FIG. 1A

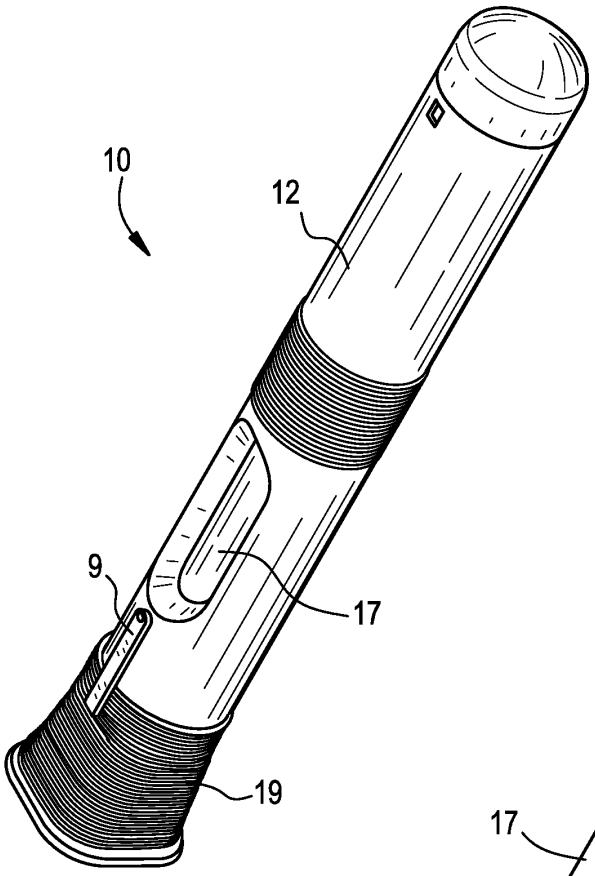


FIG. 1B

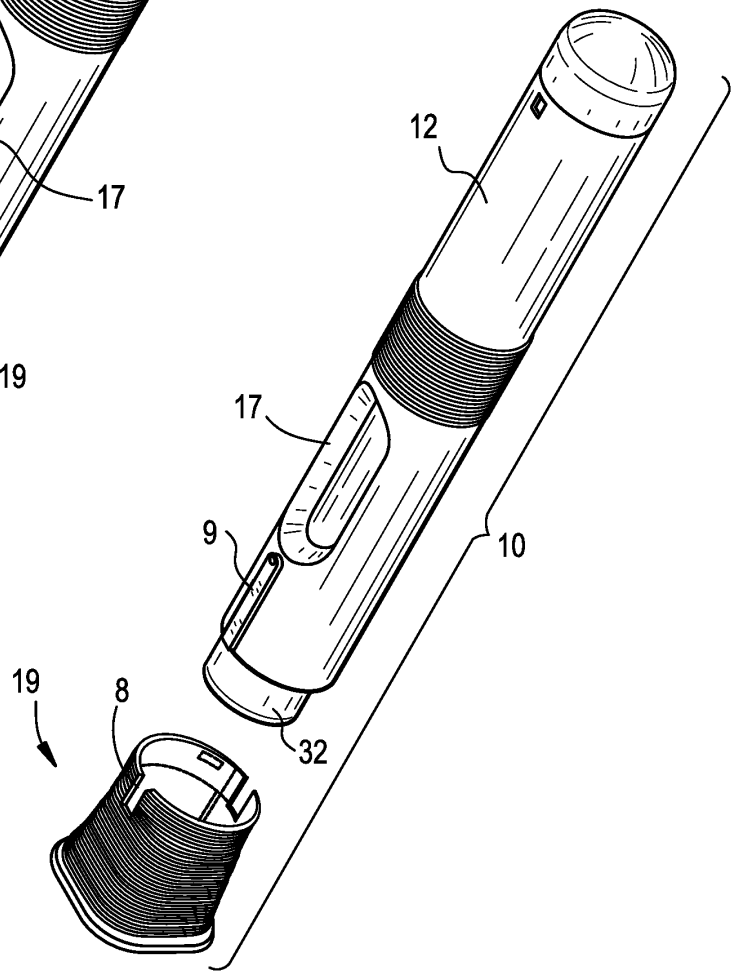


FIG. 1C

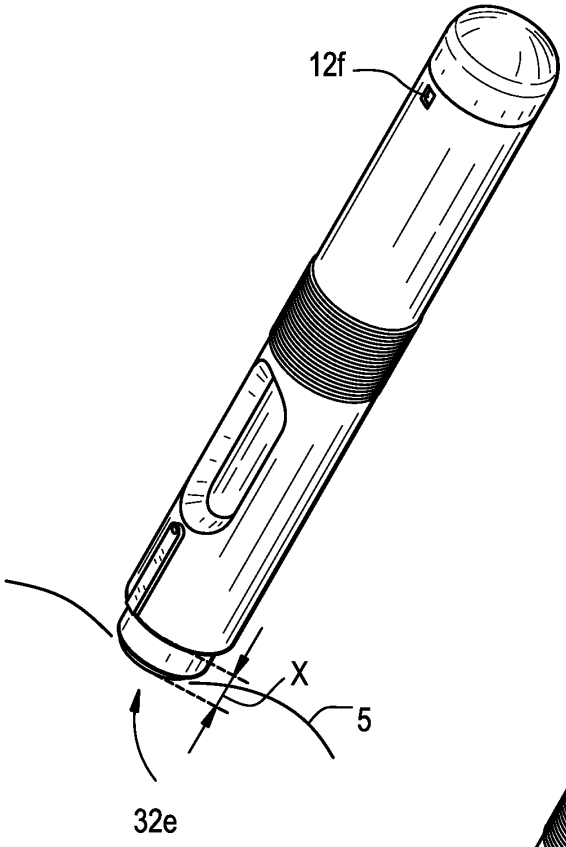
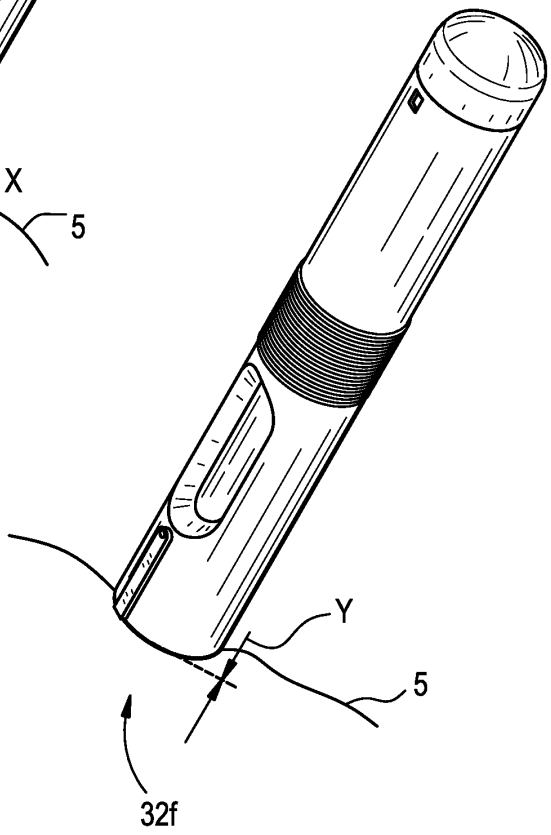
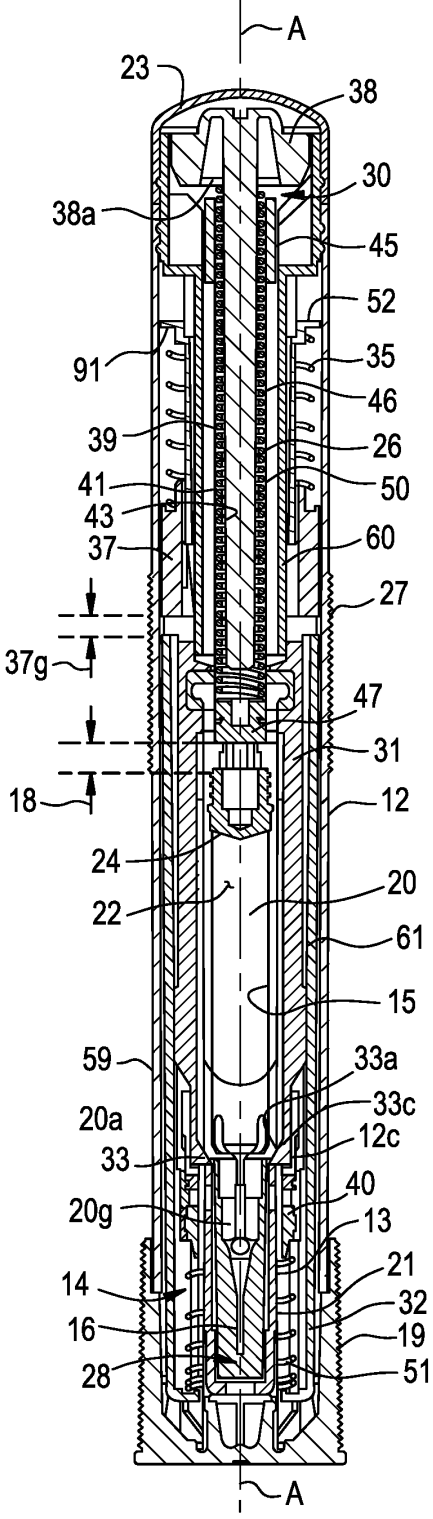


FIG. 1D

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46
39
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37g
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18
12
24
20
22
61
15
59
33a
33c
20a
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20g
13
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14
32
16
19
28
51
A

FIG. 2

FIG. 3A

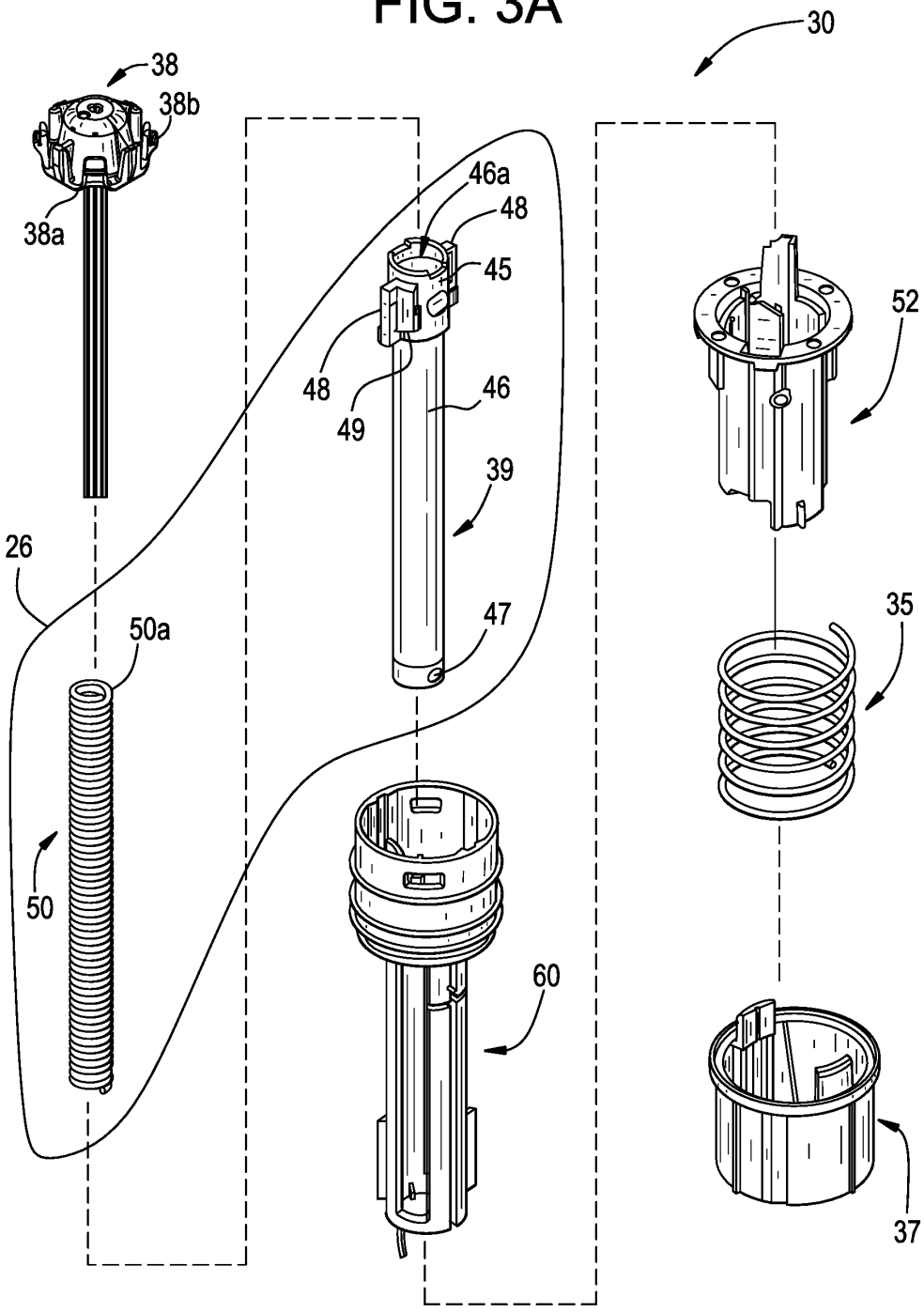


FIG. 3B

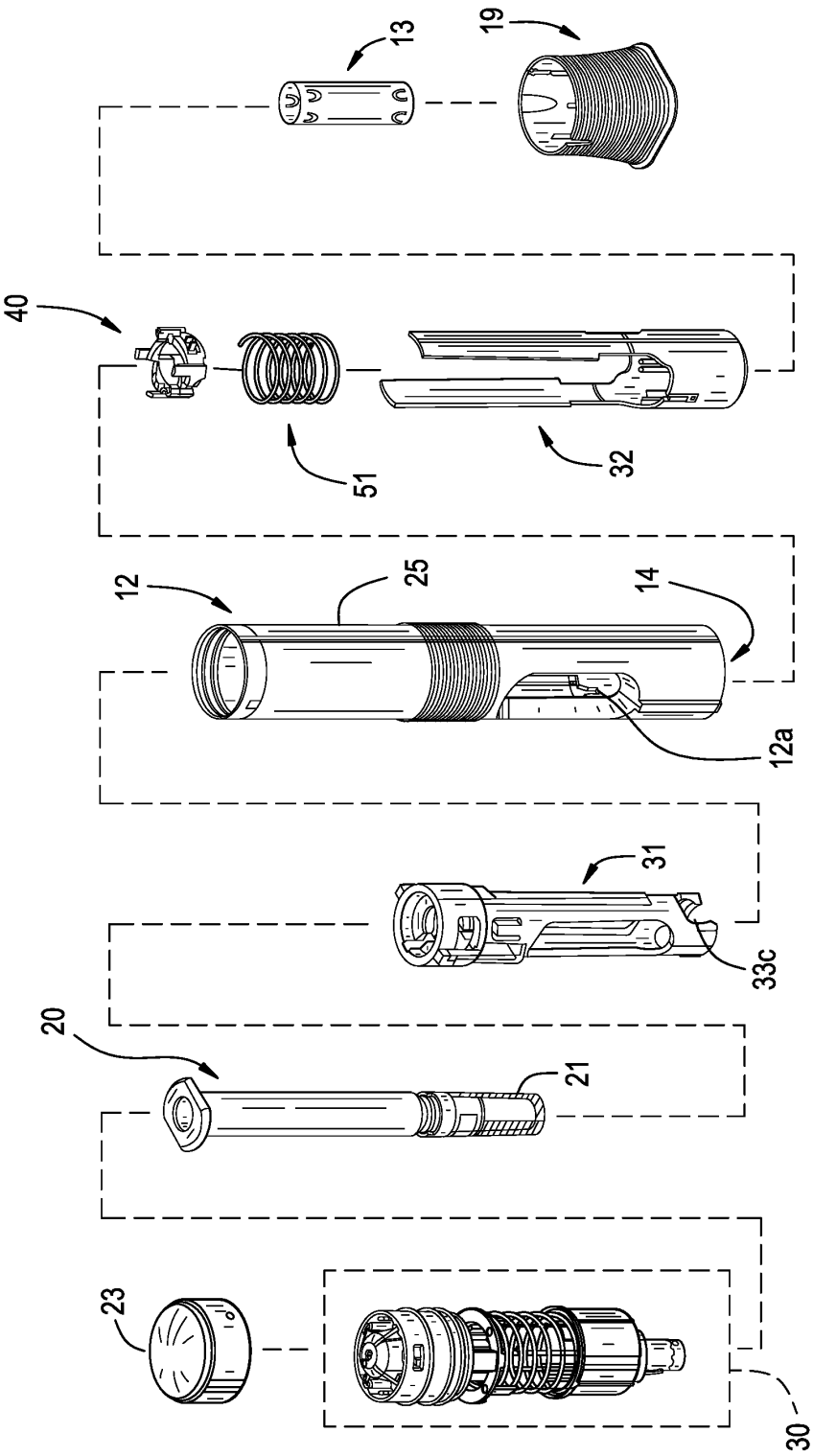


FIG. 4A

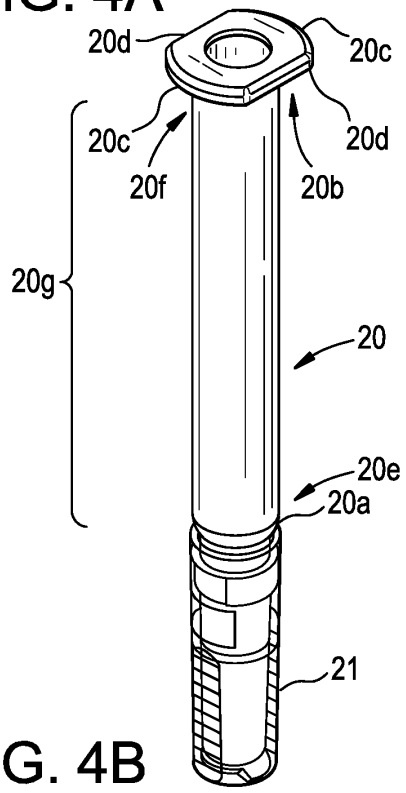


FIG. 4B

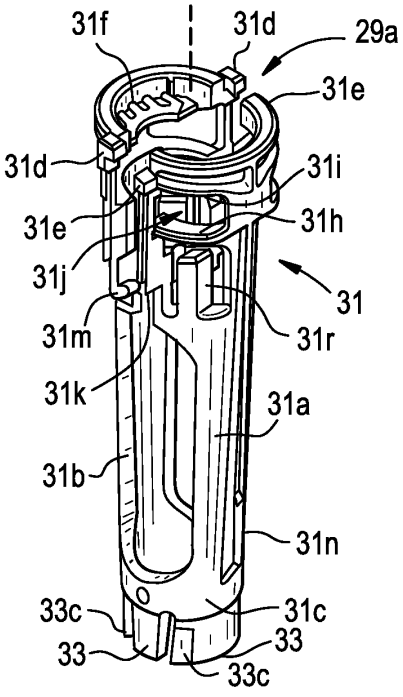


FIG. 4C

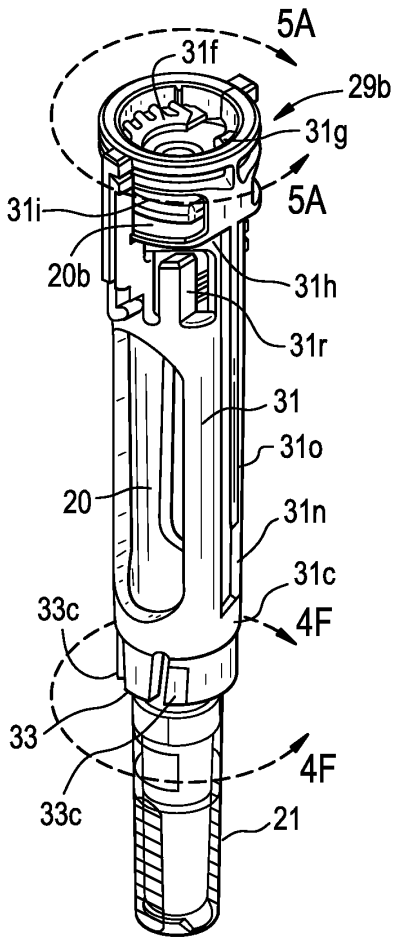
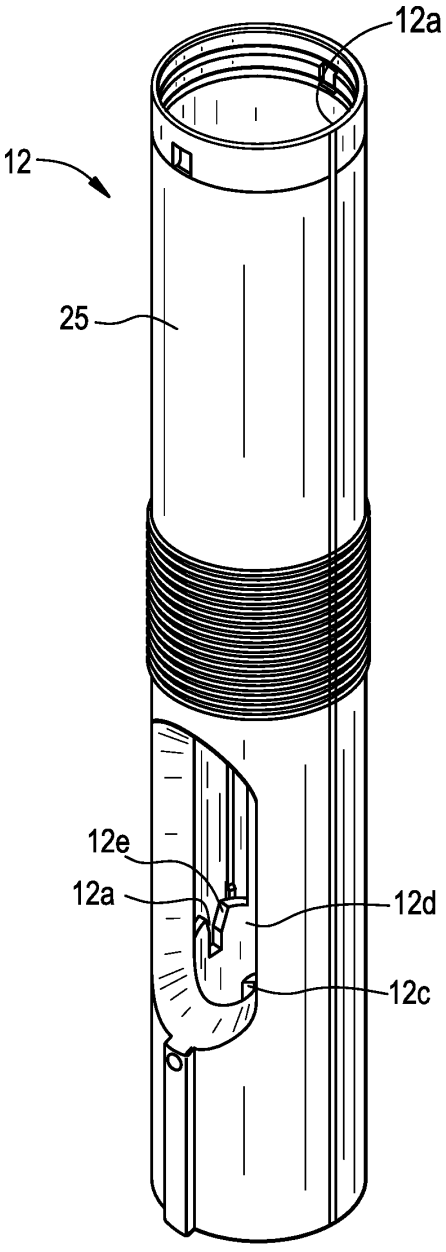


FIG. 4E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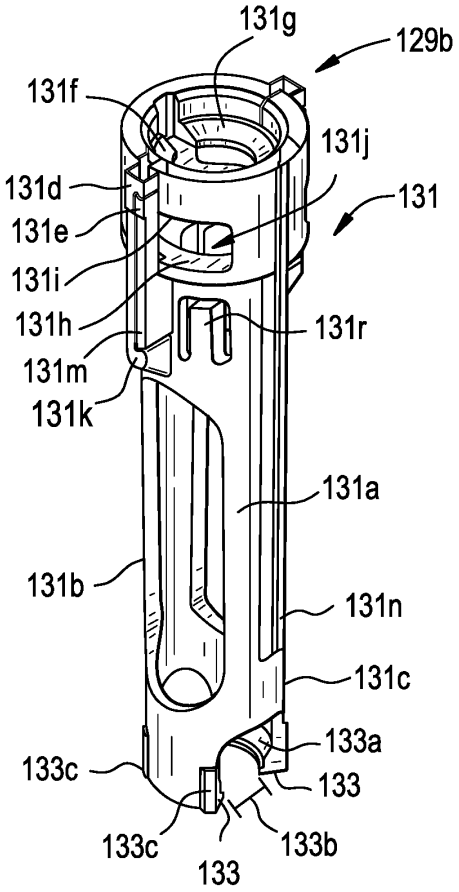
12e
12a
12d
12c

FIG. 4D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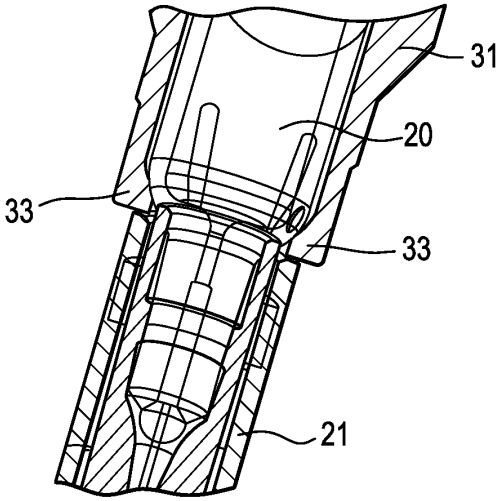
133c
133b
133

FIG. 4F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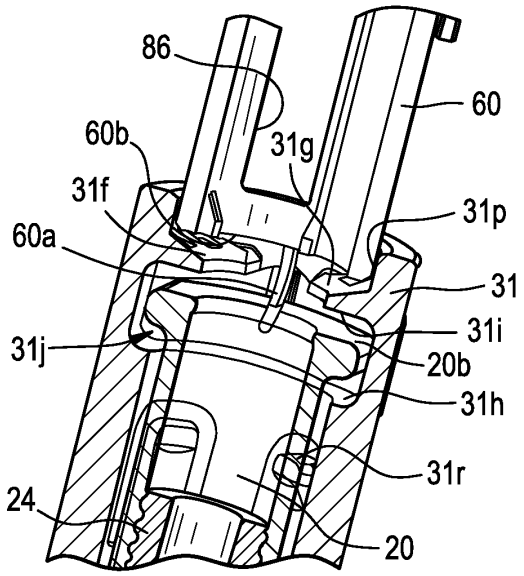
21

FIG. 5A


86
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31
31i
31j
20b
31h
31r
24
20

FIG. 5B

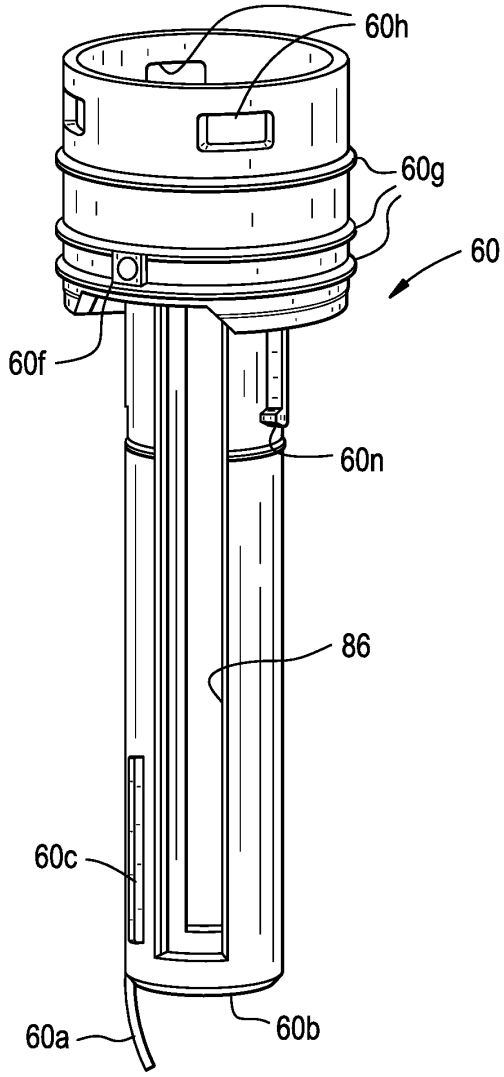


FIG. 5C

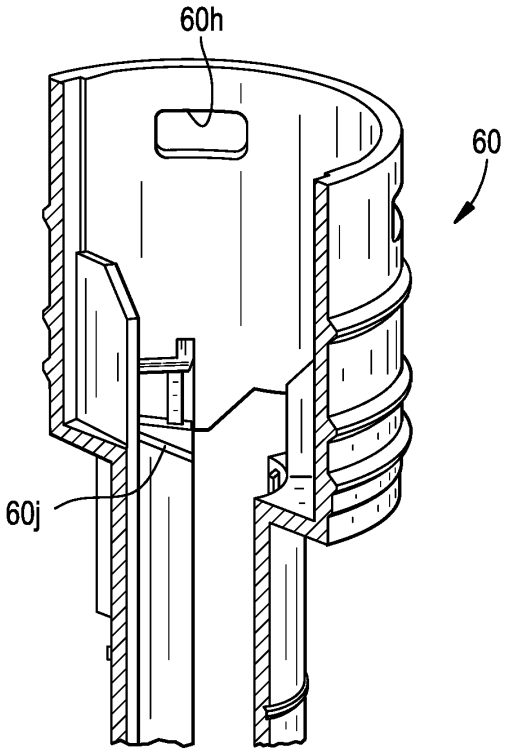


FIG. 6A

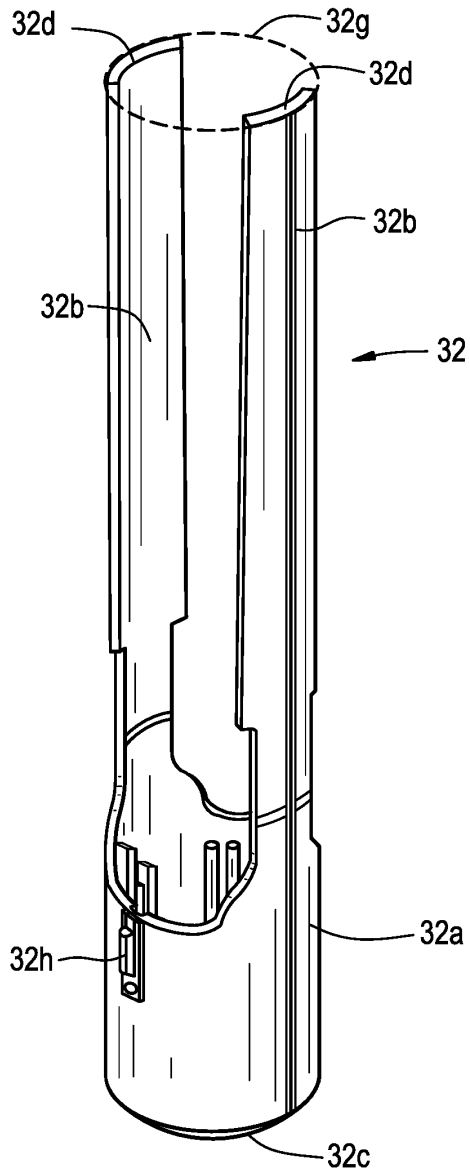


FIG. 6B

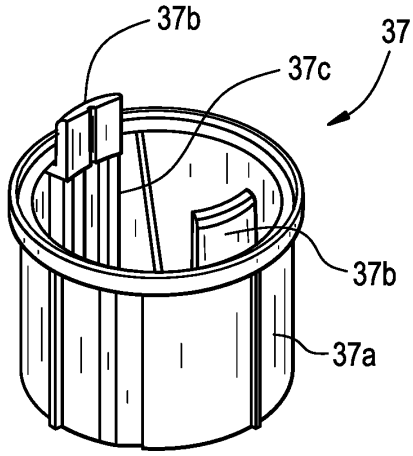


FIG. 6C

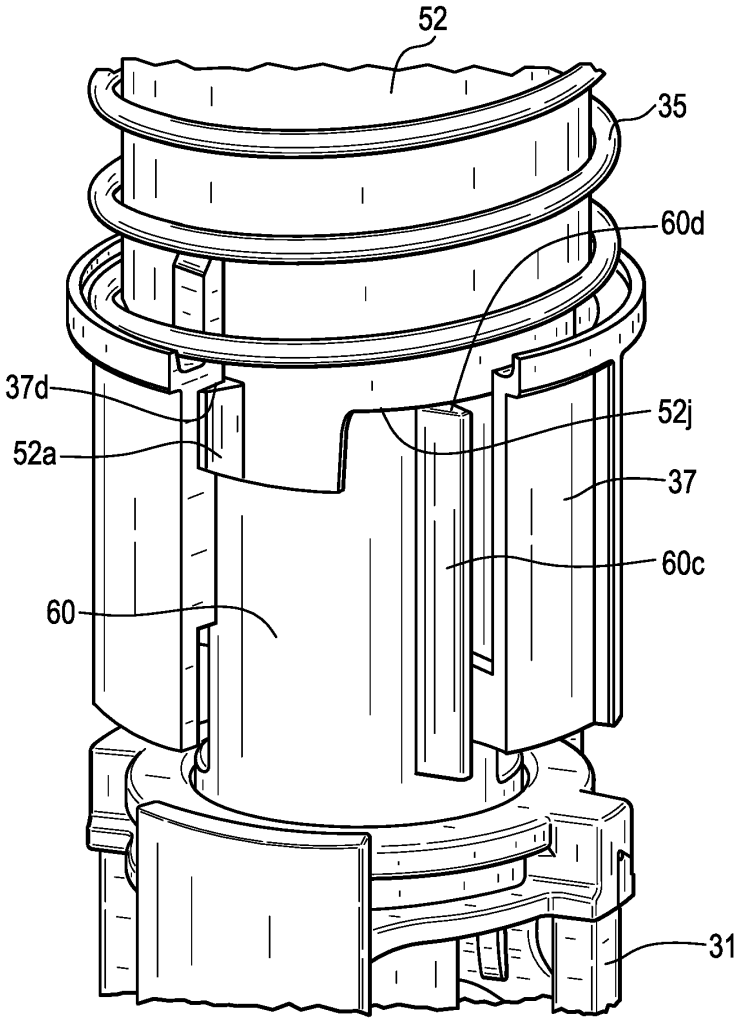


FIG. 7A

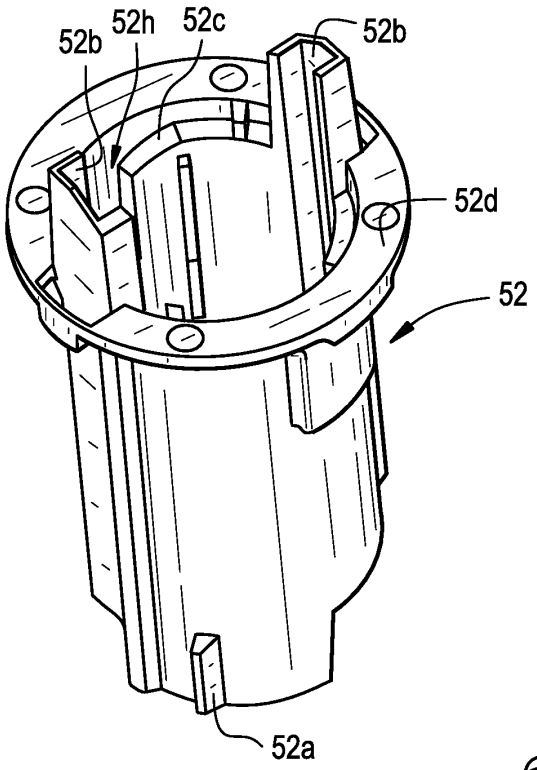


FIG. 7B

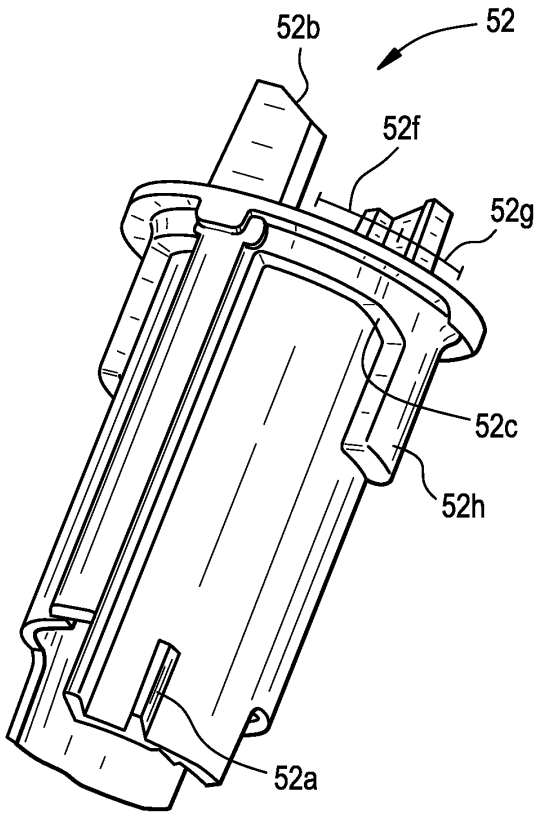


FIG. 8

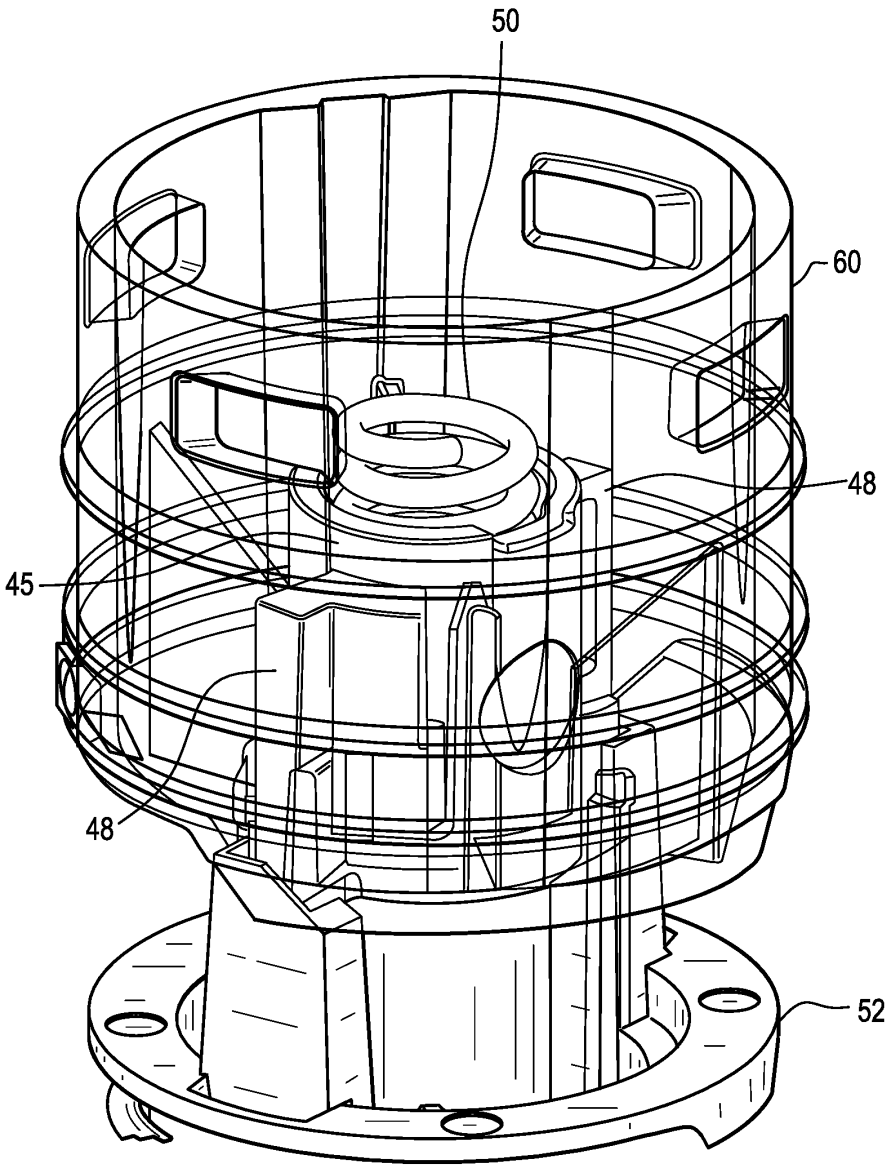


FIG. 9A

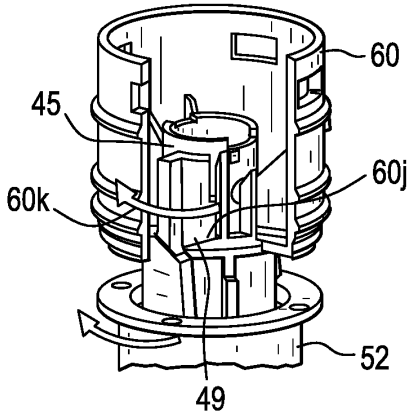


FIG. 10A

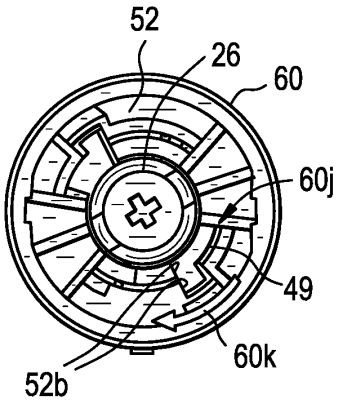


FIG. 9B

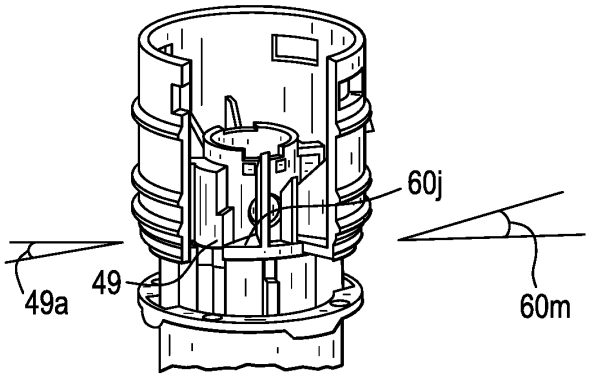


FIG. 10B

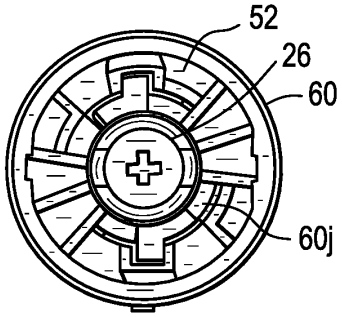


FIG. 9C

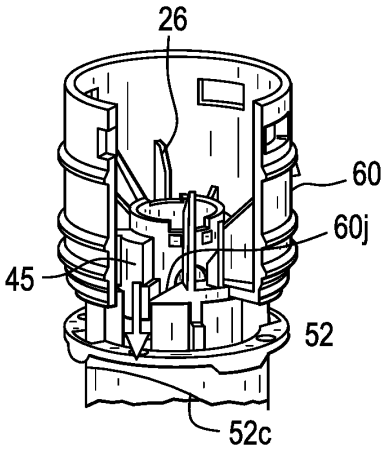


FIG. 10C

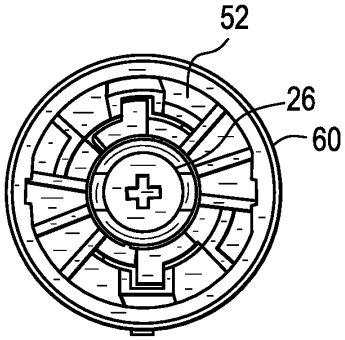


FIG. 11C

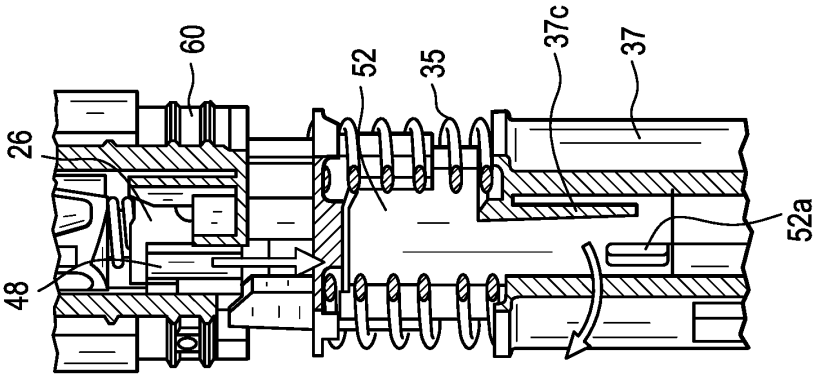


FIG. 11B

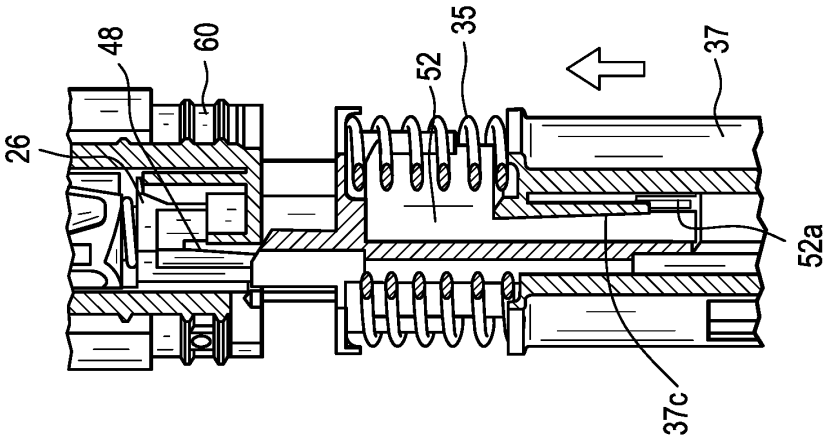


FIG. 11A

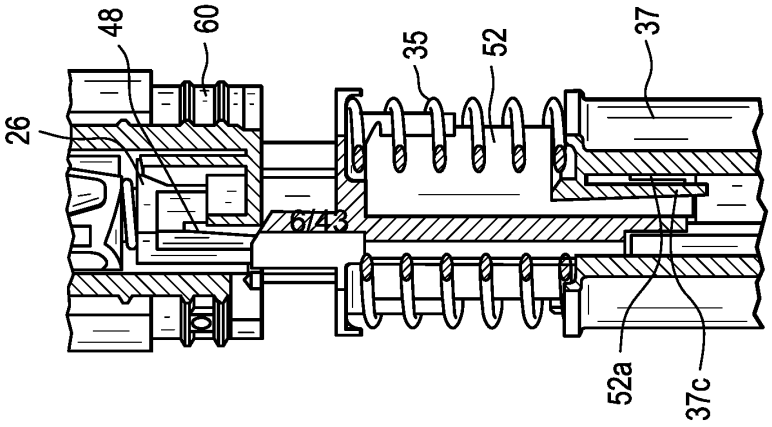


FIG. 12A

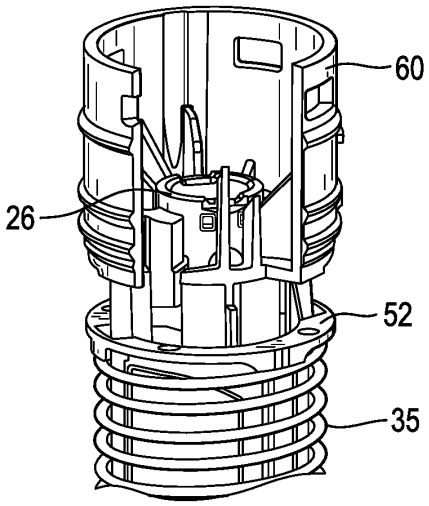


FIG. 12B

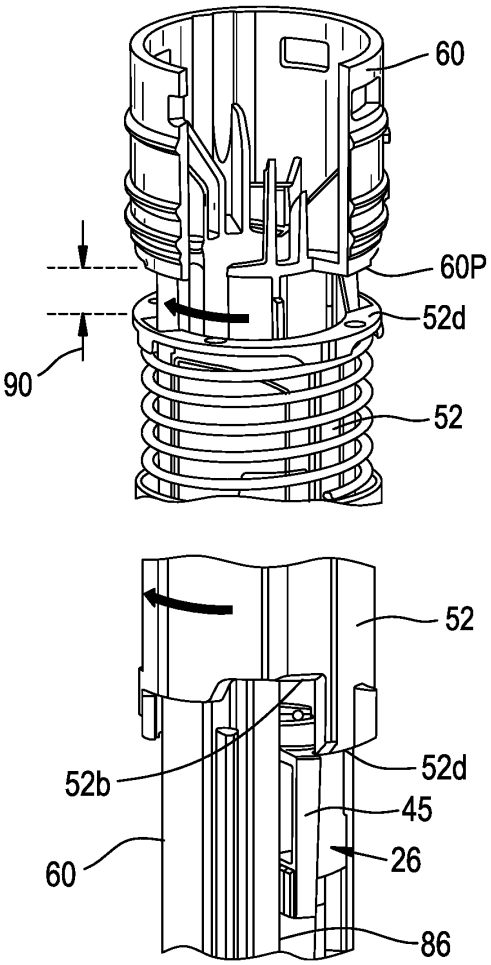


FIG. 12C

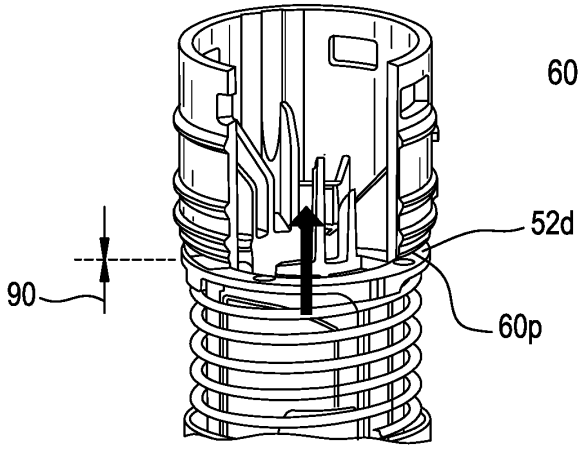


FIG. 13

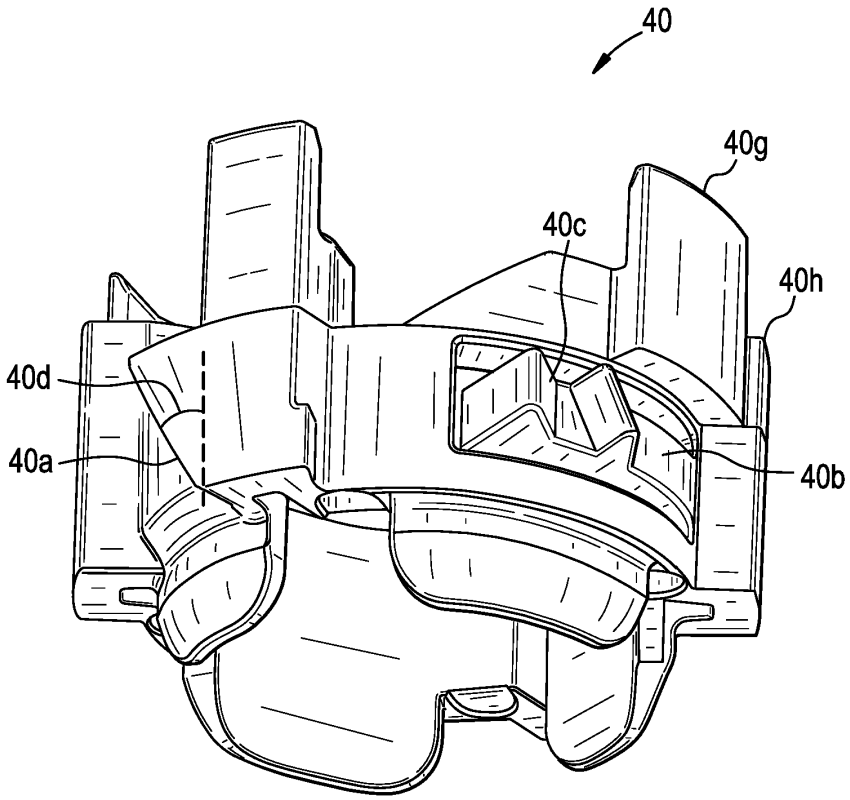


FIG. 14

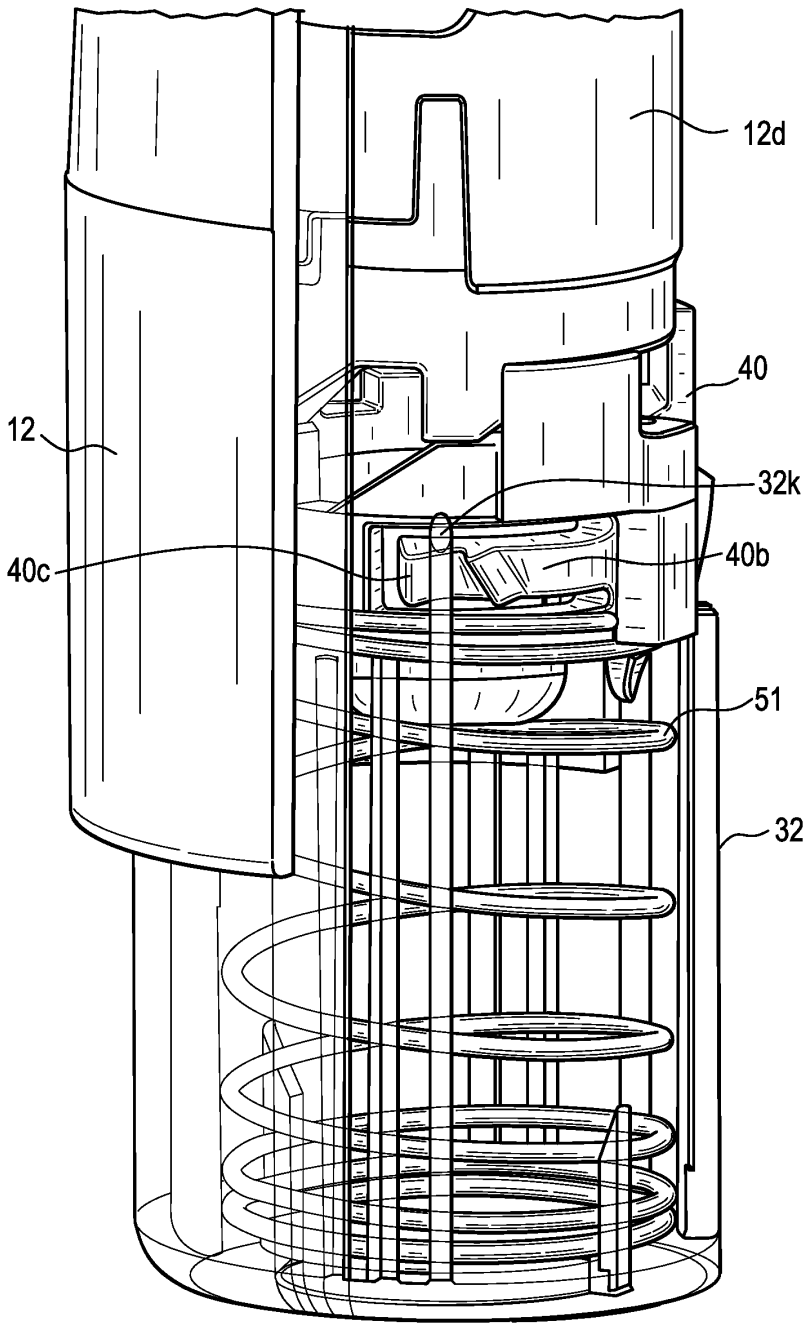


FIG. 15B

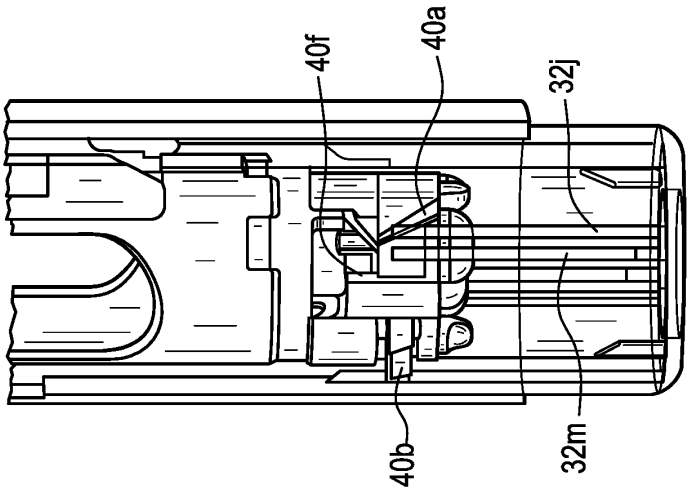


FIG. 15A

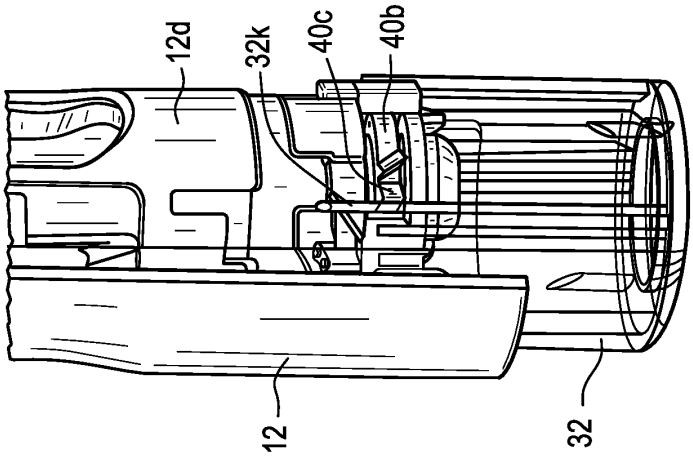


FIG. 16B

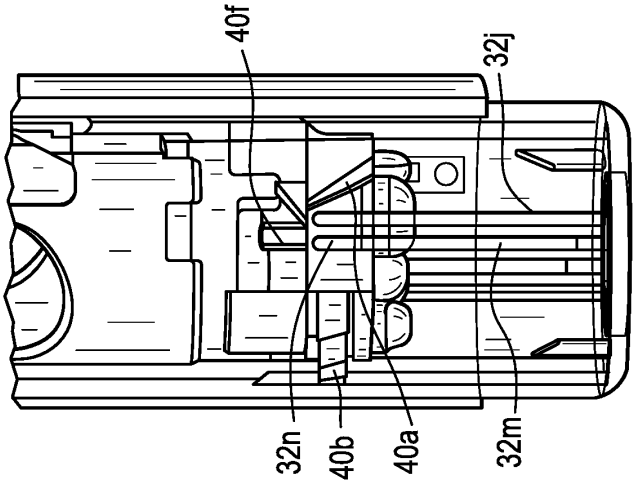


FIG. 16A

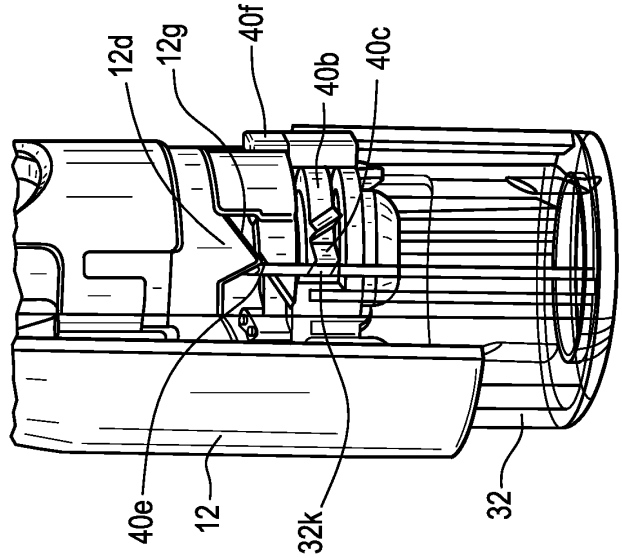


FIG. 17

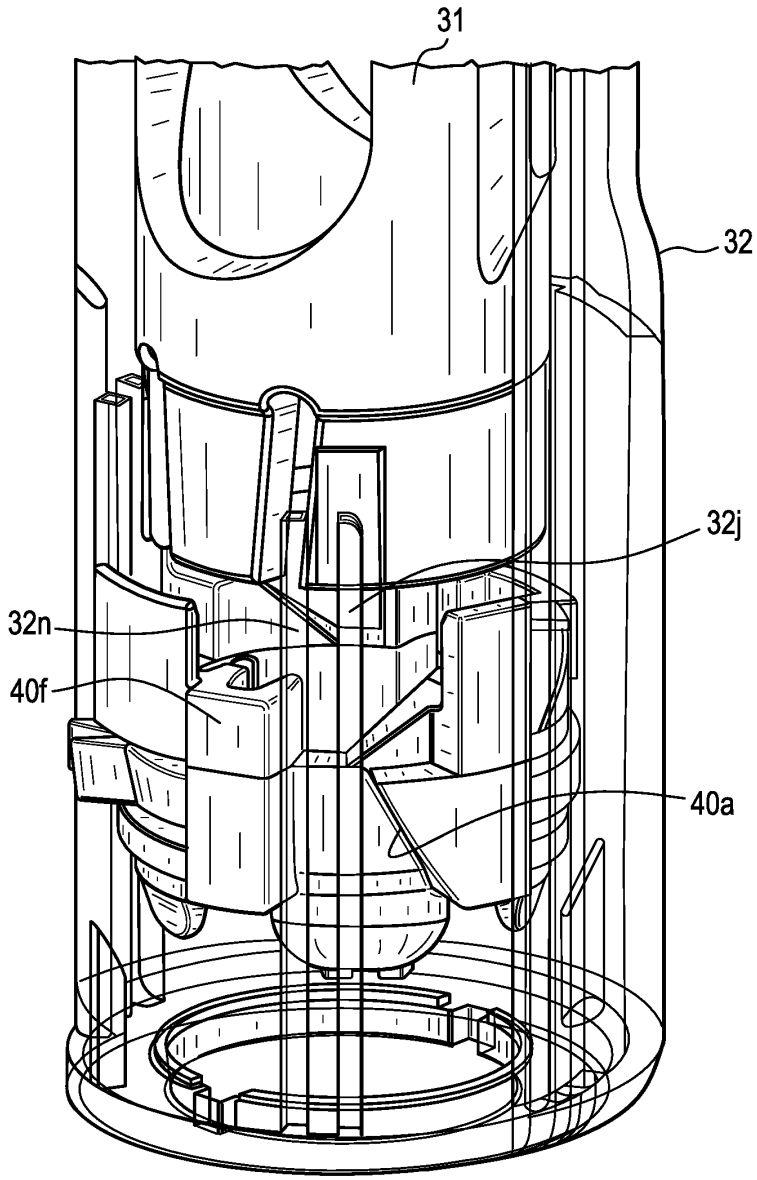


FIG. 18B

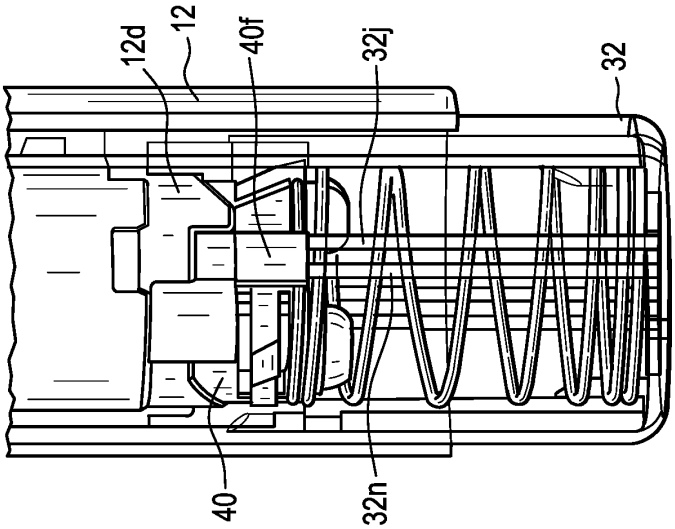


FIG. 18A

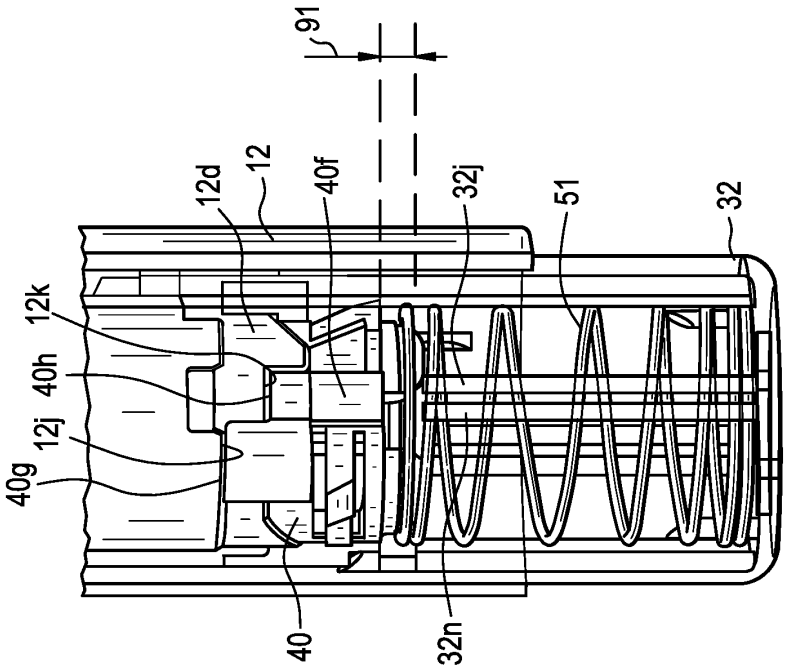


FIG. 19A

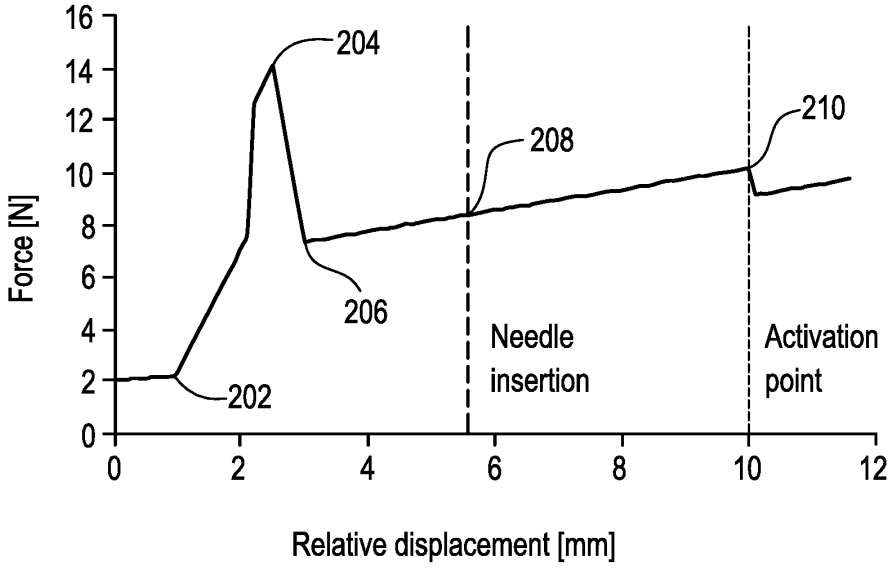
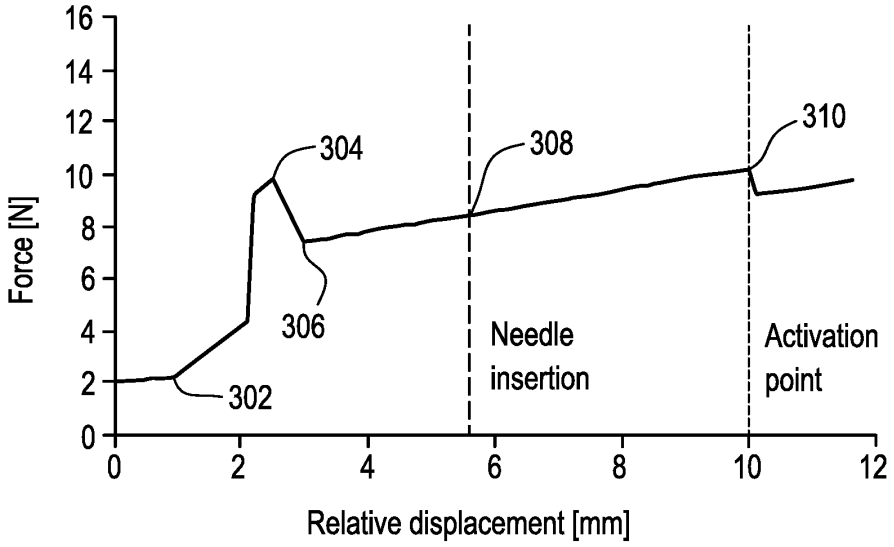


FIG. 19B



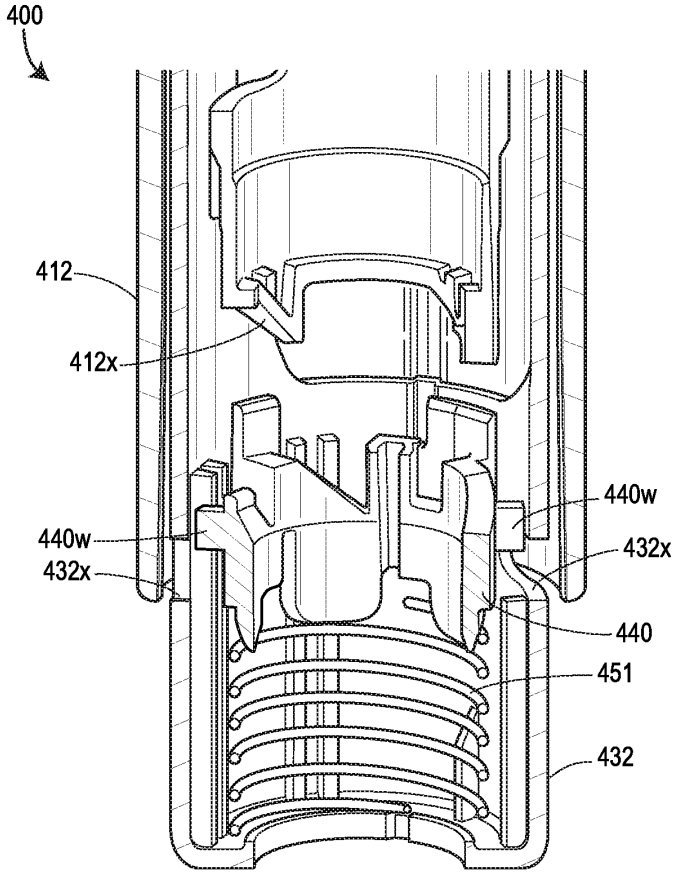


FIG. 20A

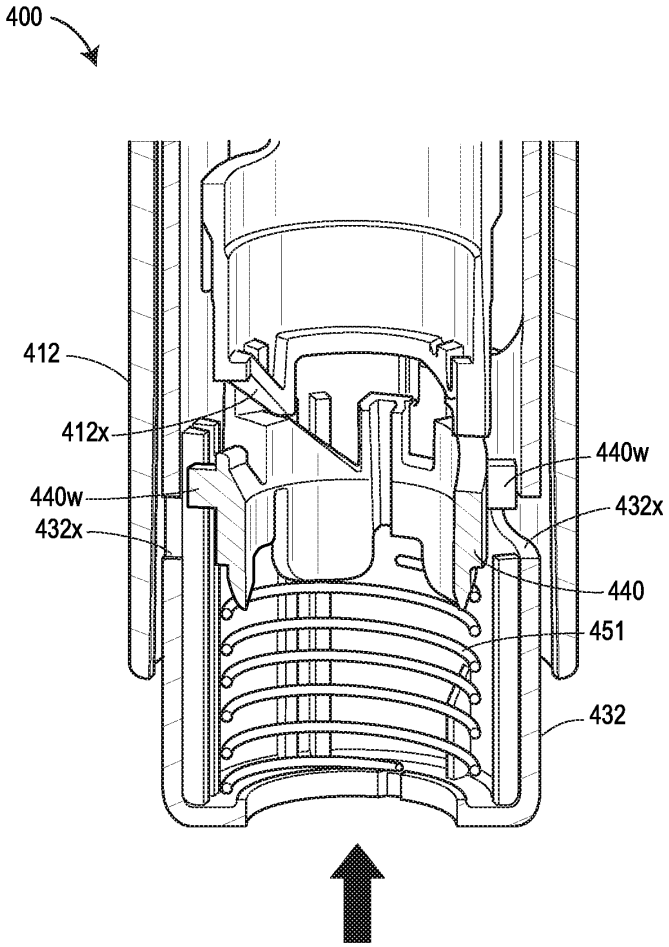


FIG. 20B

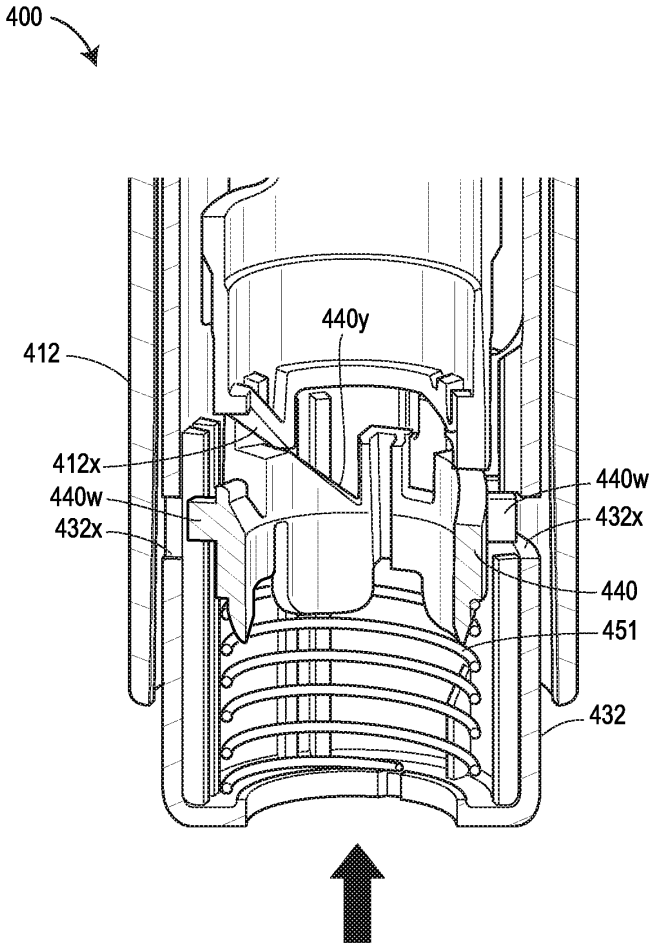


FIG. 20C

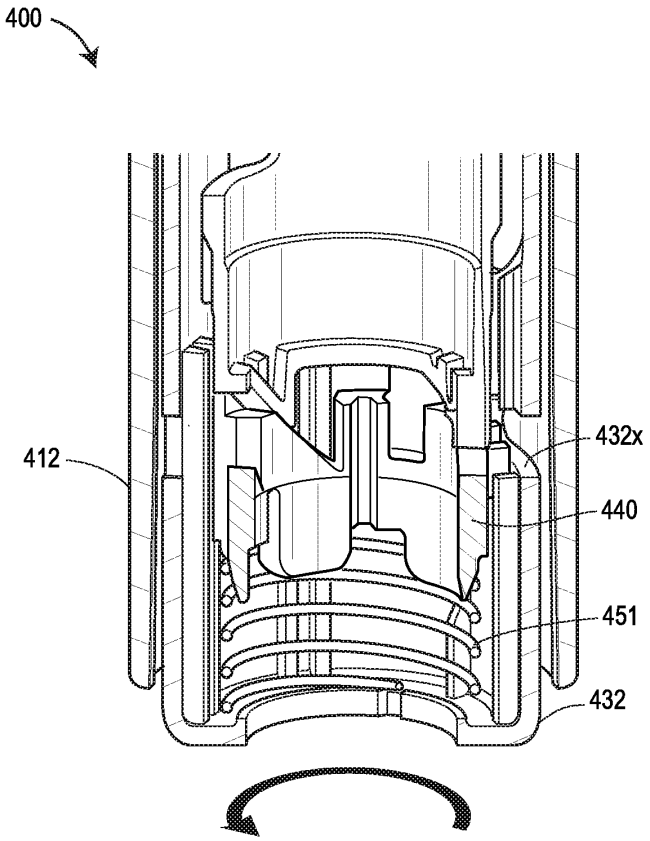


FIG. 20D

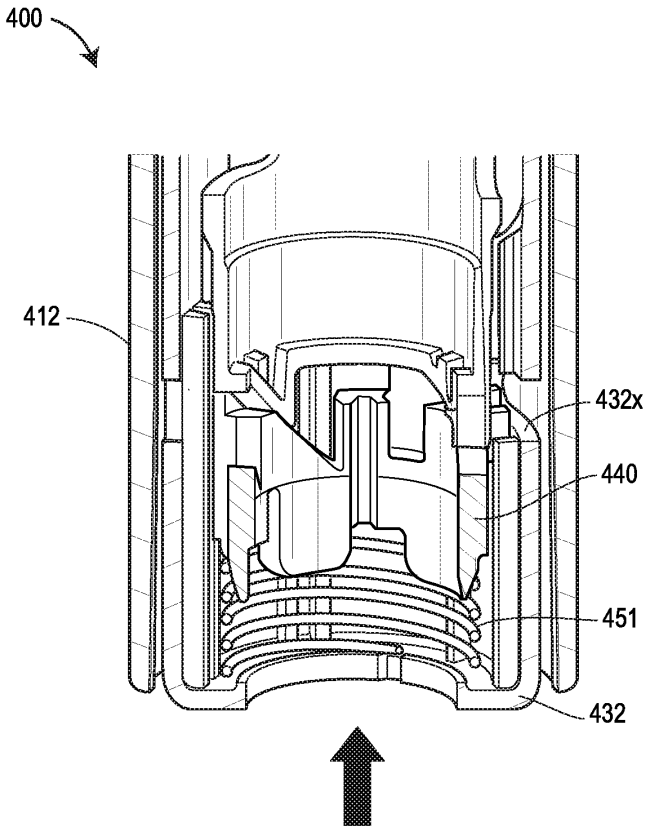


FIG. 20E

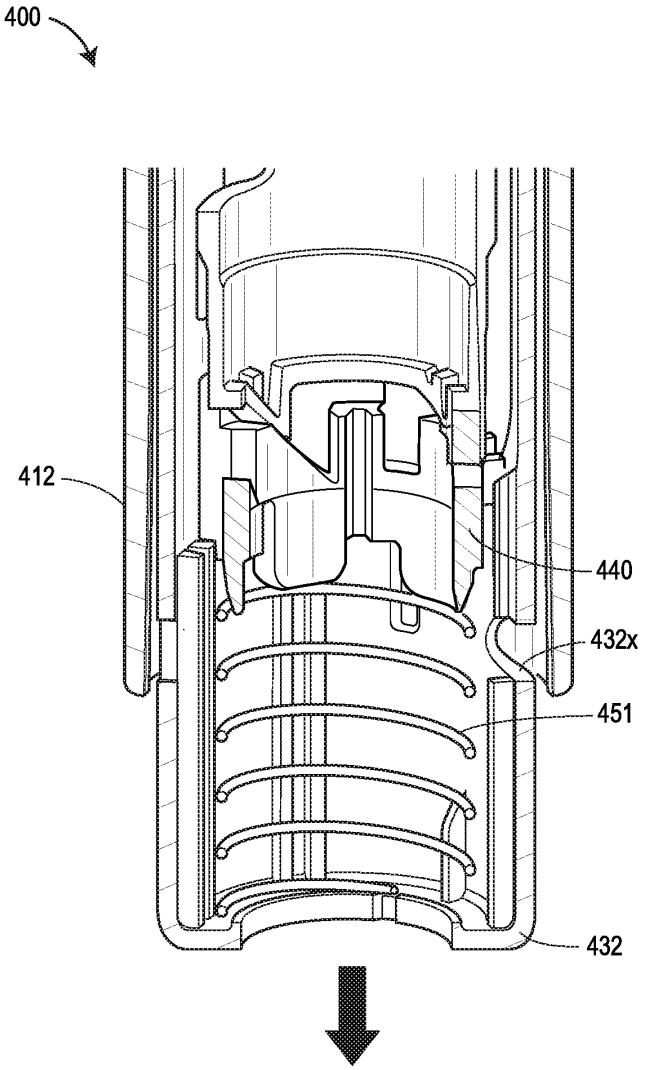


FIG. 20F

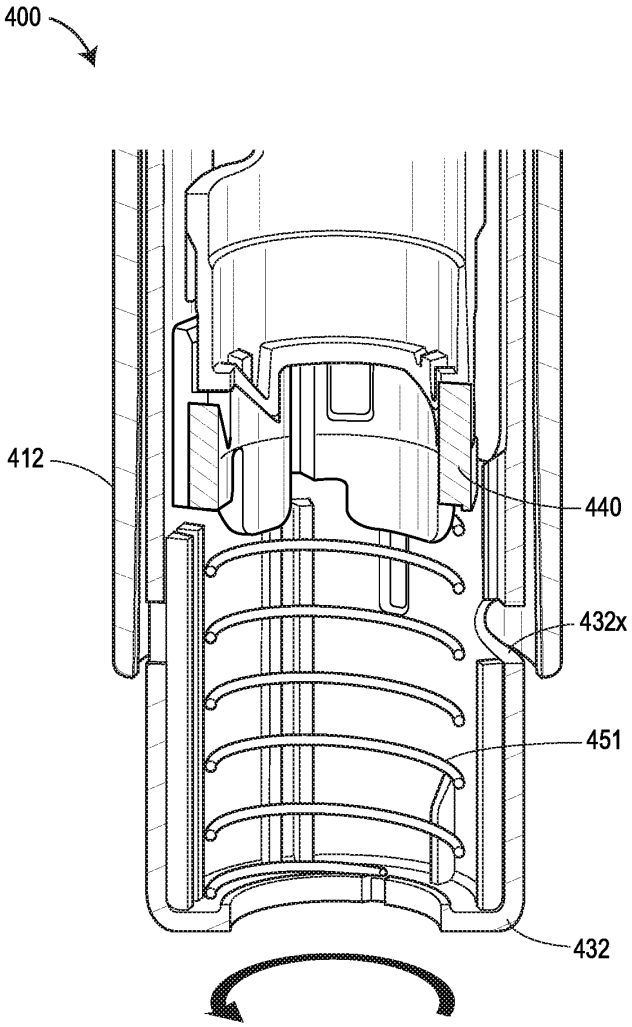


FIG. 20G

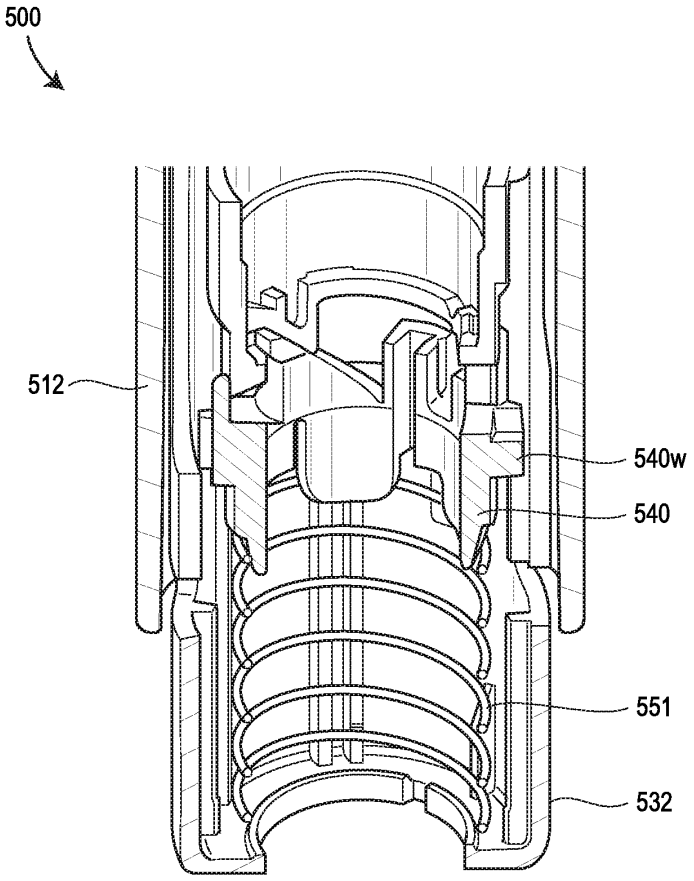


FIG. 21A

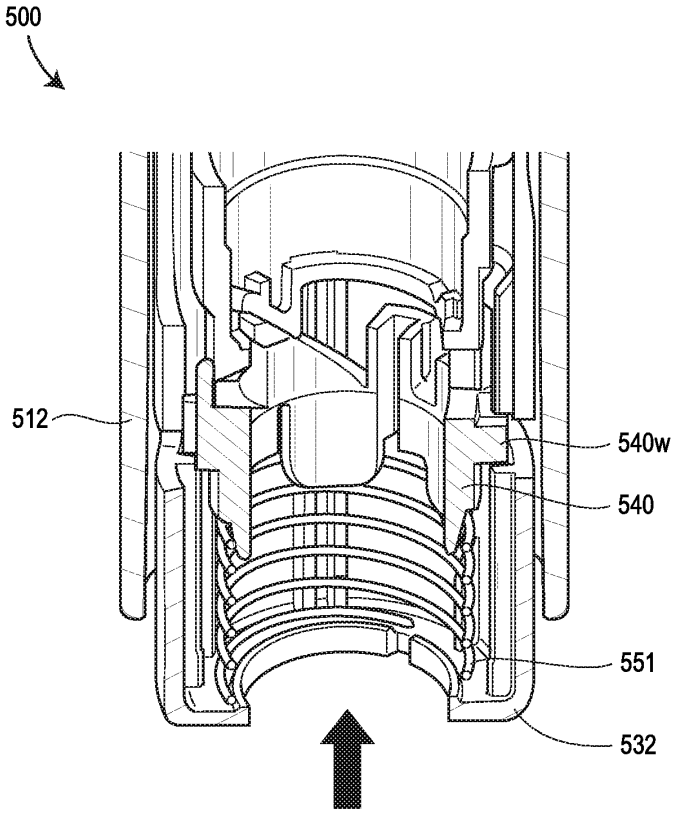


FIG. 21B

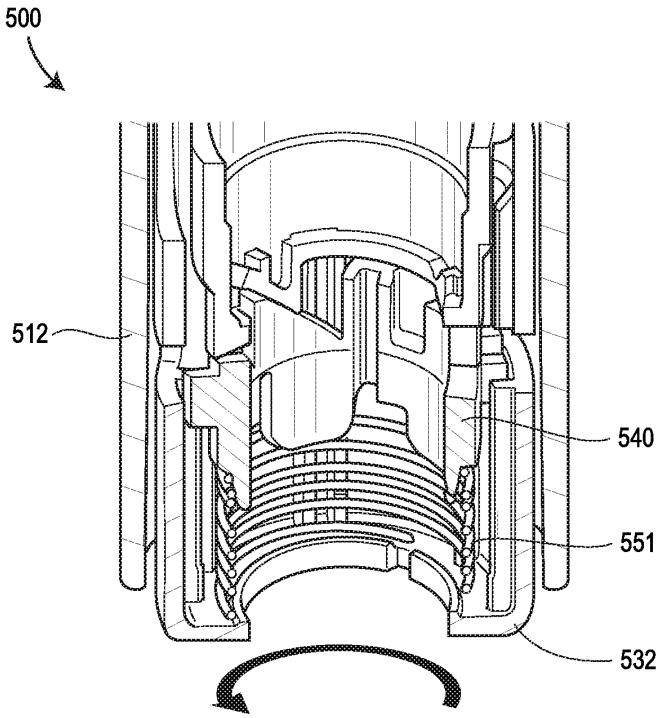


FIG. 21C

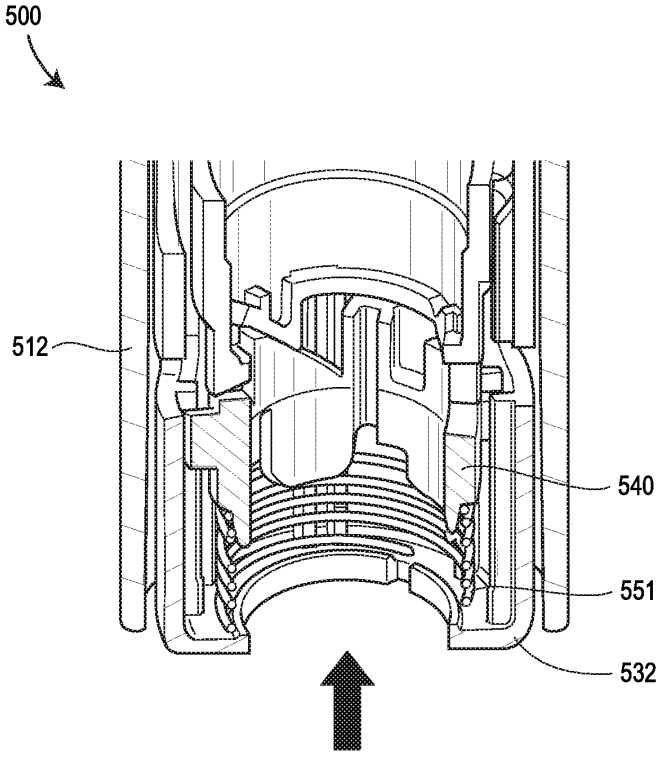


FIG. 21D

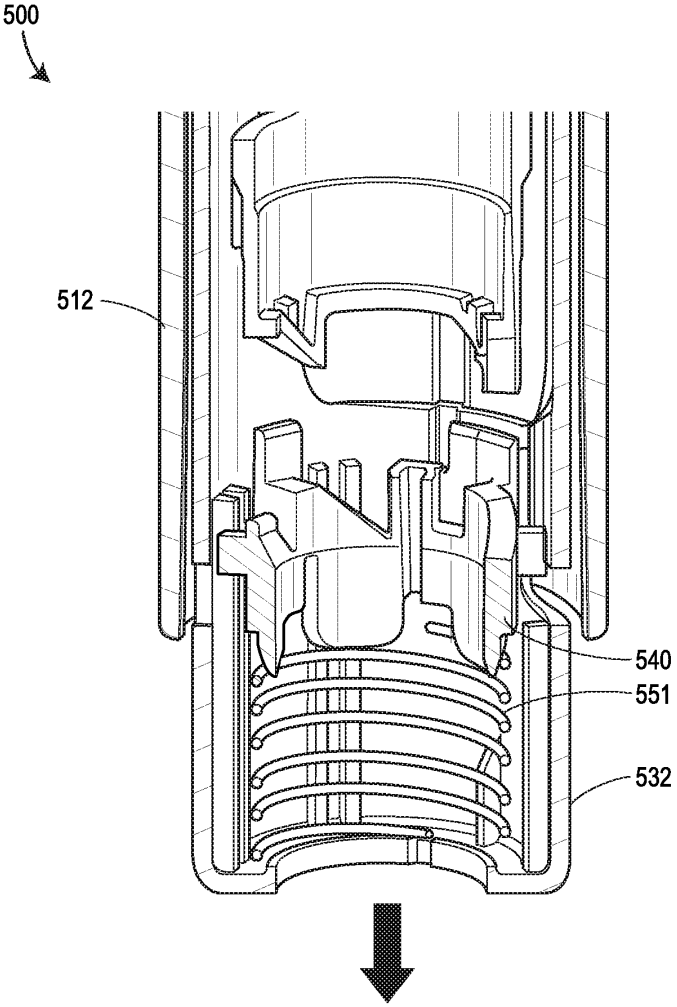


FIG. 21E

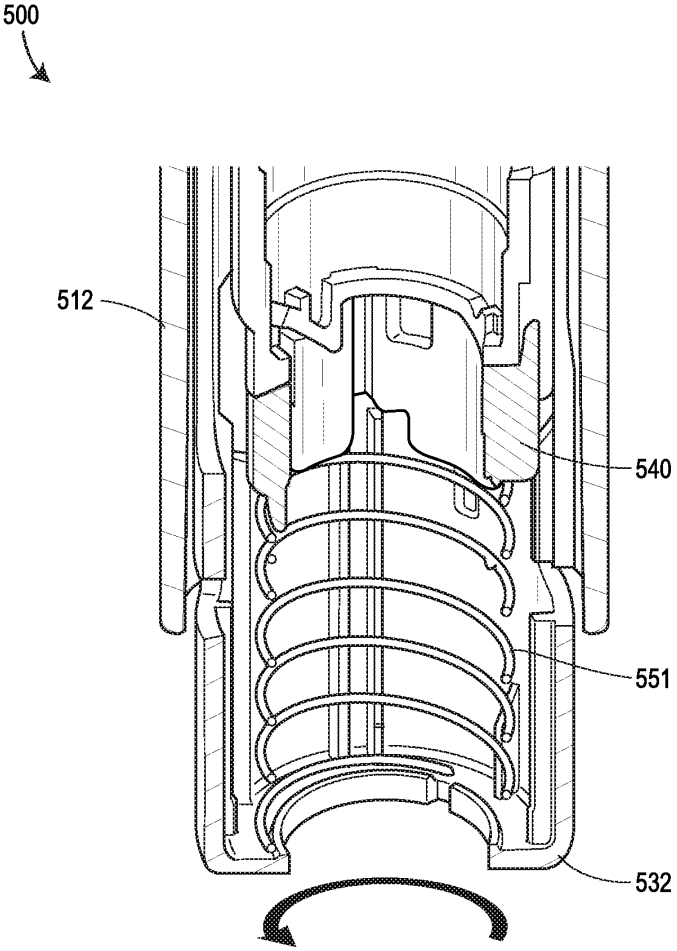


FIG. 21F

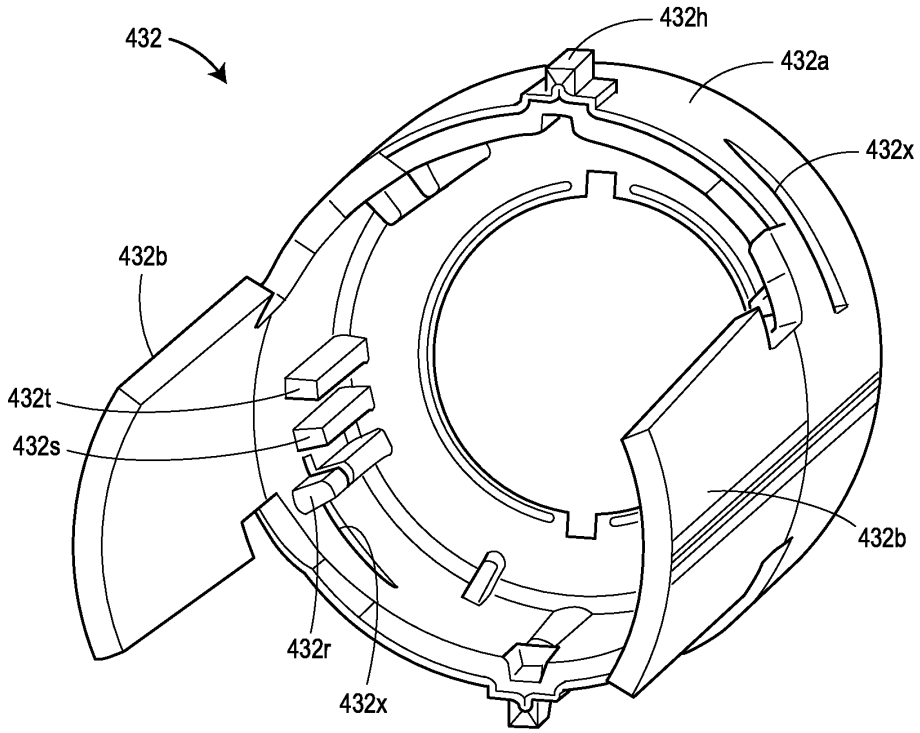


FIG. 22

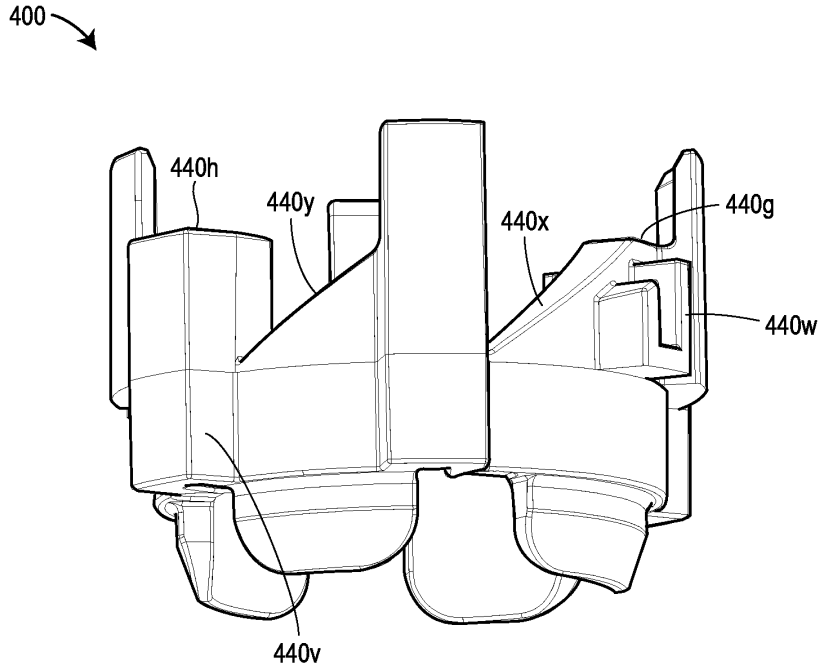


FIG. 23

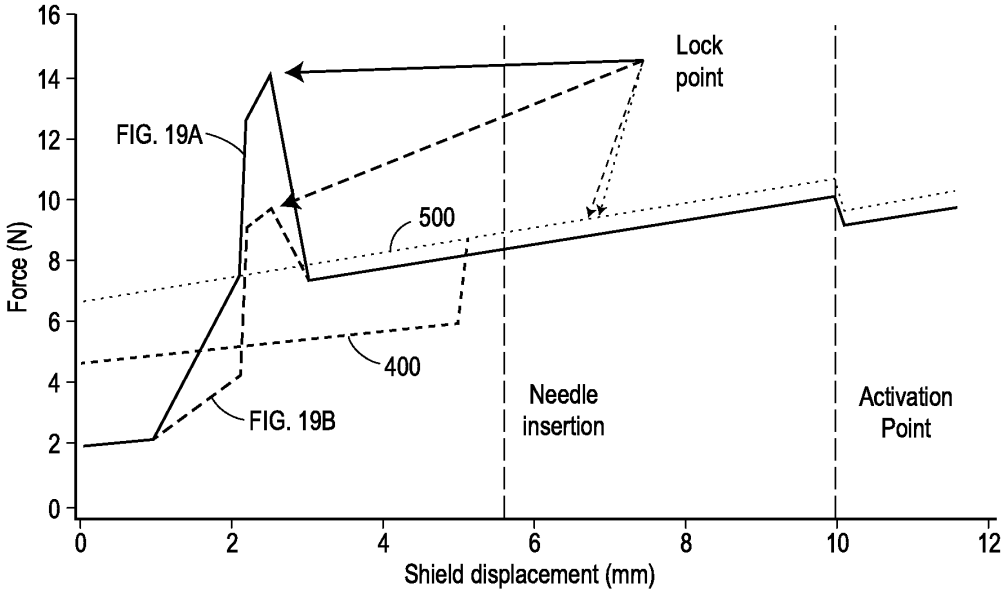

16
14
12
10
8
6
4
2
0
Force (N)
0
2
4
6
8
10
12
Shield displacement (mm)
FIG. 19A
FIG. 19B
500
400
Lock
point
Needle
insertion
Activation
Point

FIG. 24

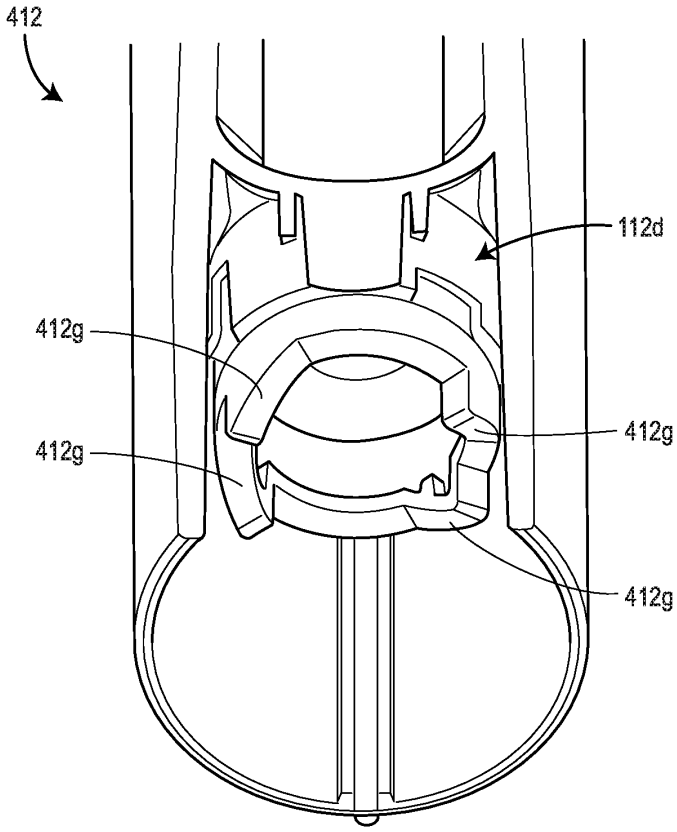


FIG. 25

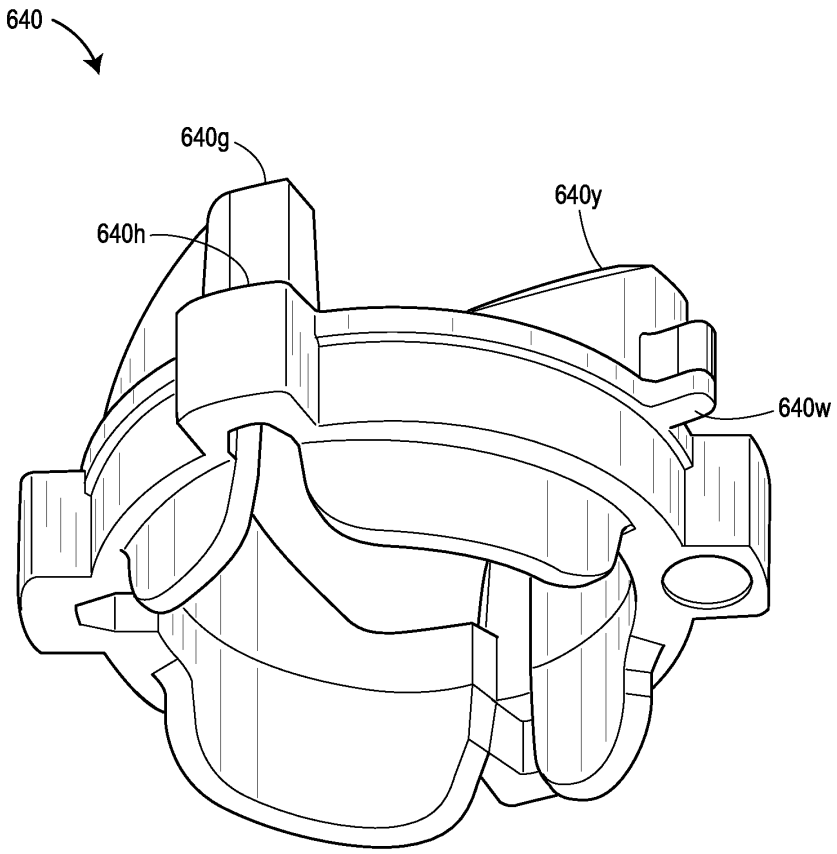


FIG. 26A

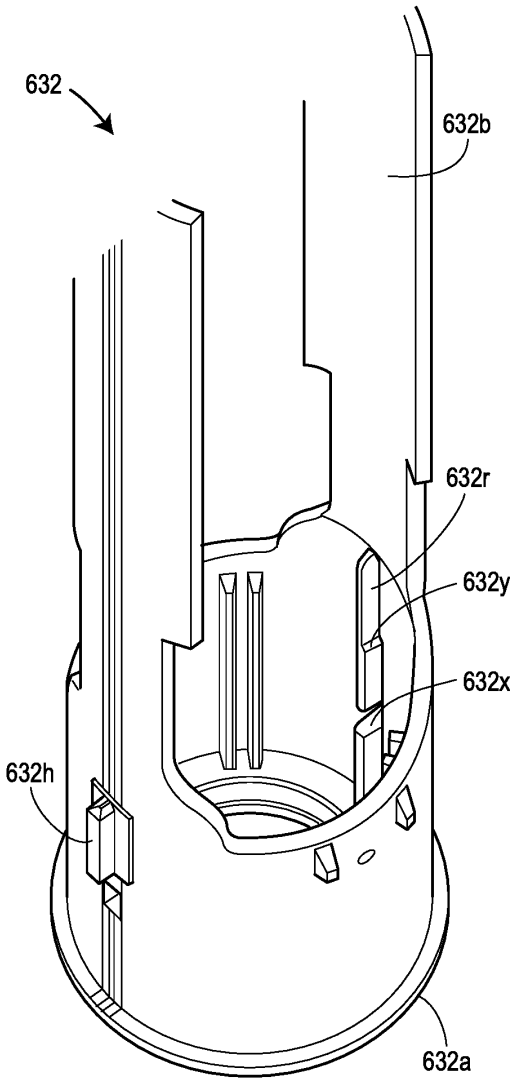


FIG. 26B

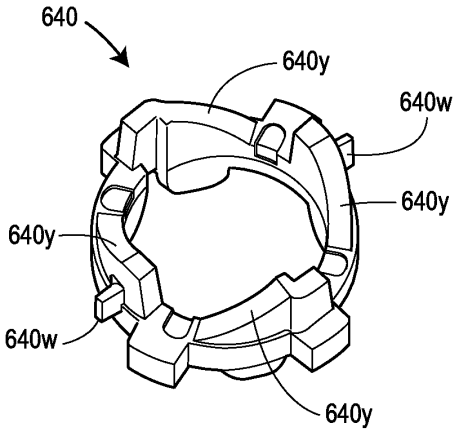


FIG. 26C

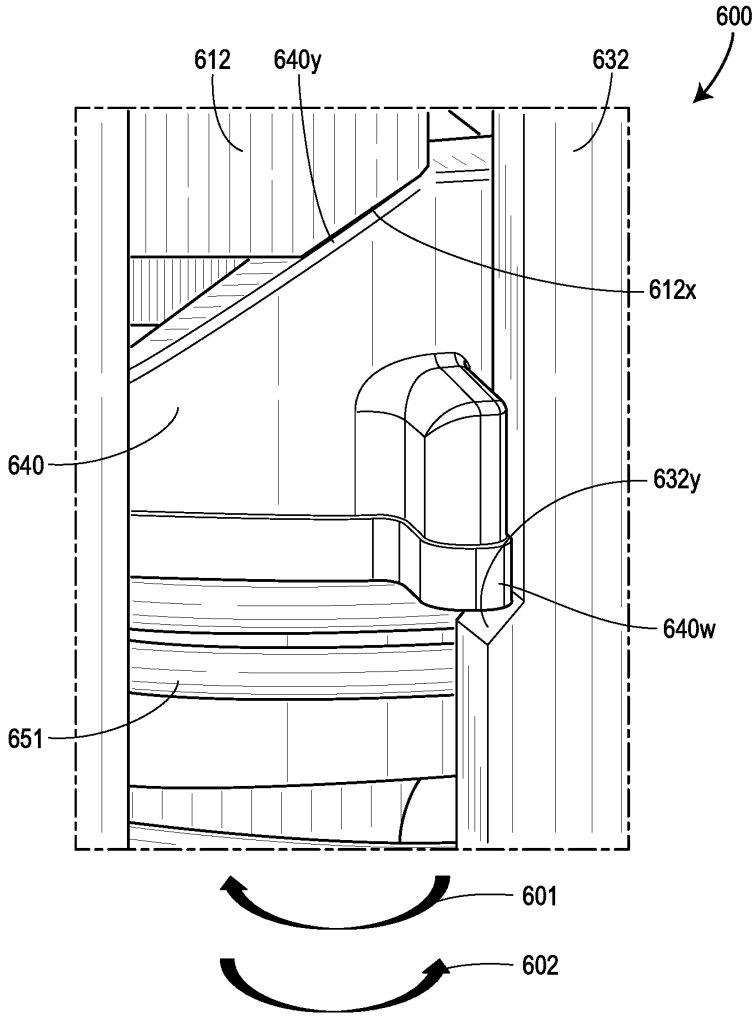


FIG. 26D