

(19) (KR)  
 (12) (A)

(51) Int. Cl.<sup>7</sup>  
 H01L 41/09

(11)  
 (43)

10-2004-0049309  
 2004 06 11

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(86)	PCT/GB2002/004370	(87)	WO 2003/028122
(86)	2002 09 26	(87)	2003 04 03

(30)	0123294.1	2001 09 27	(GB)
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(71)	1...	4 0
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(72)	22	43
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75	71
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02478	6
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가	
41	12

86	124
----	-----

41	79
----	----

(74)

:

(54)

가	2	가	가
,		가 2	,
가	, (11)		,
		가	/
		,	/

1a

' (bender)'  
(unimorph) (bimorph)

가 가 가 ( ) . , 가 0.01mm(10 $\mu$ m)

가 ,  
 , (plank) ) (

(unimorph)  
 (bimorph) 2  
 , ' (bender)'  
 가 2

(pole) (poling direction) / ( ) / ( ) ( )

가

portions) 가 . , , , 가 . . . . (separately-actuatable

(nominal median plane) 2 가 ) 2

(same sense dimension change)

가,

2 가 ) 2

(same sense dimension change)

가,

가

가

2

(beam) , 가  
(elongate body) 가

가

가,

## 가 가 .

가

(paste)

가

PVDF(Polyvinylidene difluoride)

가

가

(

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가 - 2 가

) , 가 (several time

가  
가  
, ( ) / 2  
, , ( )  
(bender)

가  
2  
가  
가  
가

1a,b

2a,b 1 (가 )

3a,b V- U-

4

5a,b 2 'S'-

6a,b,c,d 2

7a-d

8a,b 9 2

10a-c 3

1a , 가

3 (11) (12) 가  
2a,b (U,L) 3 (11) (12) 가 ( ) ( )  
4 4 7 (MP) 가 , ( ) 가

) ( 1b ), (14) (13) (11) ( ) 가,  
,

1a		(13)		(14)	
	( 가 )		,	,	가
,	가	( , , , ...)	,	,	가
, 가	가	(11)	(	, (MP)	가
가	가	,	,	(11) ) 가	(MP) )
가	가	,	,	1a	,
가	가				.
2a,b	2	가	(25)	(25))	(26))
2a	2a	가	(26)	(25)	(26)
2a,b				(U,L)	2
1	2	가			
,	4		3a,b	V	U
U	(MP)	3a	,	V	2
(32)	가	3a	(MP)	V	(21) 가
4				(22)	3b
)				(31)	
					(41)
					(42)
					(
5a,b	S		2	'S'	
)		가	(		,
(53)	1	5a			,
5b				(53)	,
					,
)	2	S-			(
가					
6a-d	2	가 2			
b-d	2			2가	
( )		( 6b)	( ( ) 6c,d)		6a
					,
		가			6

PZT4D 6b 15mm , 20im 2  
 7mg . , 20im 0.5mm . ± 20V  
 , 7mN (blocking force) ± 0.1mm .

7a-d

) (A - A) 가 . (twisting) ; 7b,d (A - A). ( 7d )

7

8 10 3

9 10 가  
10 ( 8 ) 가 , ,  
10 . . . . ,

D 0im, 0.25mm, ±20V, 1mm, 0.3mN 15mg ± 0.25mm 15mm, 10mm 가 PZT4 2

8 10

가

가

( )

가

### (가)

(sawing)

가

가

가 ,

가 ,  
2 , 2

(57)

1.

2  
가 , ,

2.

1 , ,  
electric-portion groups) 가 (separate, distinct piezo

3.

1 2 ,

4.

1 3 ,

5.

4 ,

6.

4 5 ,

7.

4 6 ,

8.

4 7 ,

9.

1 8 , ( ) , , ,

10.

가 (broken annular shape) 가 가

, , , , , , , ,

**11.**

1 10 ,

**12.**

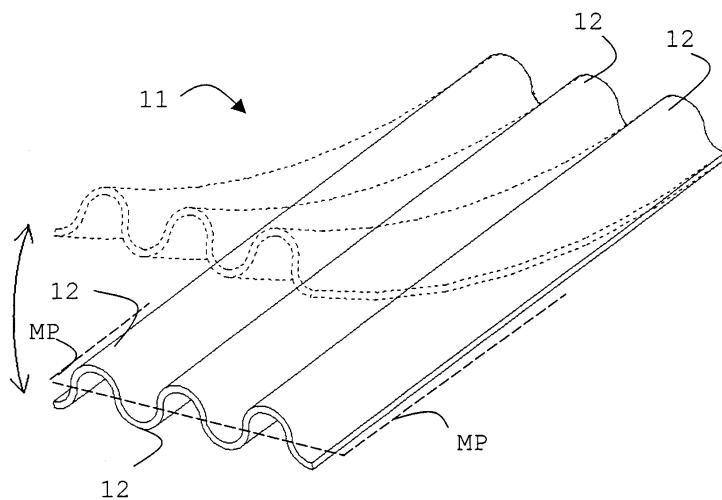
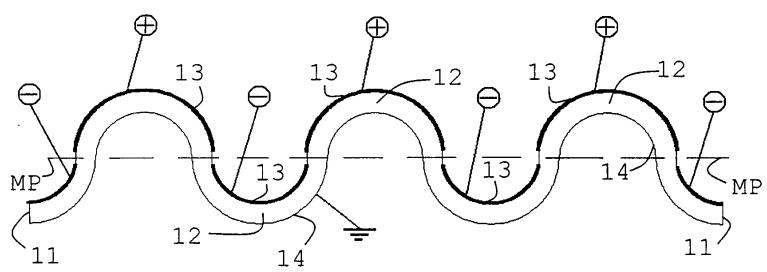
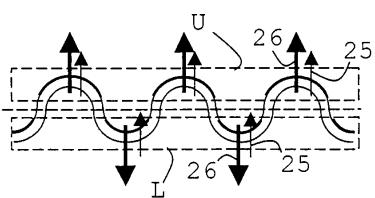
1 11 ,

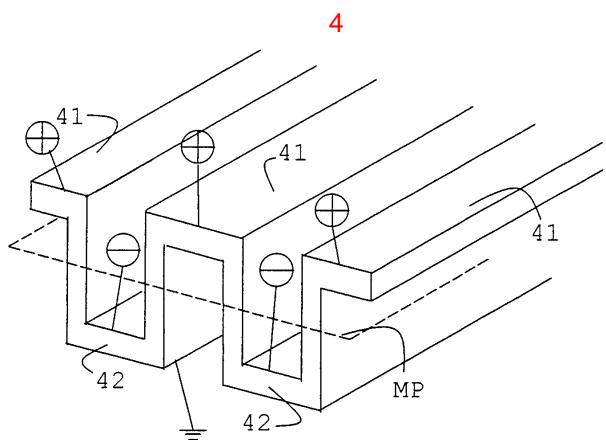
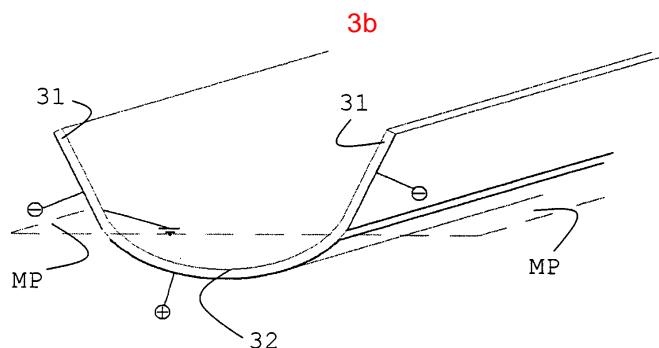
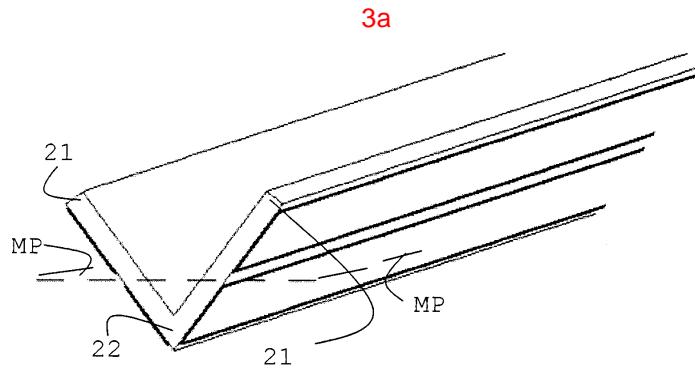
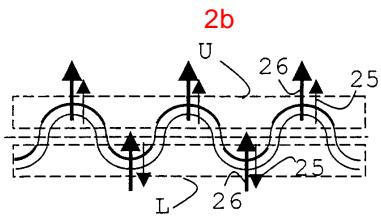
**13.**

1 12 ,

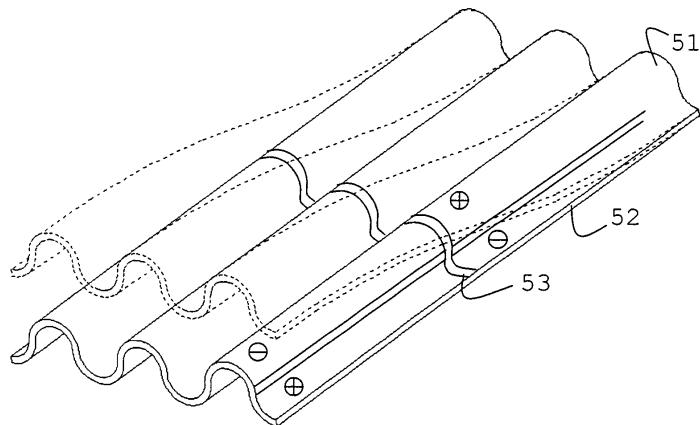
**14.**

1 13

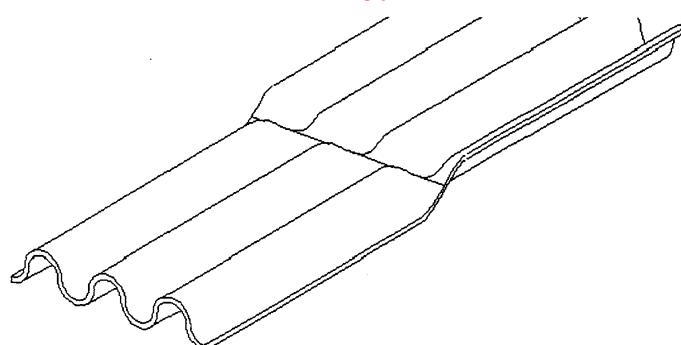
**1a****1b****2a**



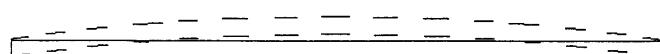
5a



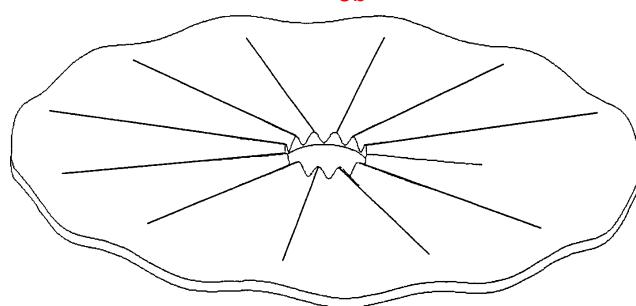
5b



6a



6b



6c

