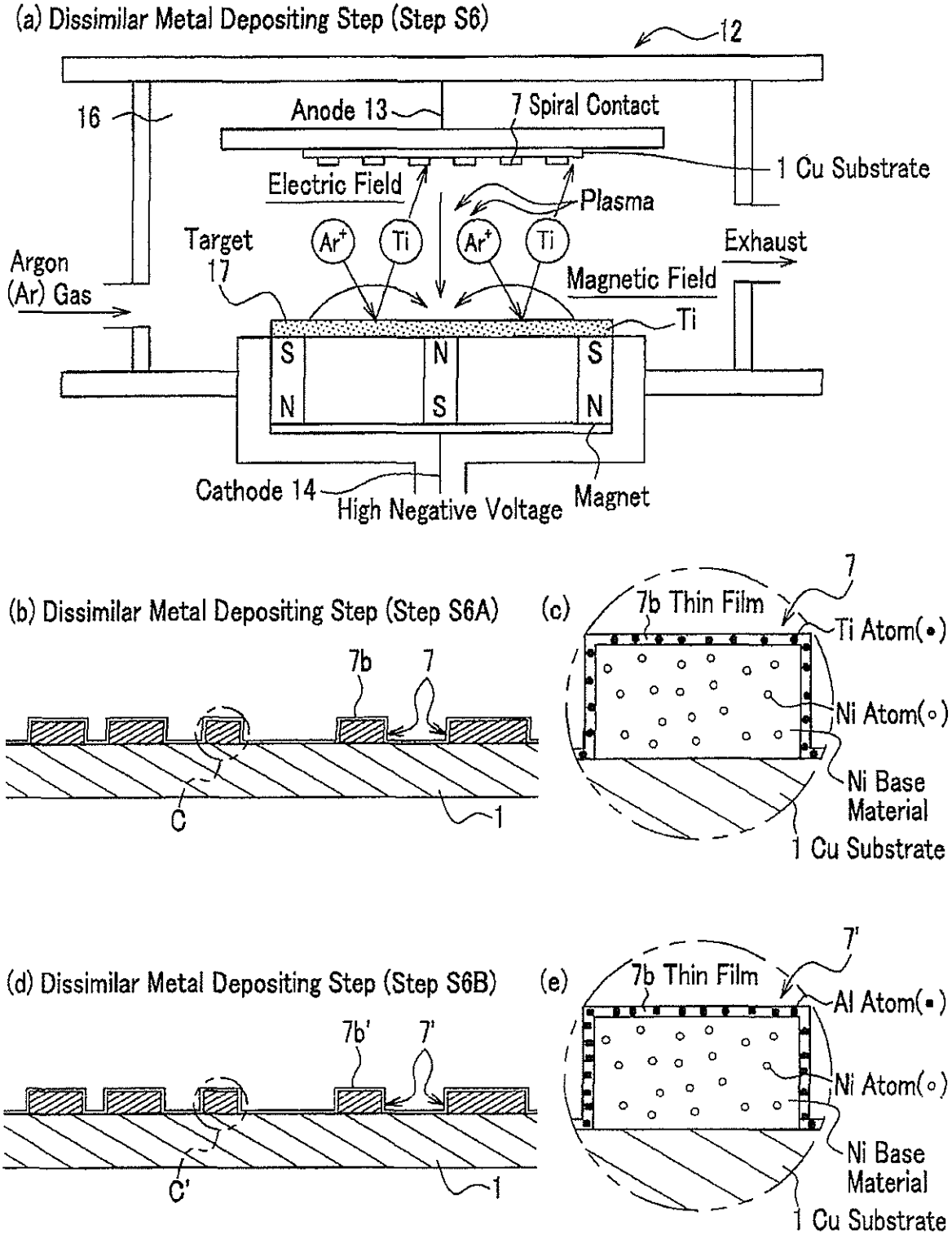
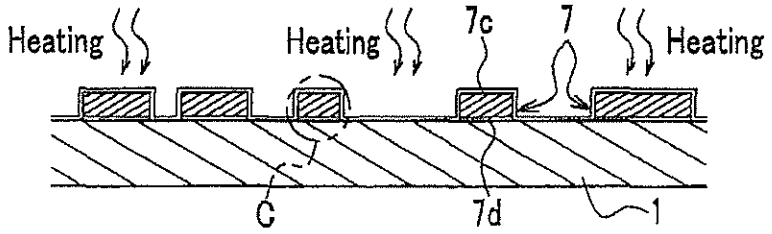
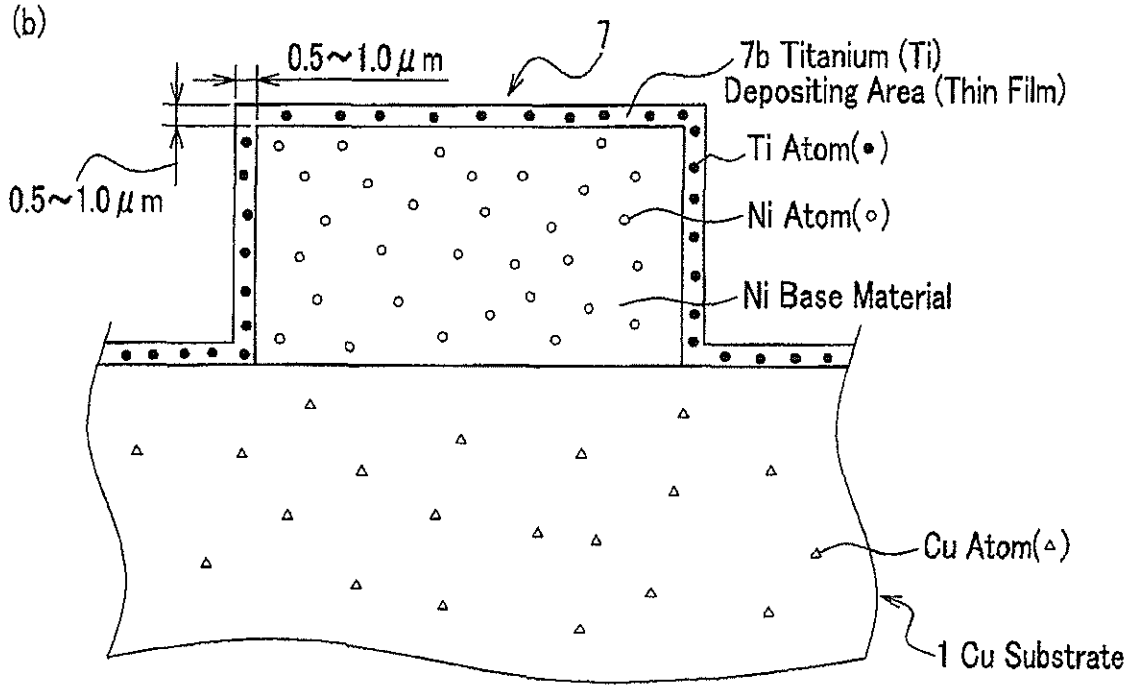

(a) Dissimilar Metal Depositing Step (Step S6)
12
16
Anode 13
7 Spiral Contact
1 Cu Substrate
Electric Field
Plasma
Target
17
Ar+
Ti
Ar+
Ti
Exhaust
Argon
(Ar) Gas
Magnetic Field
Ti
S
N
N
S
S
N
Cathode 14
High Negative Voltage
Magnet
(b) Dissimilar Metal Depositing Step (Step S6A)
7b
7
C
1
(c)
7
7b Thin Film
Ti Atom(•)
Ni Atom(◦)
Ni Base
Material
1 Cu Substrate
(d) Dissimilar Metal Depositing Step (Step S6B)
7b'
7'
C'
1
(e)
7'
7b Thin Film
Al Atom(•)
Ni Atom(◦)
Ni Base
Material
1 Cu Substrate

FIG.4

(a) Dissimilar Metal Diffusing and Infiltrating Step (Step S7A)



(b)



(c)

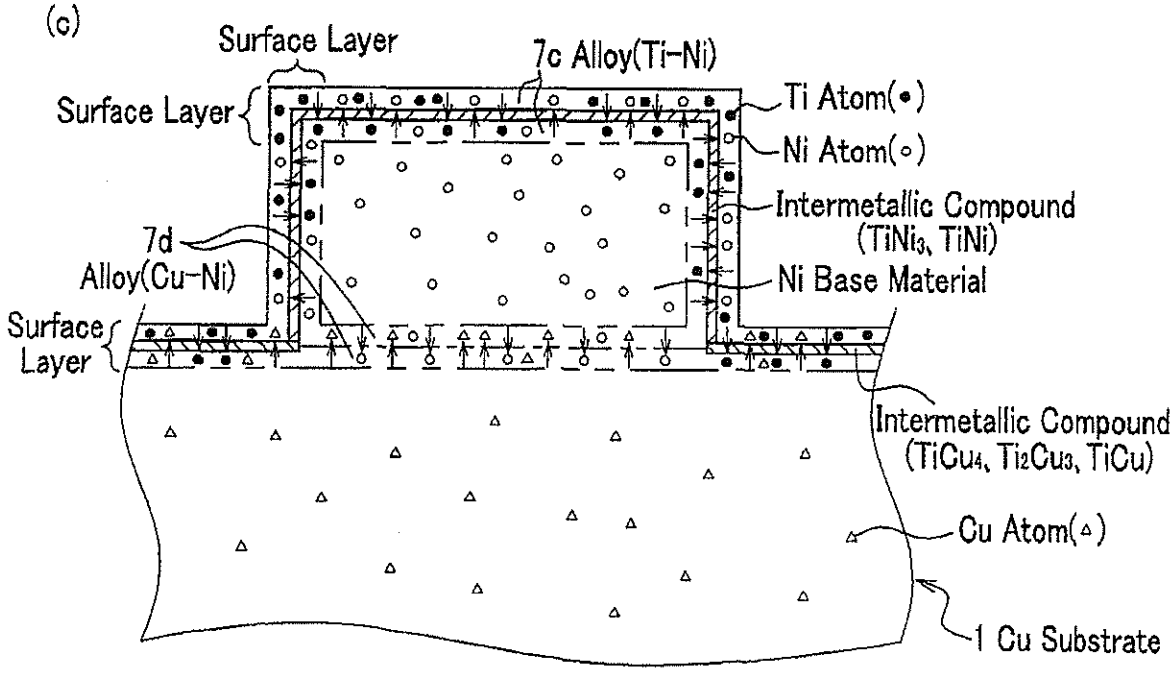
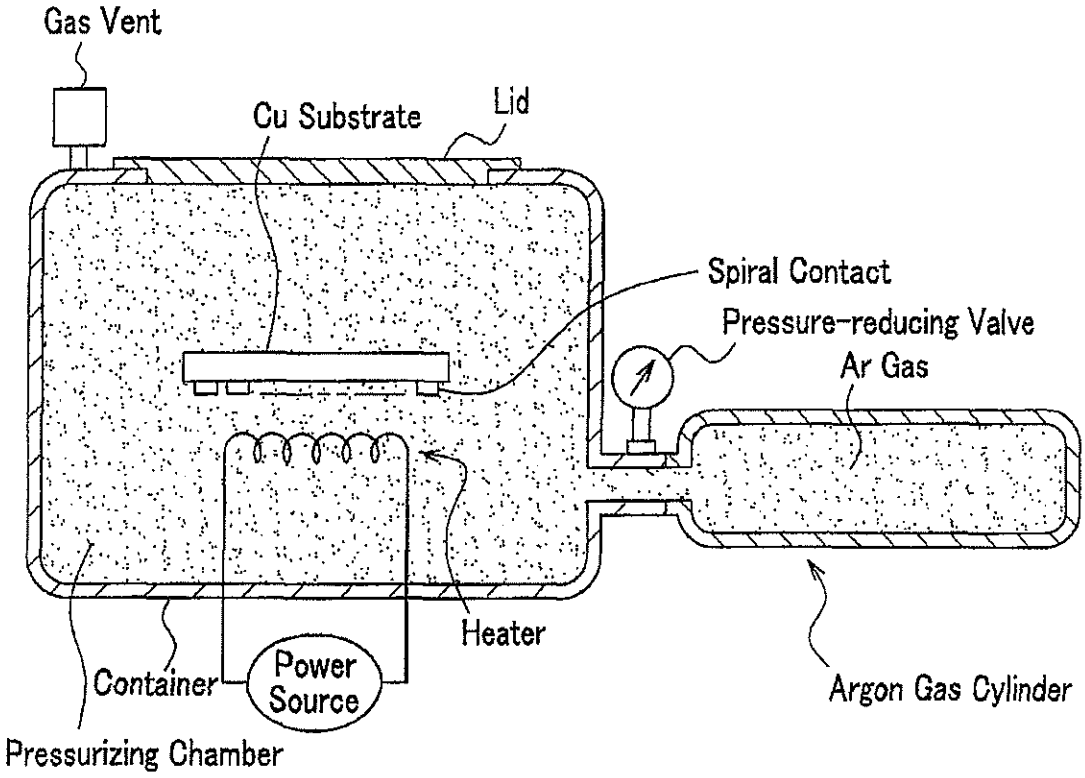
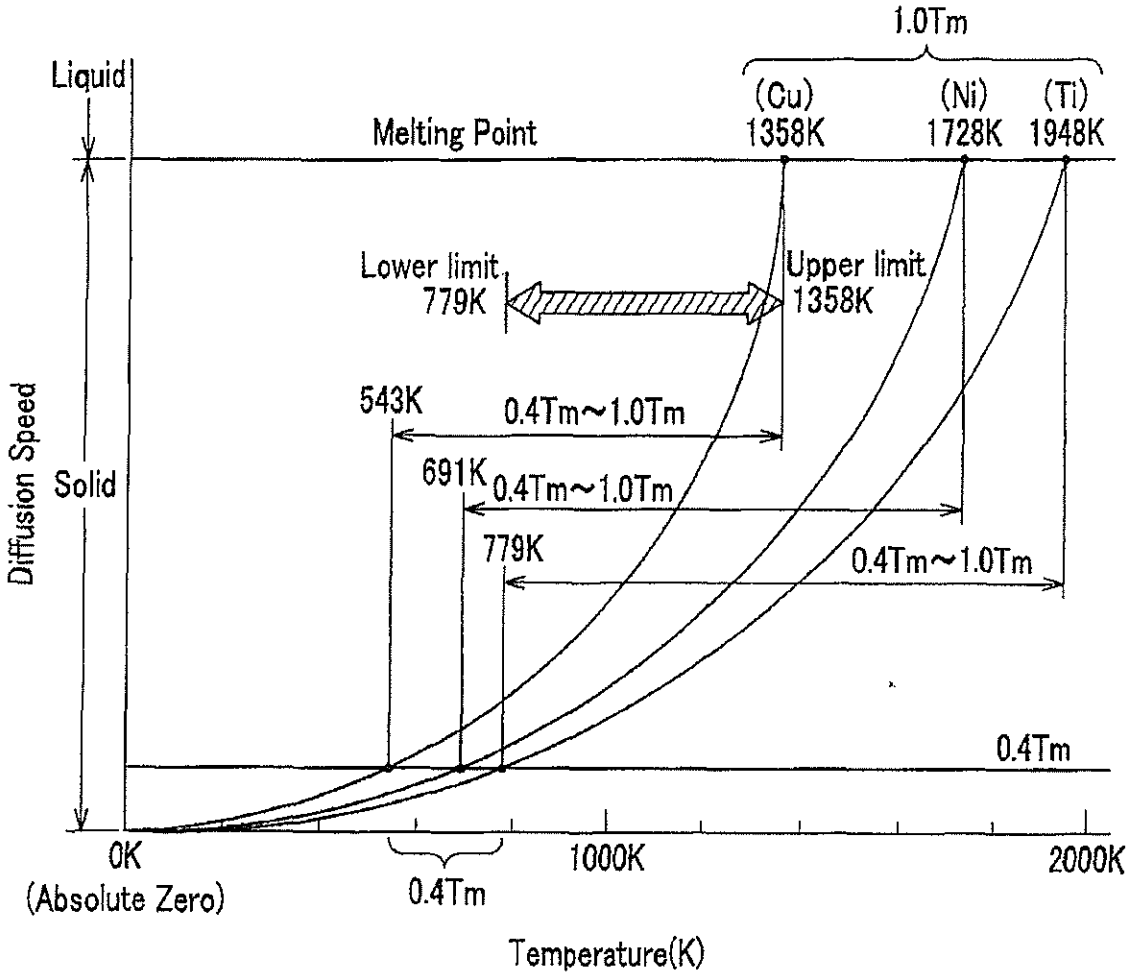


FIG.5



Pressurization Setting Value: 0.1 MPa to 10.0 MPa

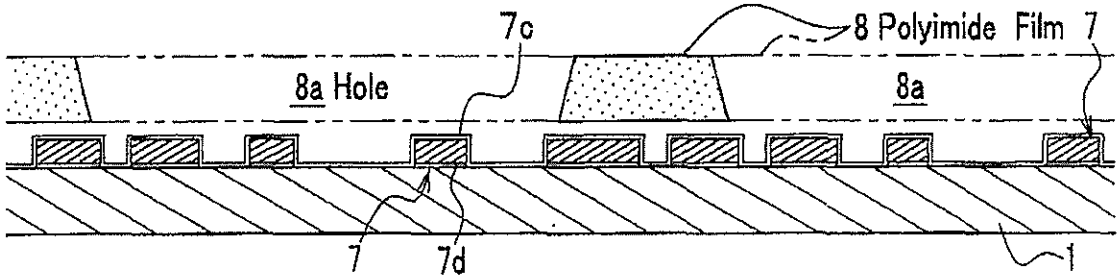
FIG.6



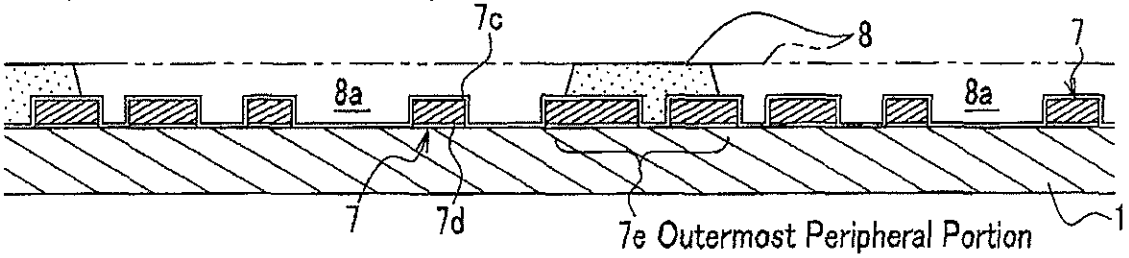
Heating Temperature: 0.4Tm to 1.0Tm

FIG.7

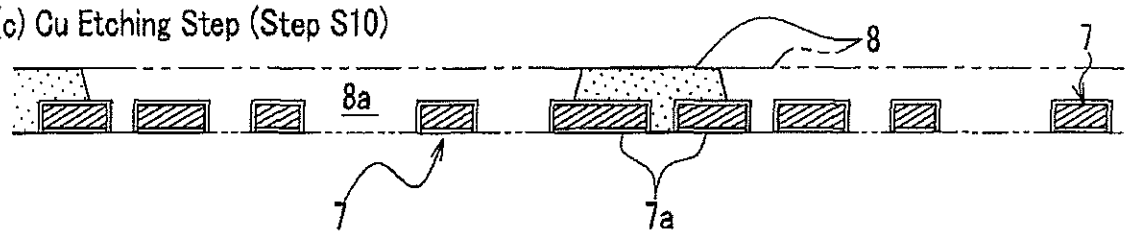
(a) Polyimide Film Laminating Step (Step S8)



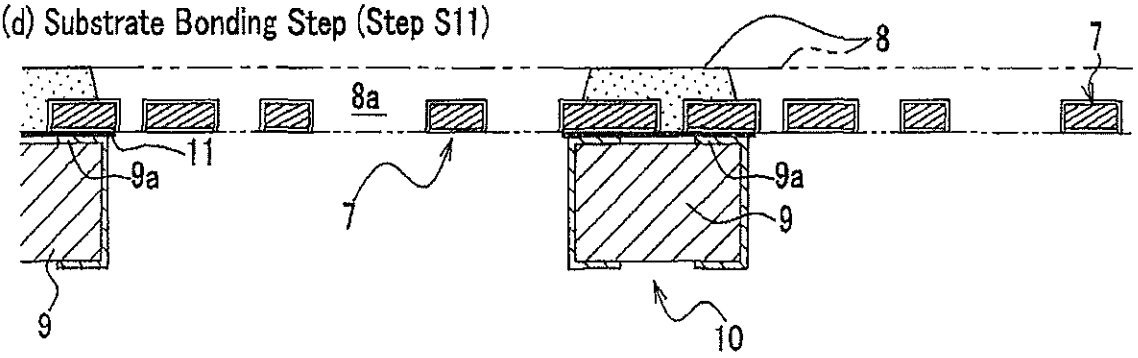
(b) Polyimide Film Press-laminating Step (Step S9)



(c) Cu Etching Step (Step S10)



(d) Substrate Bonding Step (Step S11)



(e) Electroless Au Plating Step (Step S12)

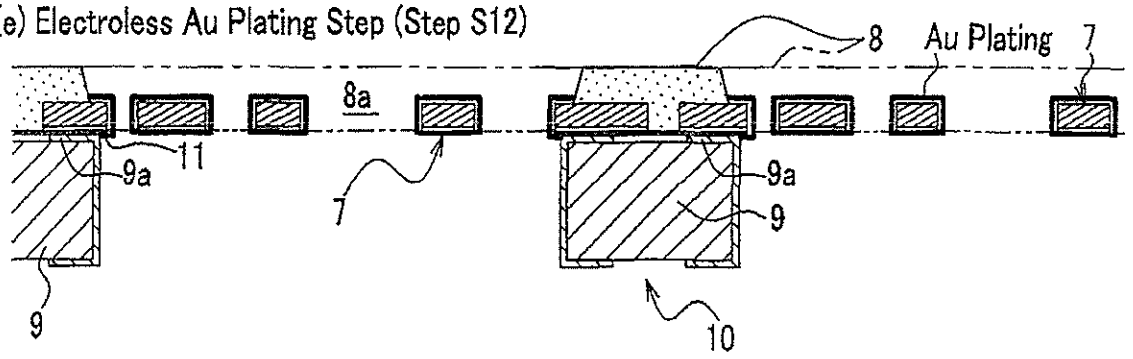
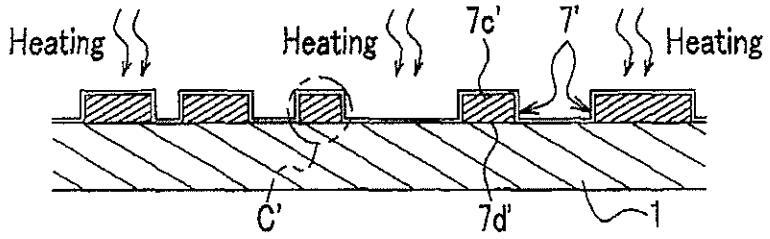
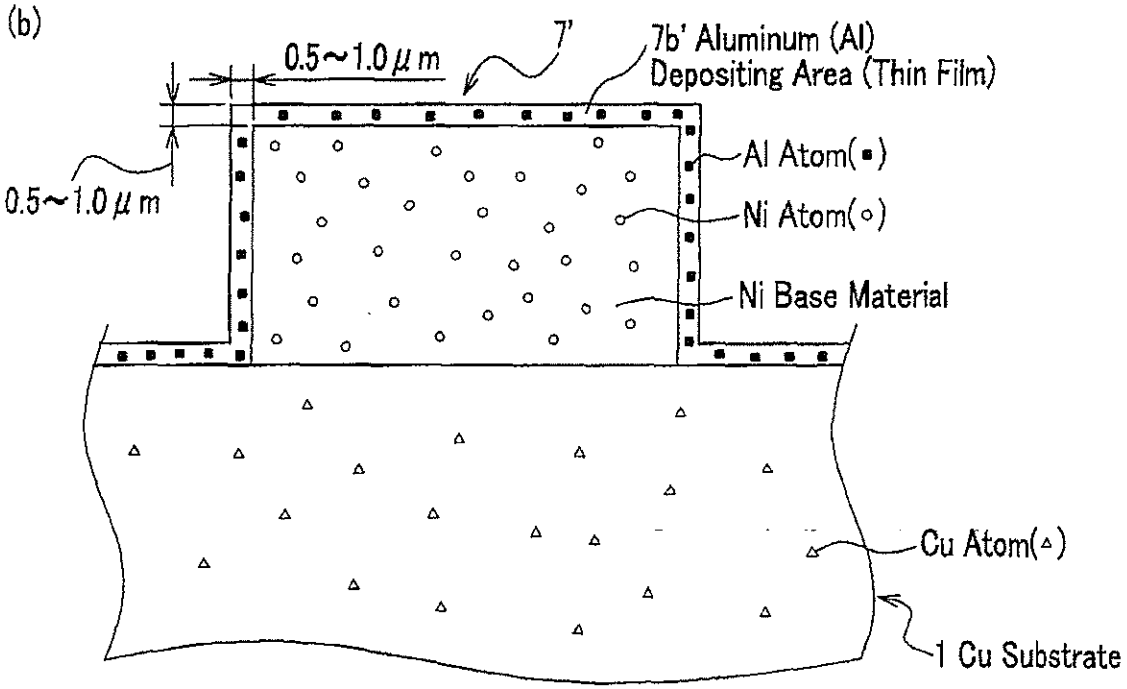


FIG.8

(a) Dissimilar Metal Diffusing and Infiltrating Step (Step S7B)



(b)



(c)

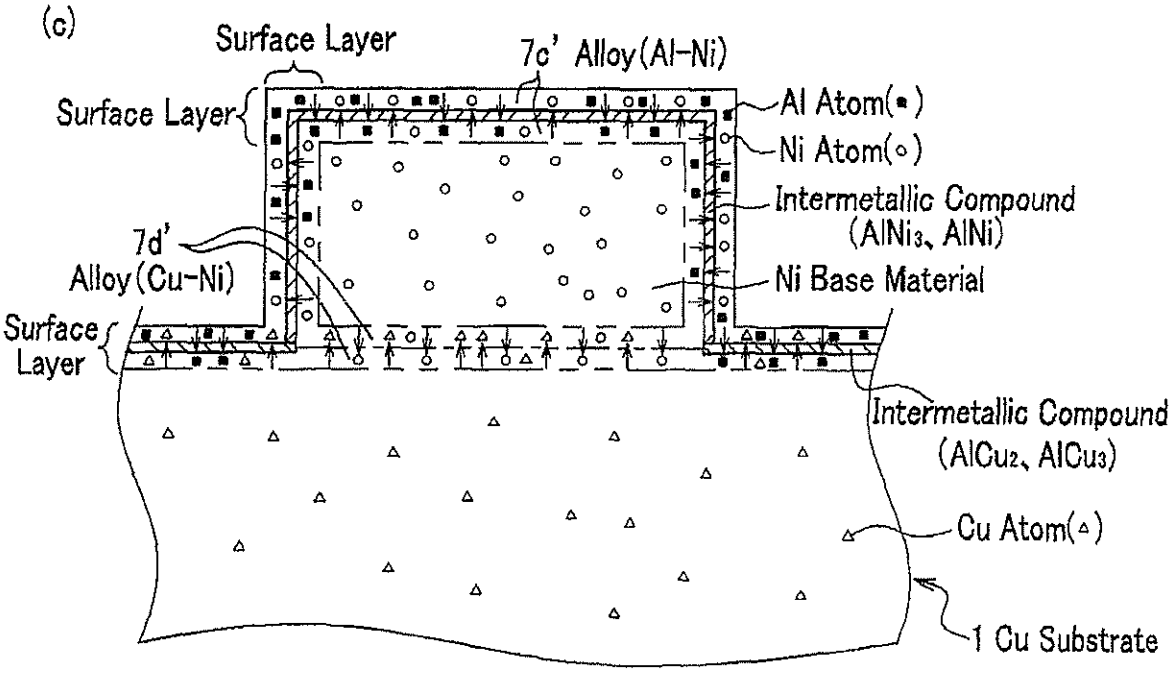
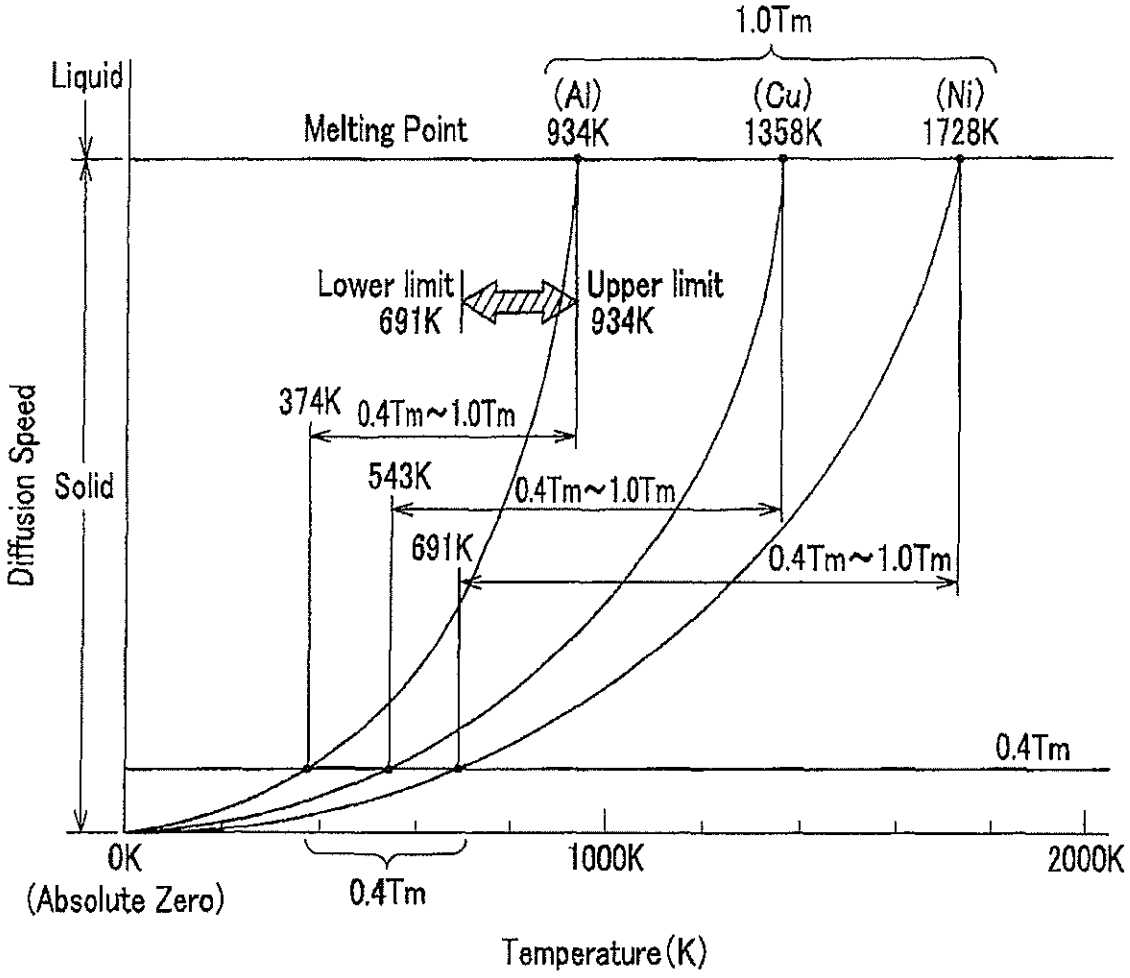


FIG.9



Heating Temperature: 0.4Tm to 1.0Tm

FIG.10

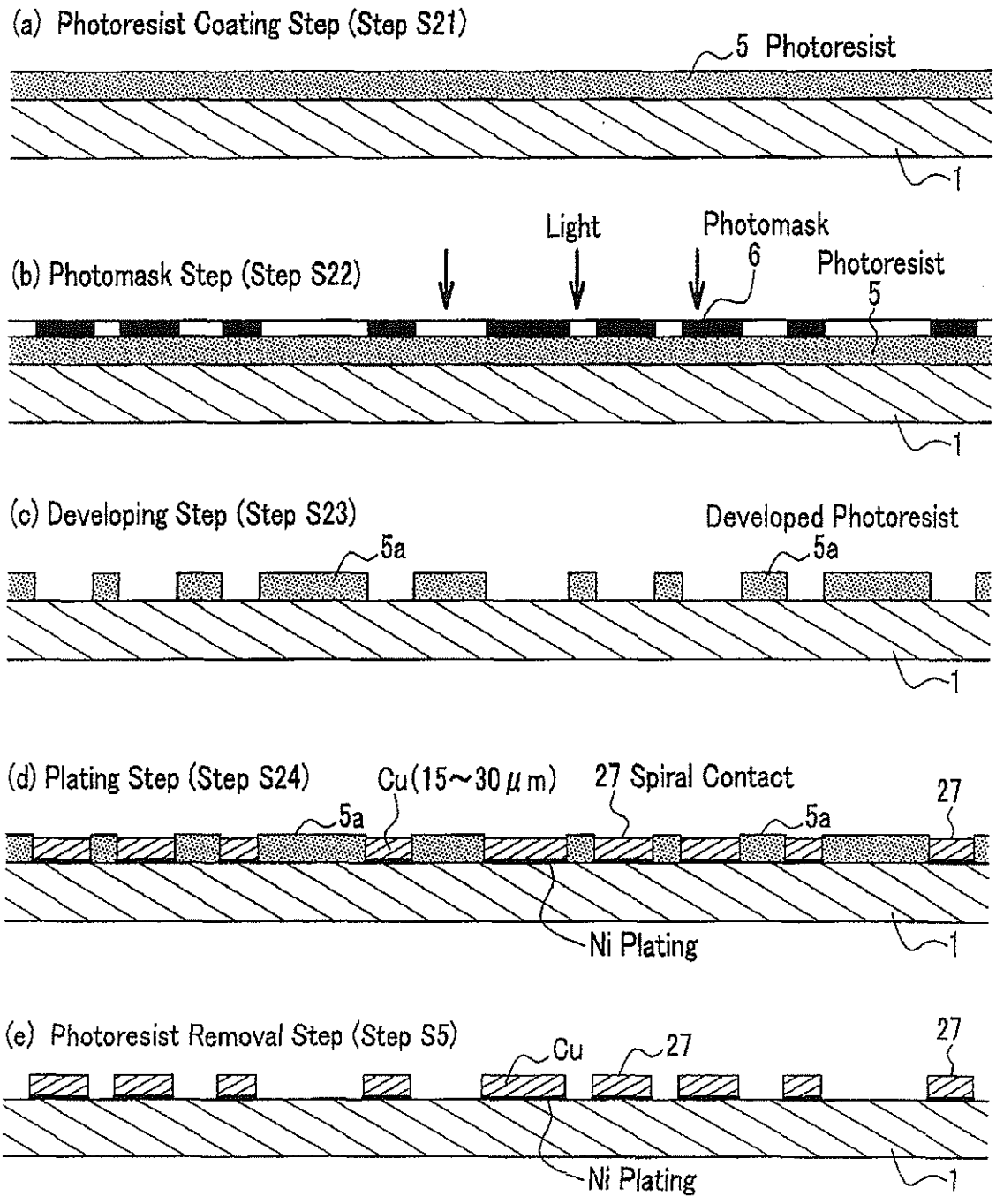
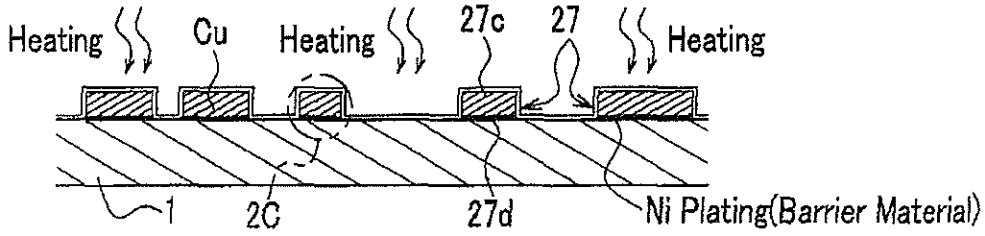
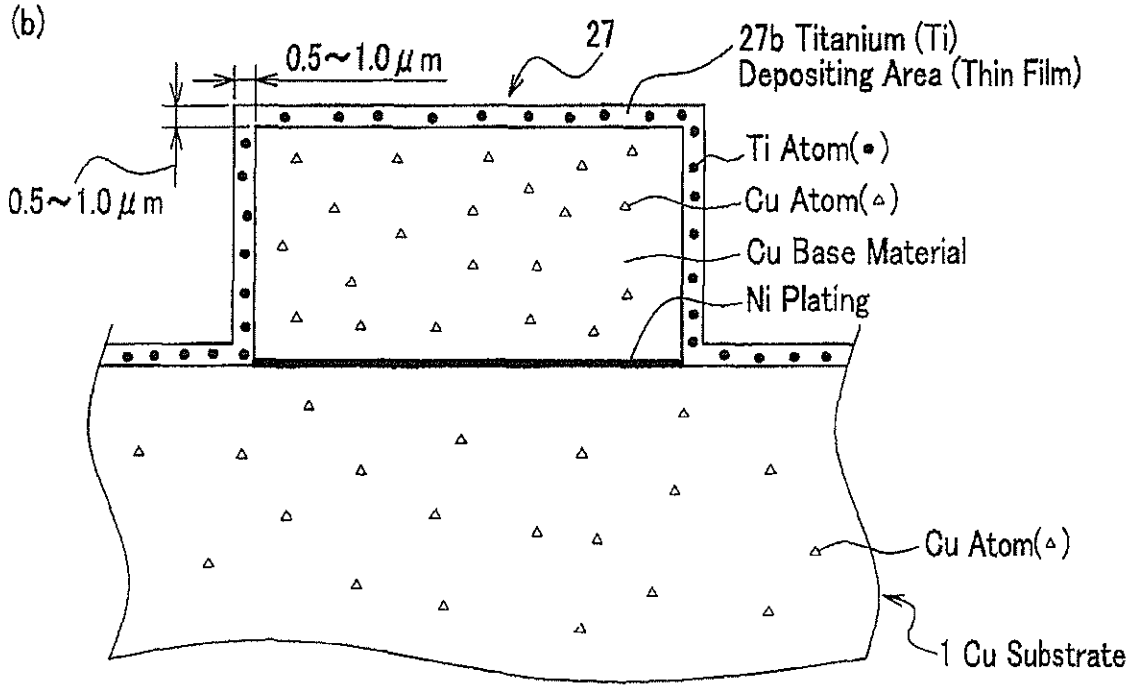

(a) Photoresist Coating Step (Step S21)
5 Photoresist
1
(b) Photomask Step (Step S22)
Light
Photomask
6
Photoresist
5
1
(c) Developing Step (Step S23)
Developed Photoresist
5a
5a
1
(d) Plating Step (Step S24)
Cu(15~30 μm)
27 Spiral Contact
5a
5a
27
Ni Plating
1
(e) Photoresist Removal Step (Step S5)
Cu
27
27
Ni Plating
1

FIG.11

(a) Dissimilar Metal Diffusing and Infiltrating Step (Step S27A)



(b)



(c)

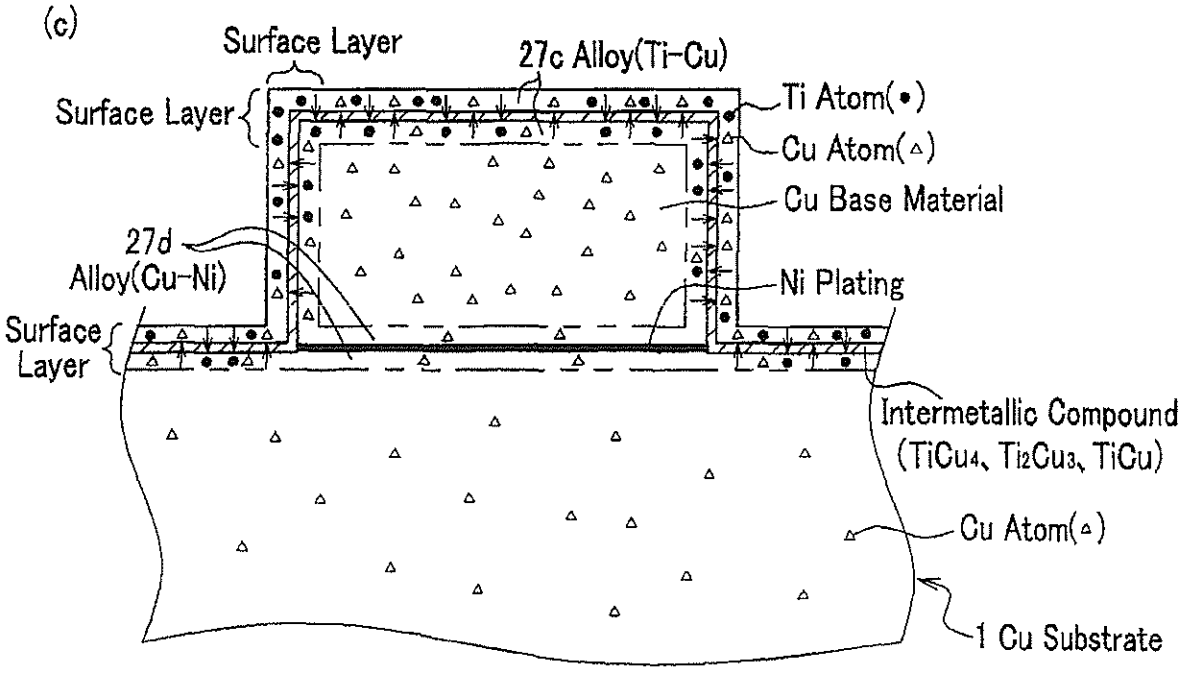
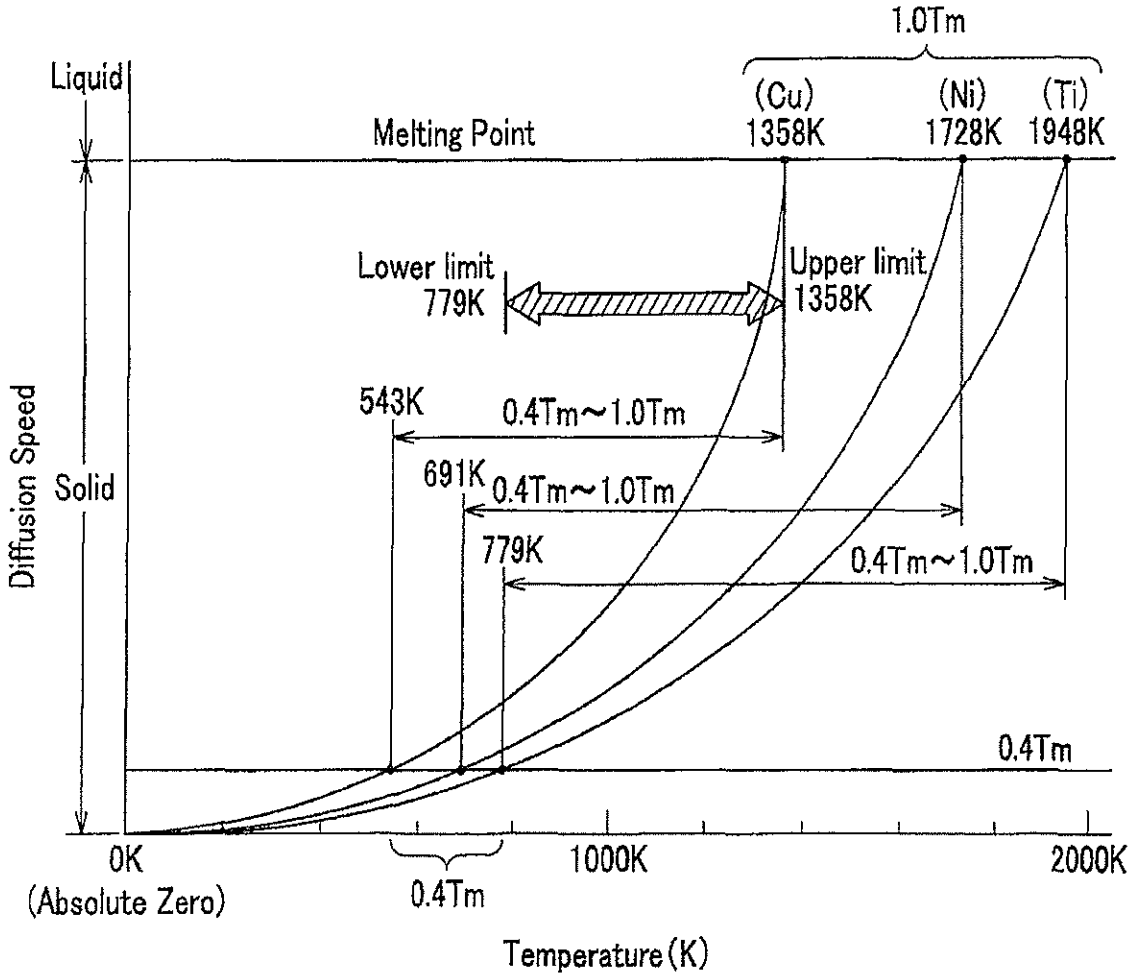


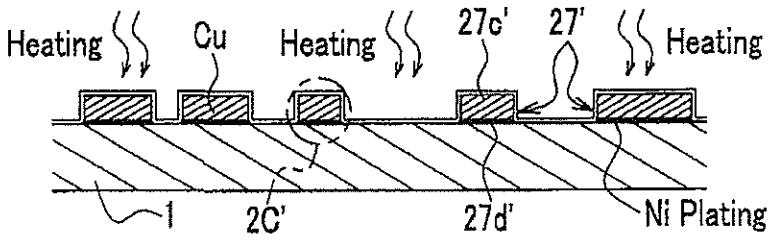
FIG.12



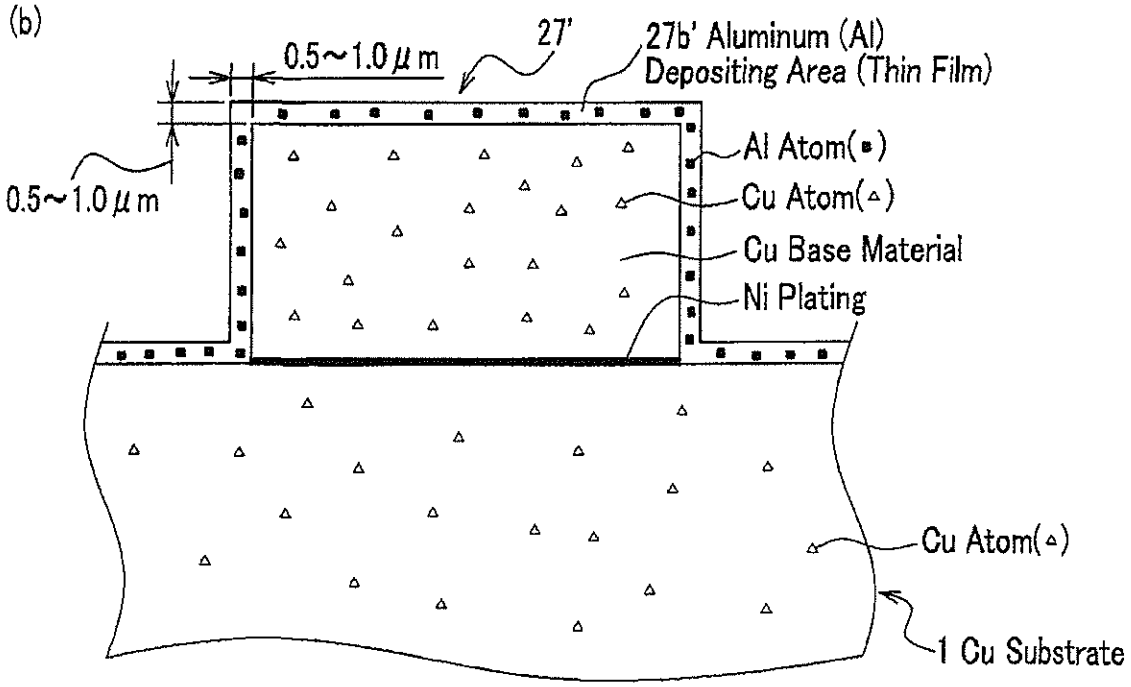
Heating Temperature: 0.4Tm to 1.0Tm

FIG.13

(a) Dissimilar Metal Diffusing and Infiltrating Step (Step S27B)



(b)



(c)

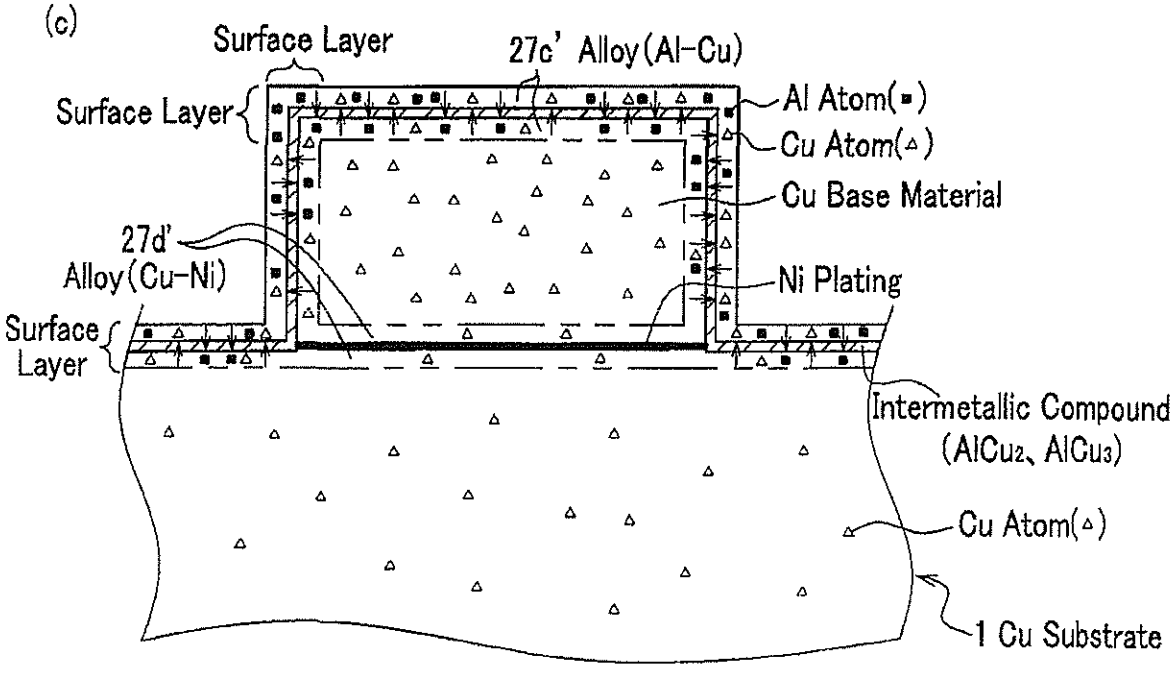
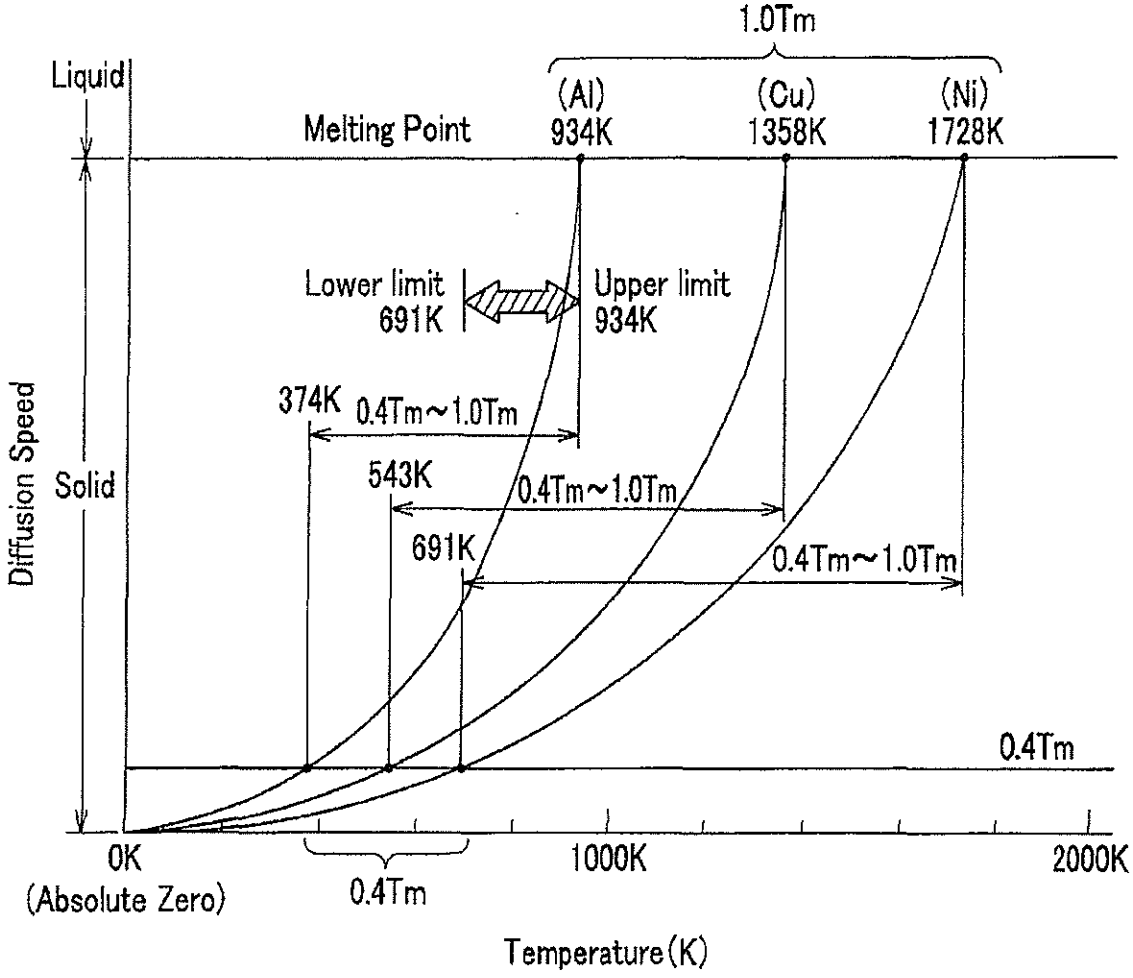


FIG.14



Heating Temperature: 0.4Tm to 1.0Tm

FIG.15

Prior Art

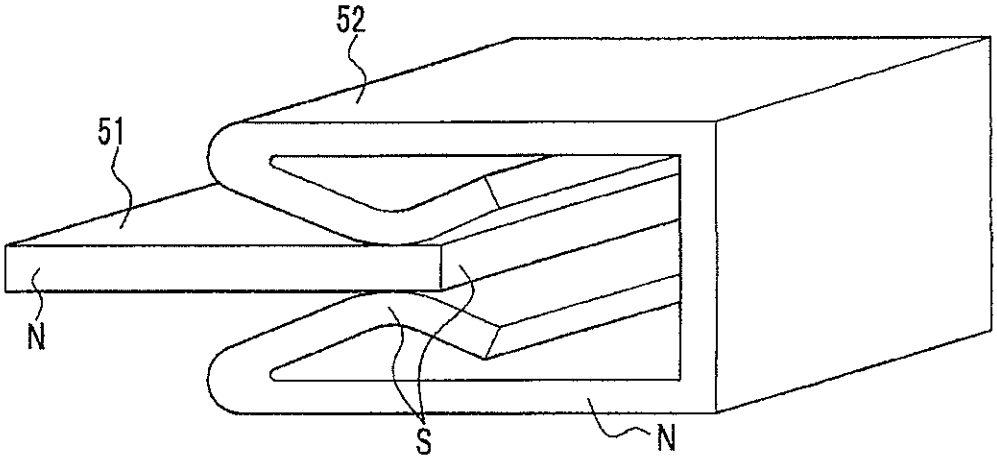


FIG.16

Prior Art

