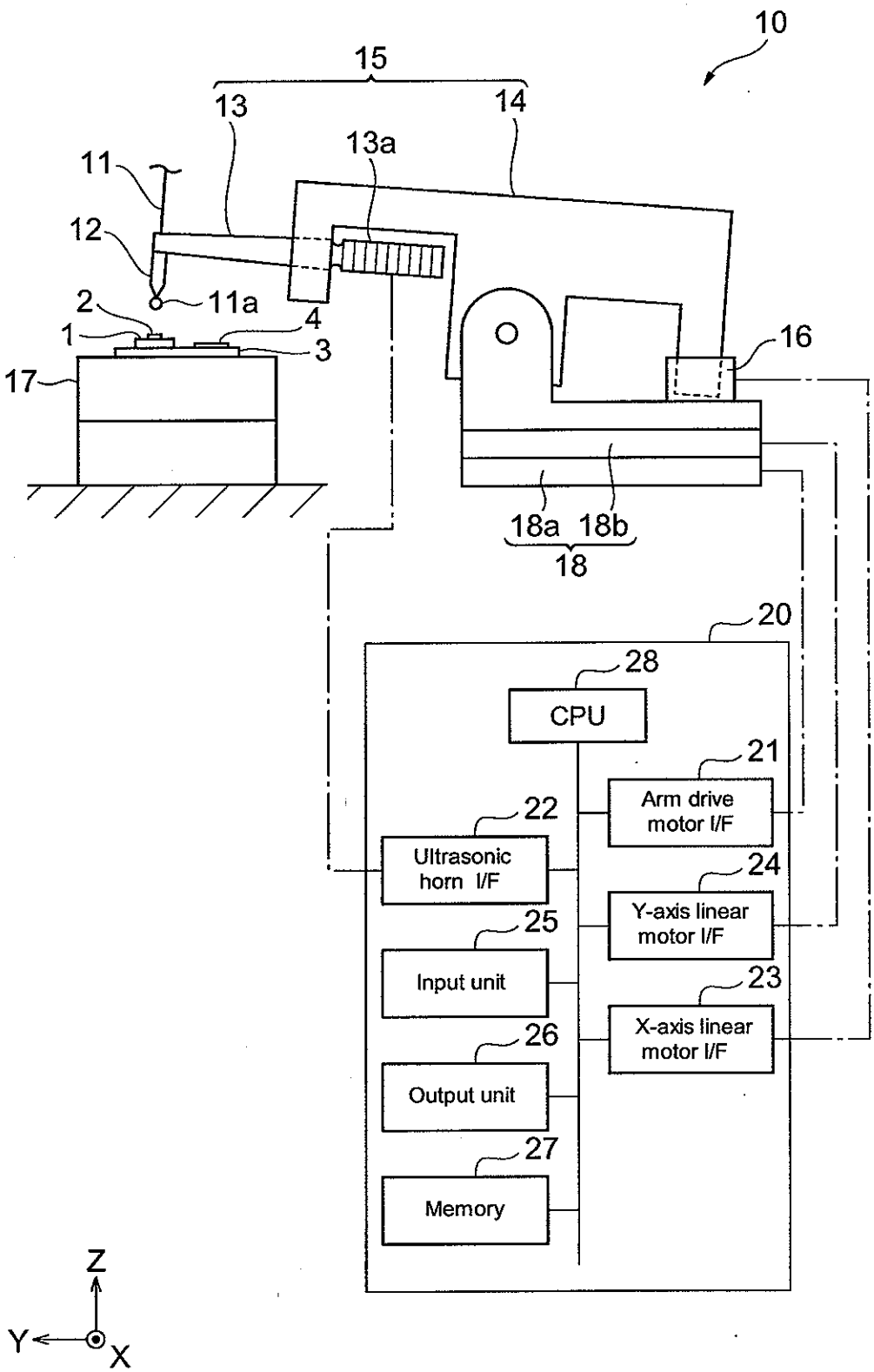

10
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13a
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12
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11a
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4
3
17
16
18a
18b
18
20
28
CPU
21
Arm drive motor I/F
22
Ultrasonic horn I/F
24
Y-axis linear motor I/F
25
Input unit
23
X-axis linear motor I/F
26
Output unit
27
Memory
Z
Y
X

FIG. 1

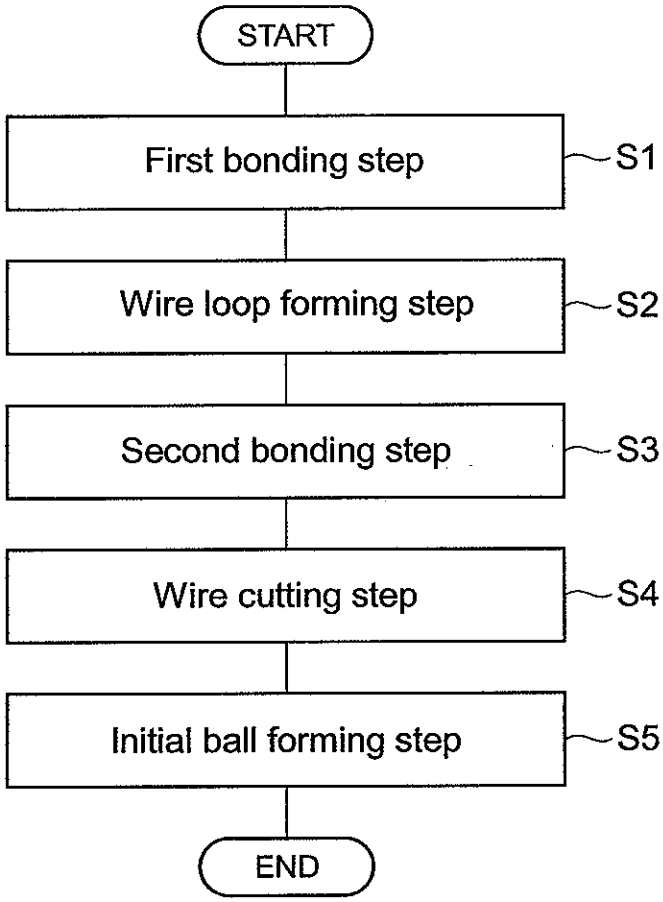

START
First bonding step
S1
Wire loop forming step
S2
Second bonding step
S3
Wire cutting step
S4
Initial ball forming step
S5
END

FIG. 2

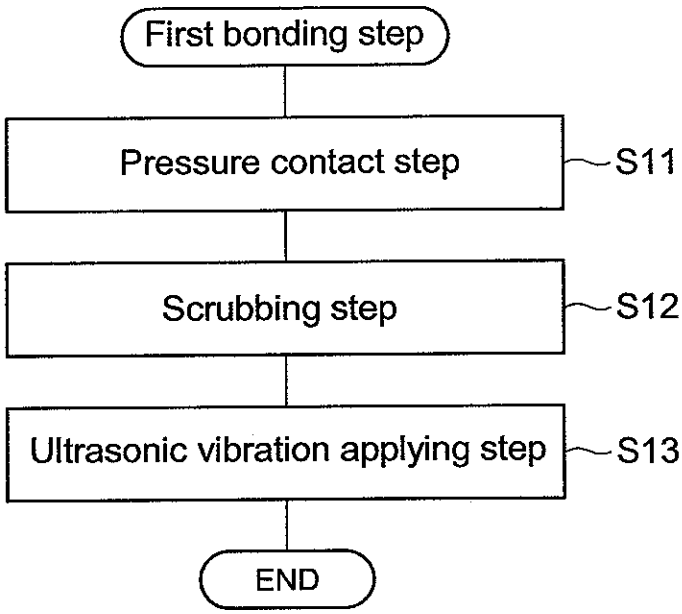

First bonding step
Pressure contact step
S11
Scrubbing step
S12
Ultrasonic vibration applying step
S13
END

FIG. 3

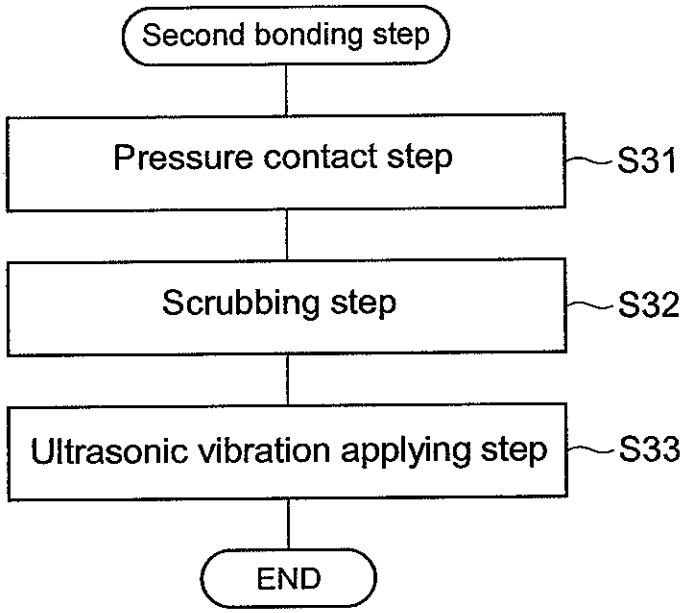

Second bonding step
Pressure contact step
S31
Scrubbing step
S32
Ultrasonic vibration applying step
S33
END

FIG. 4

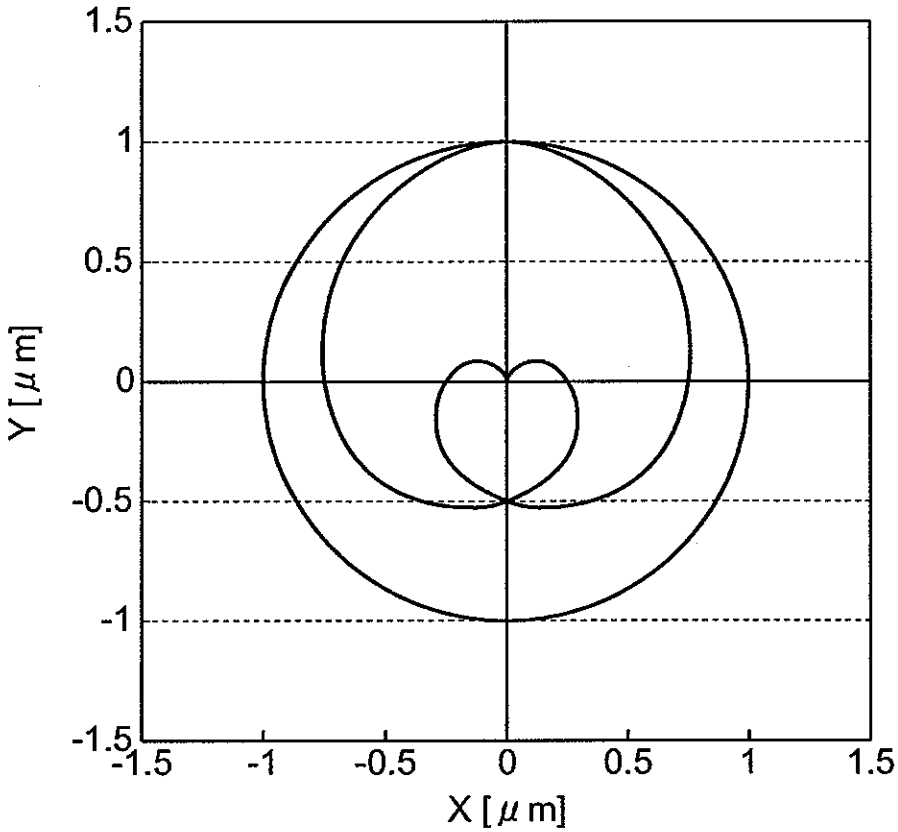


FIG. 5(a)

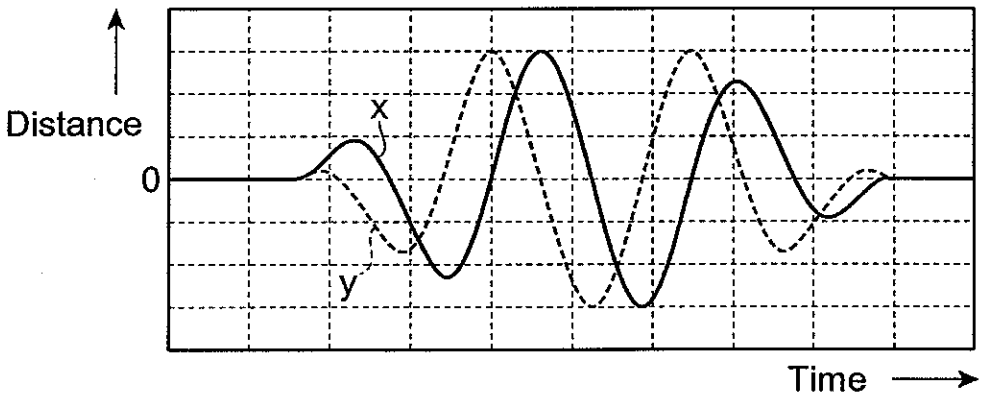


FIG. 5(b)

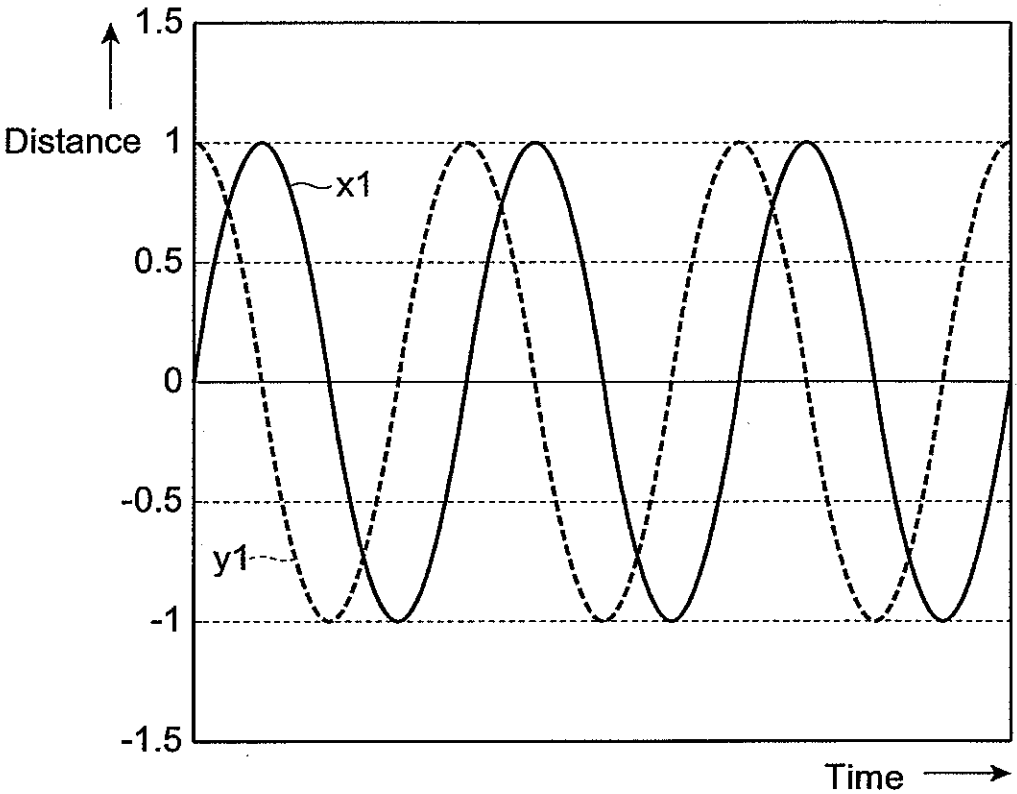


FIG. 6

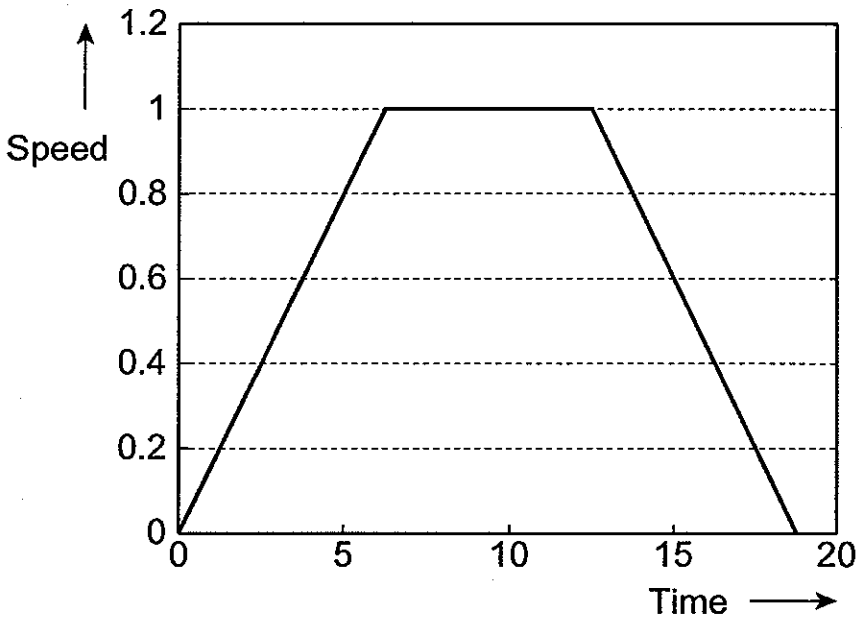


FIG. 7

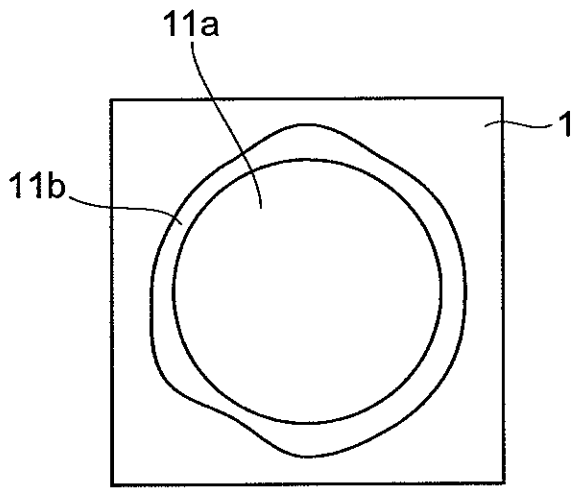


FIG. 8

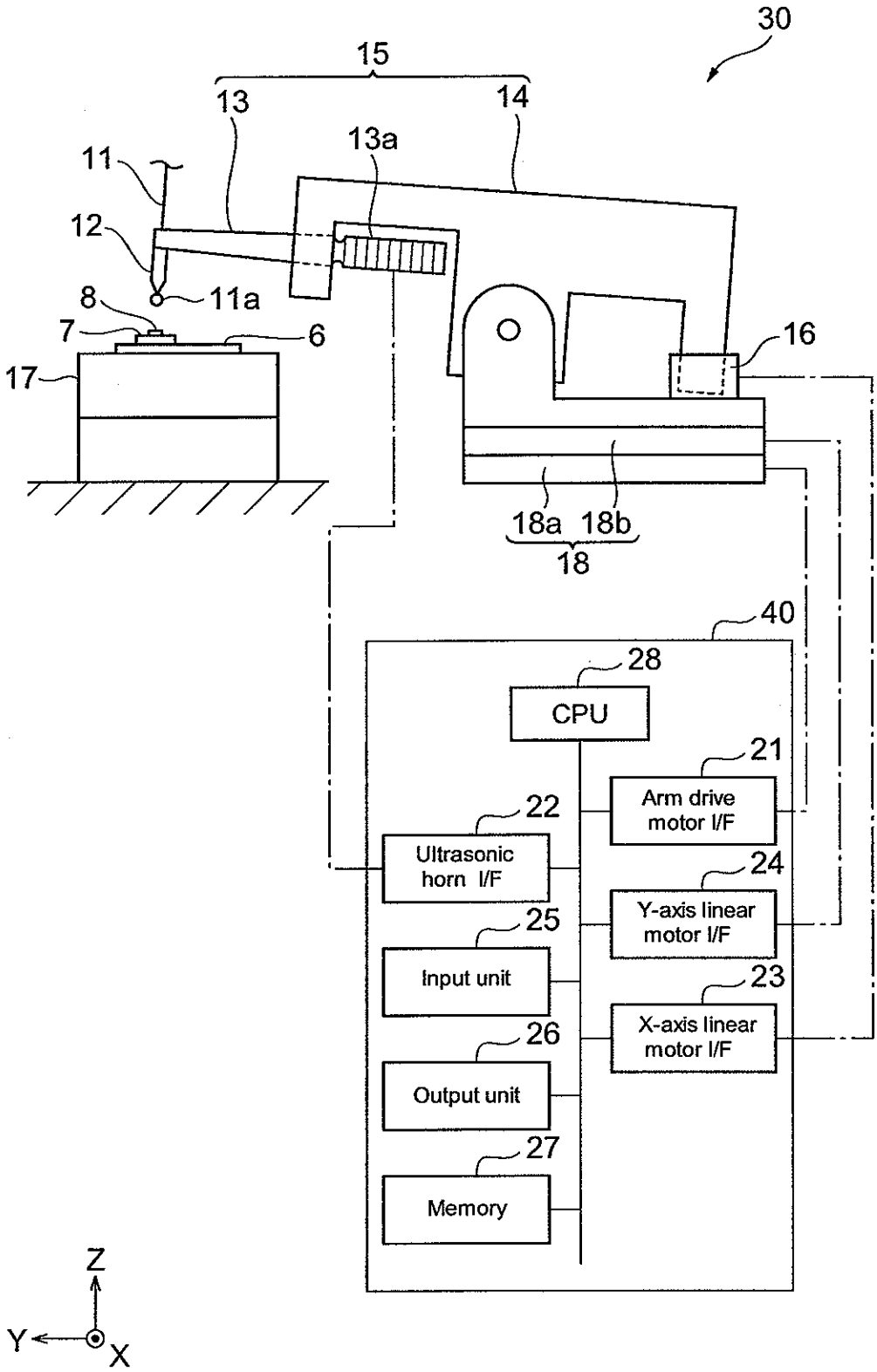

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11a
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18a
18b
18
40
28
CPU
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Arm drive motor I/F
22
Ultrasonic horn I/F
24
Y-axis linear motor I/F
25
Input unit
23
X-axis linear motor I/F
26
Output unit
27
Memory
Z
Y
X

FIG. 9

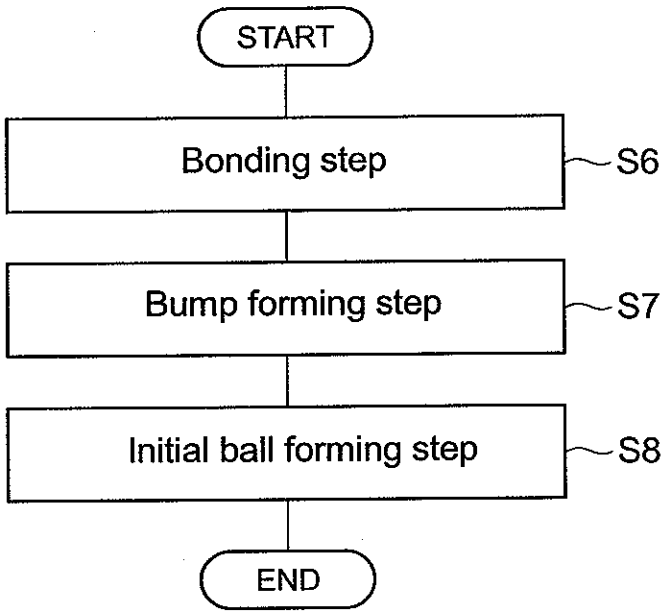

START
Bonding step
S6
Bump forming step
S7
Initial ball forming step
S8
END

FIG. 10

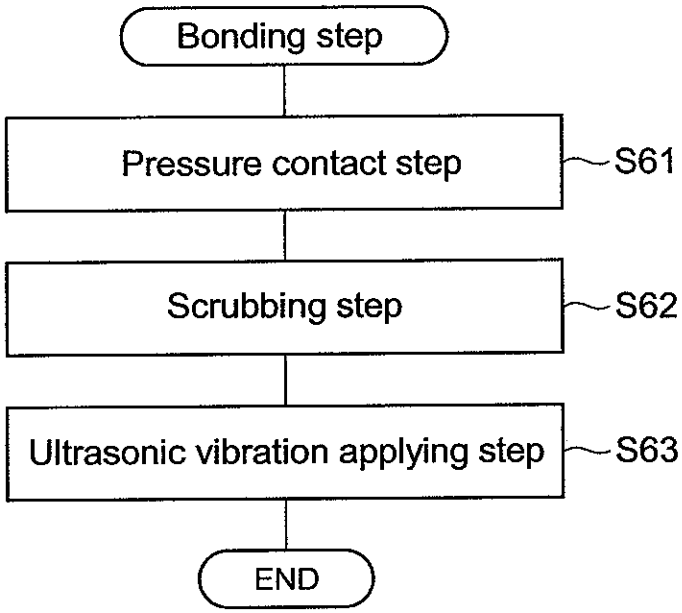

Bonding step
Pressure contact step
S61
Scrubbing step
S62
Ultrasonic vibration applying step
S63
END

FIG. 11

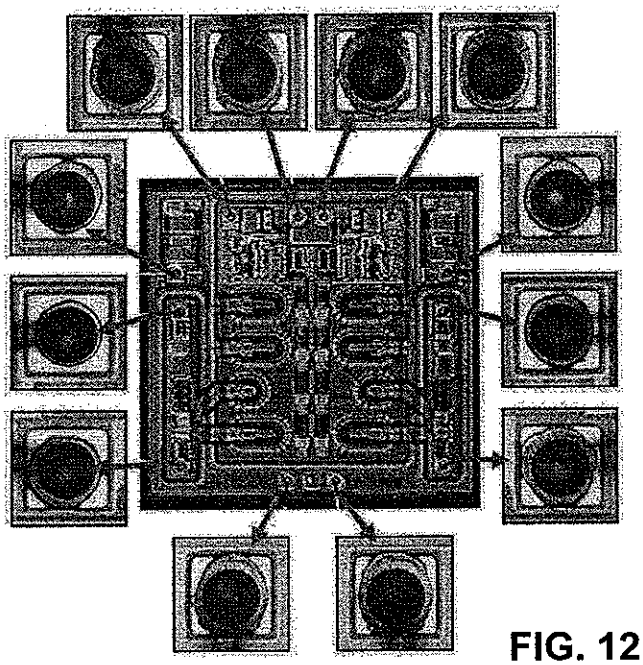


FIG. 12(a)

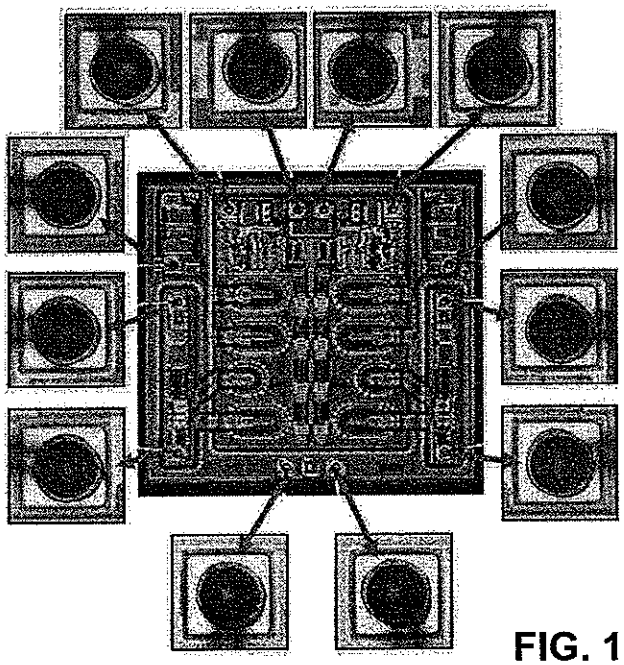


FIG. 12(b)

	Comparative Example		Practical Example	
	X (μm)	Y (μm)	X (μm)	Y (μm)
Max	138	158	124	127
Min	122	125	120	123
Ave	129.1	142.8	121.9	125.8
σ	4.27	11.96	1.51	1.34

FIG. 13

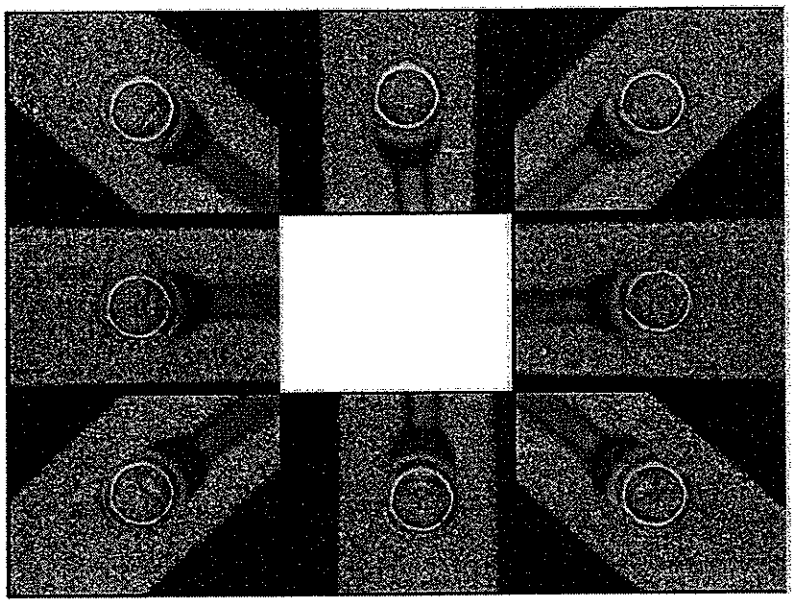


FIG. 14(a)

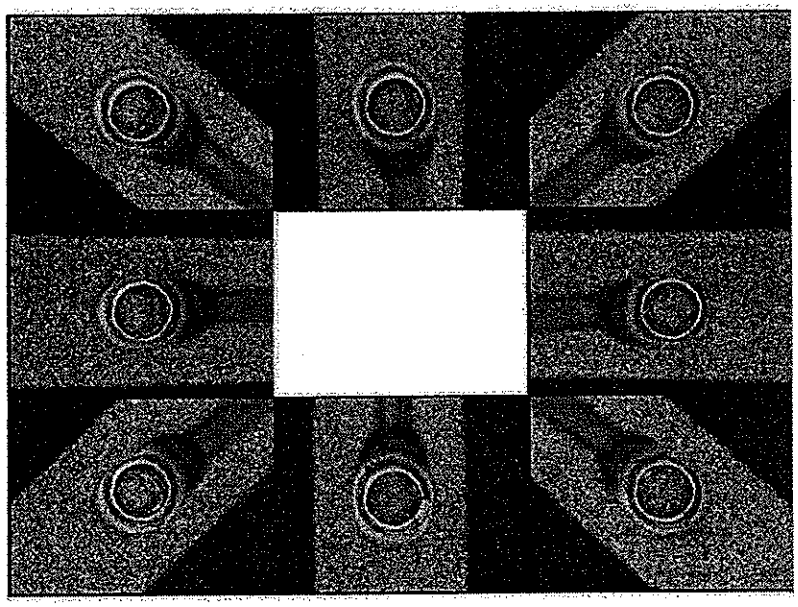


FIG. 14(b)

	Comparative Example		Practical Example	
	Bonding width	Tensile strength	Bonding width	Tensile strength
Max	38	4.51	39	4.53
Min	36	3.42	37	3.53
Ave	36.8	3.97	37.9	4.00
σ	0.62	0.40	0.67	0.34

FIG. 15

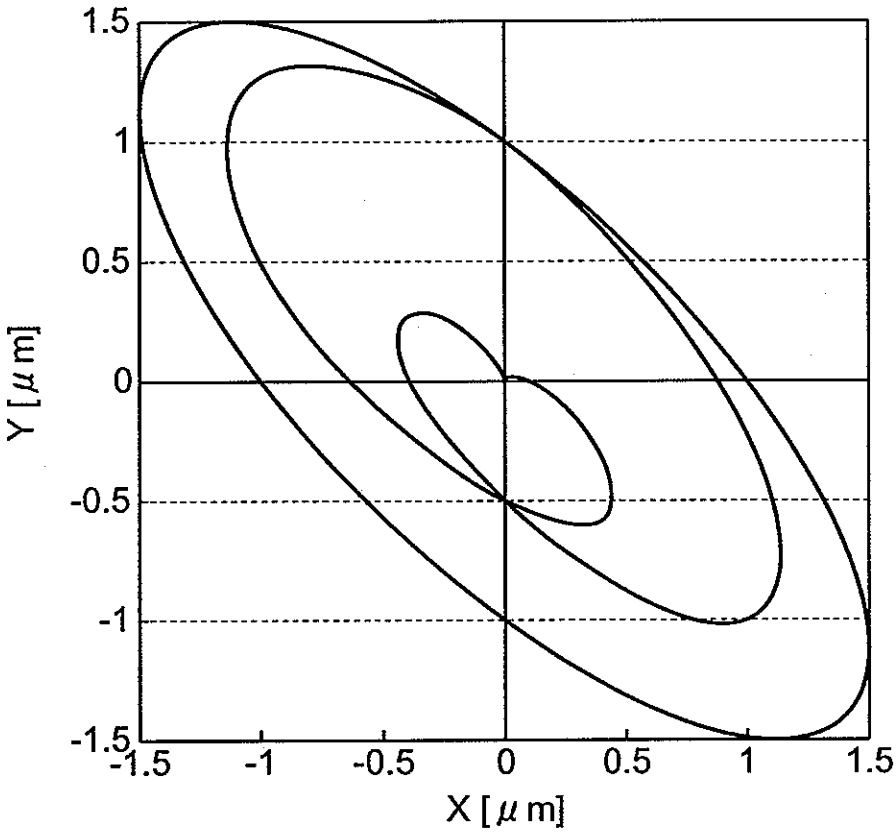


FIG. 16(a)

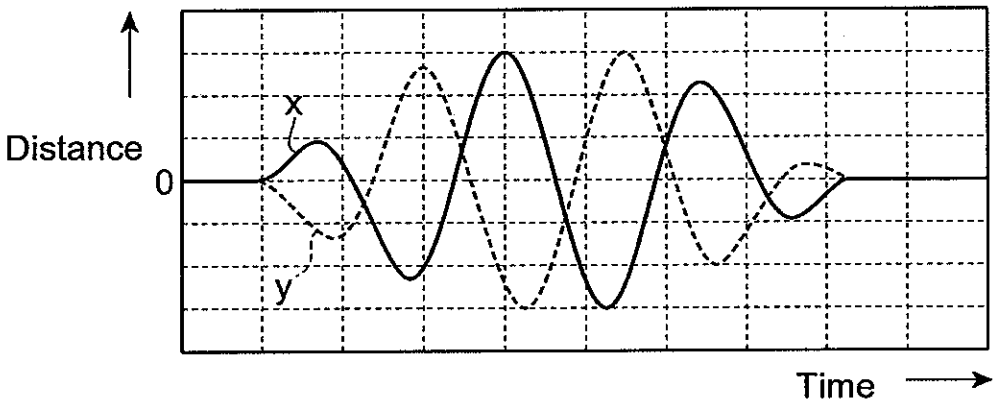


FIG. 16(b)

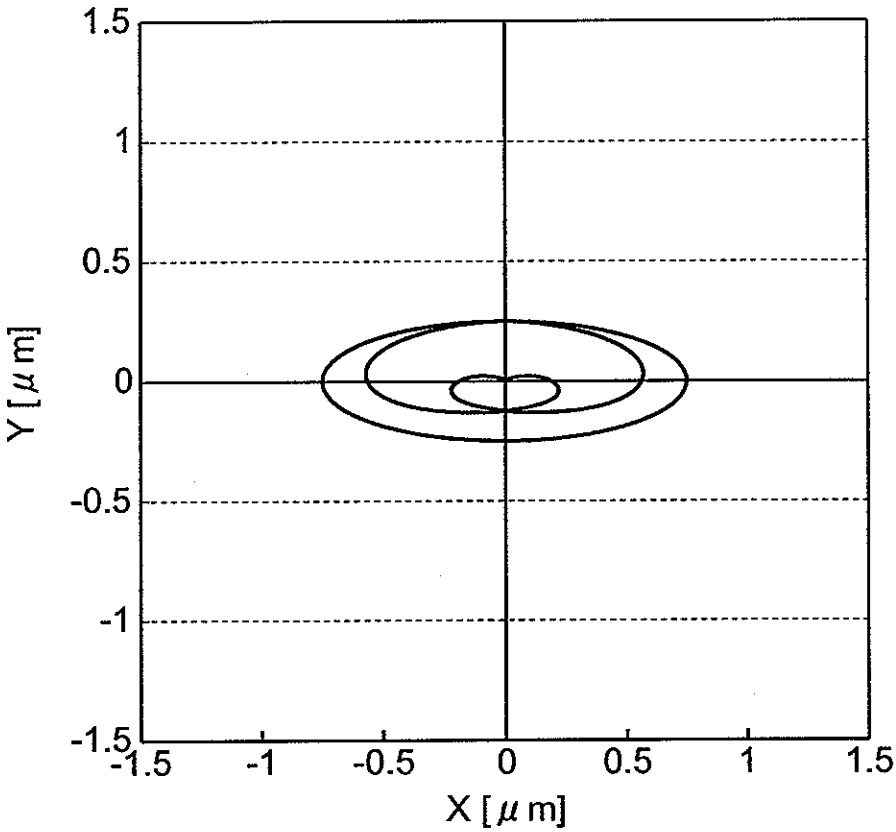


FIG. 17(a)

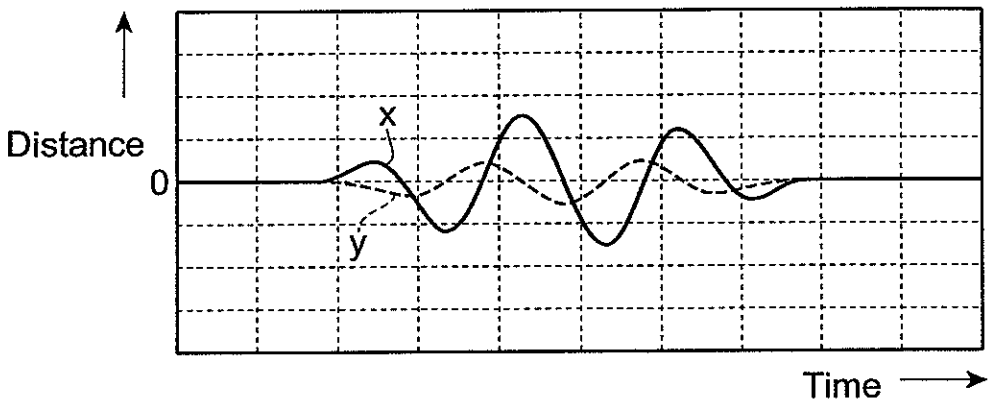


FIG. 17(b)