

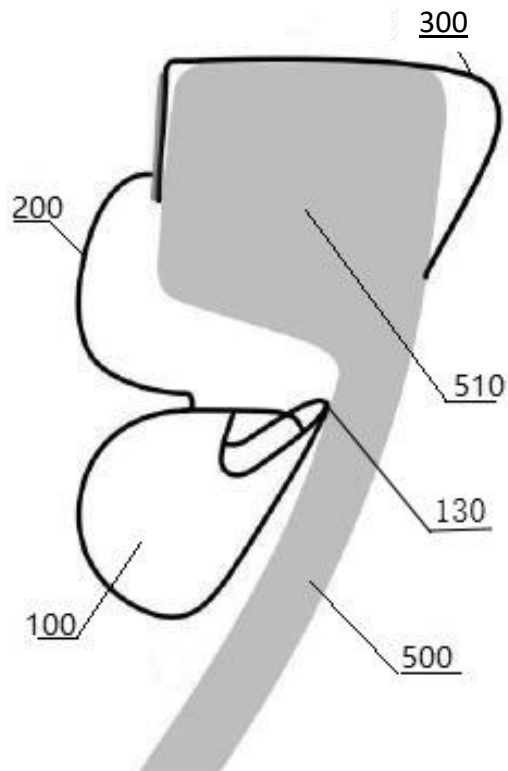


FIG. 1

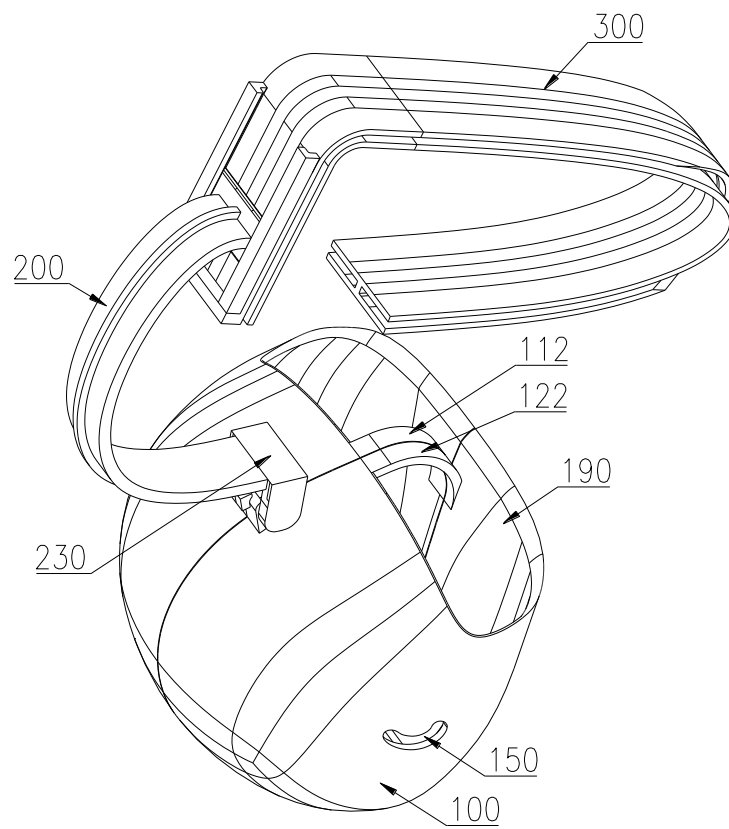


FIG. 2

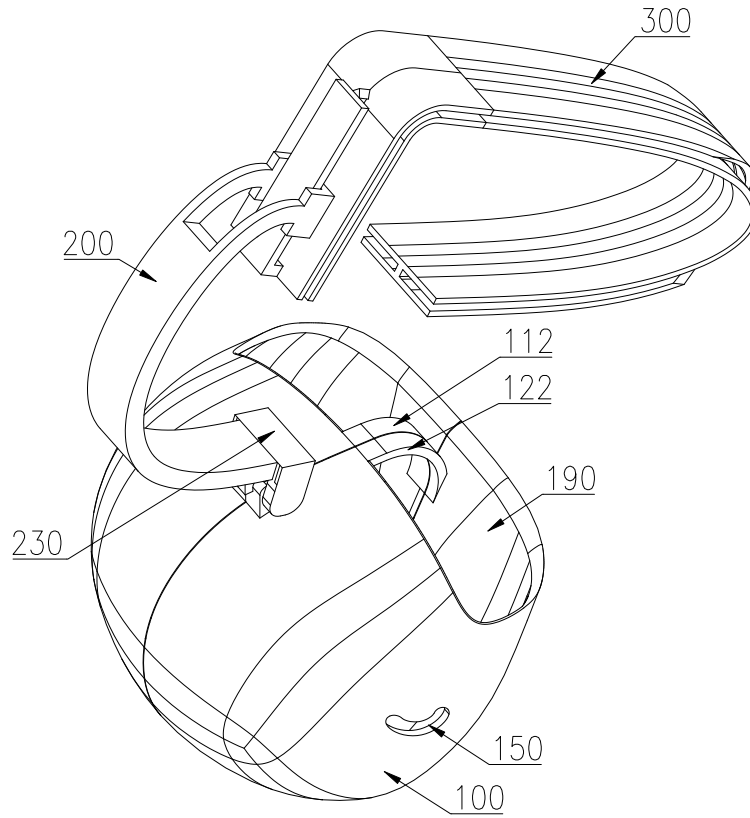


FIG. 3

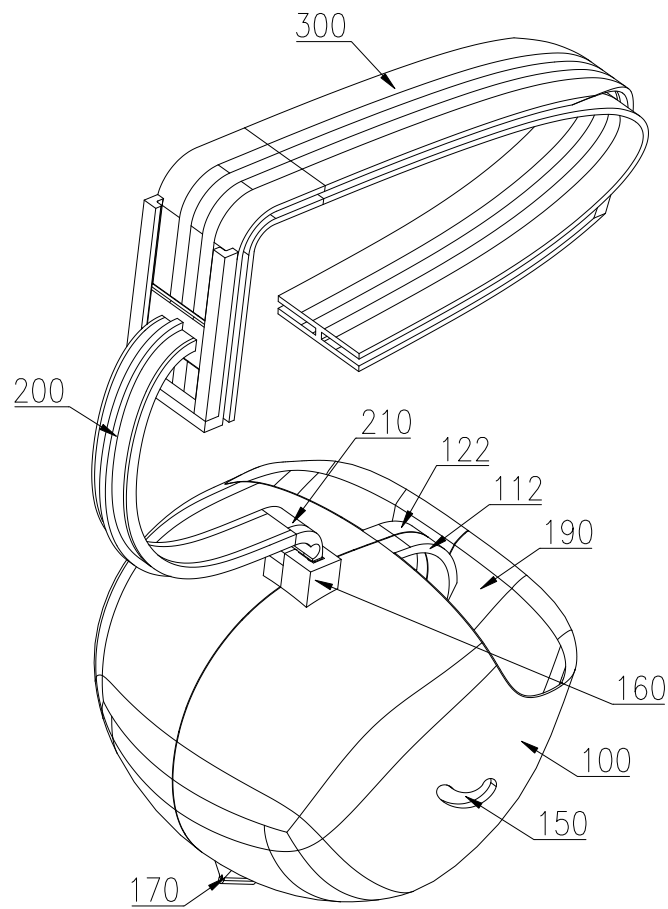
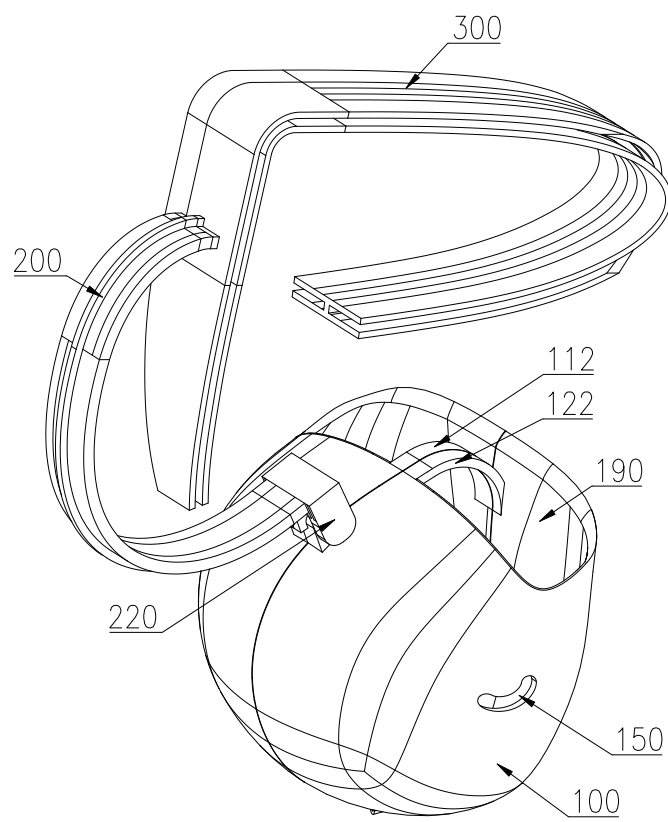
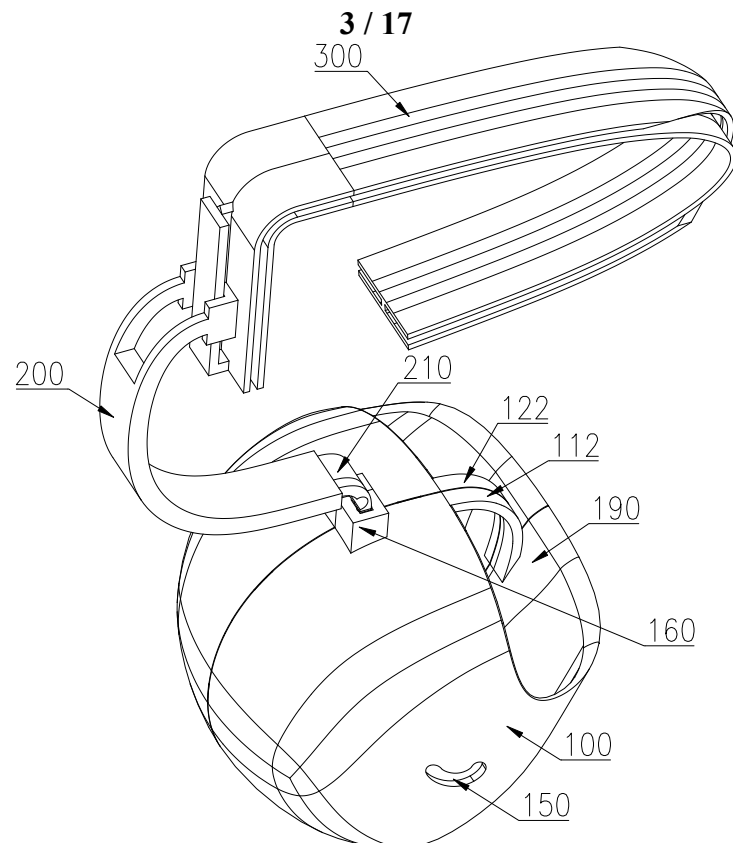


FIG. 4



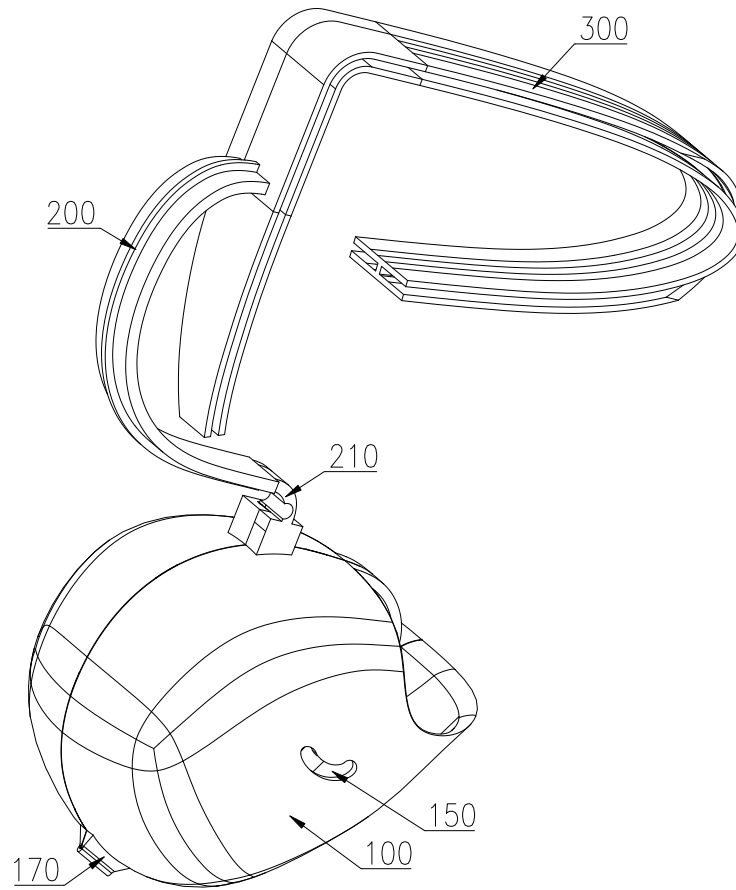


FIG. 7

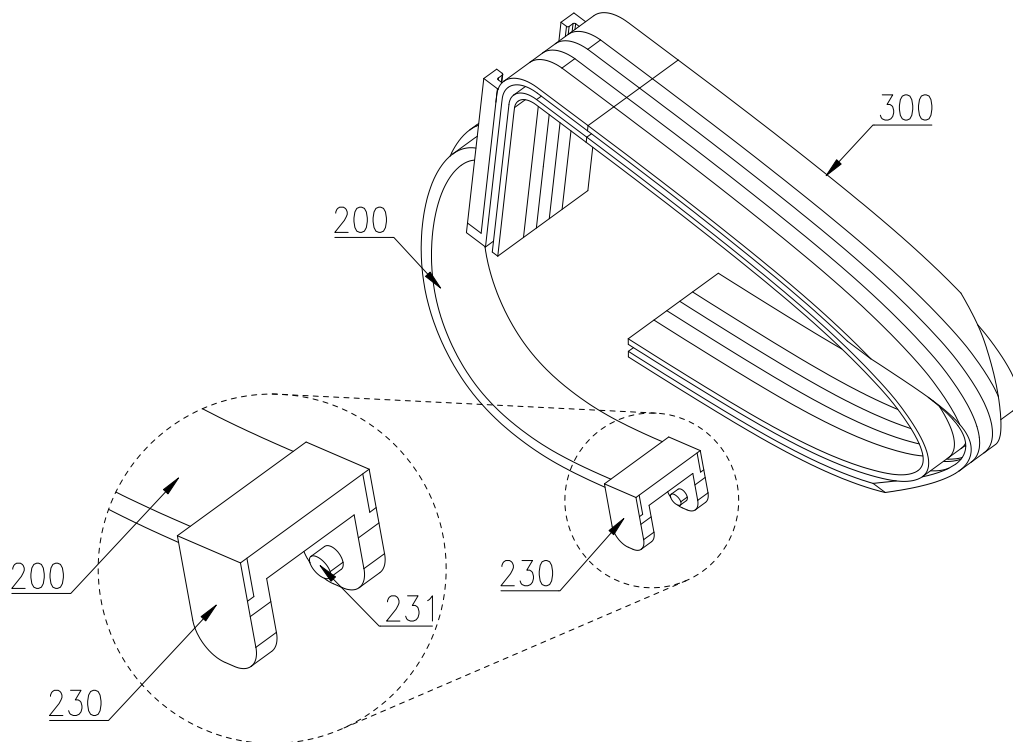


FIG. 8

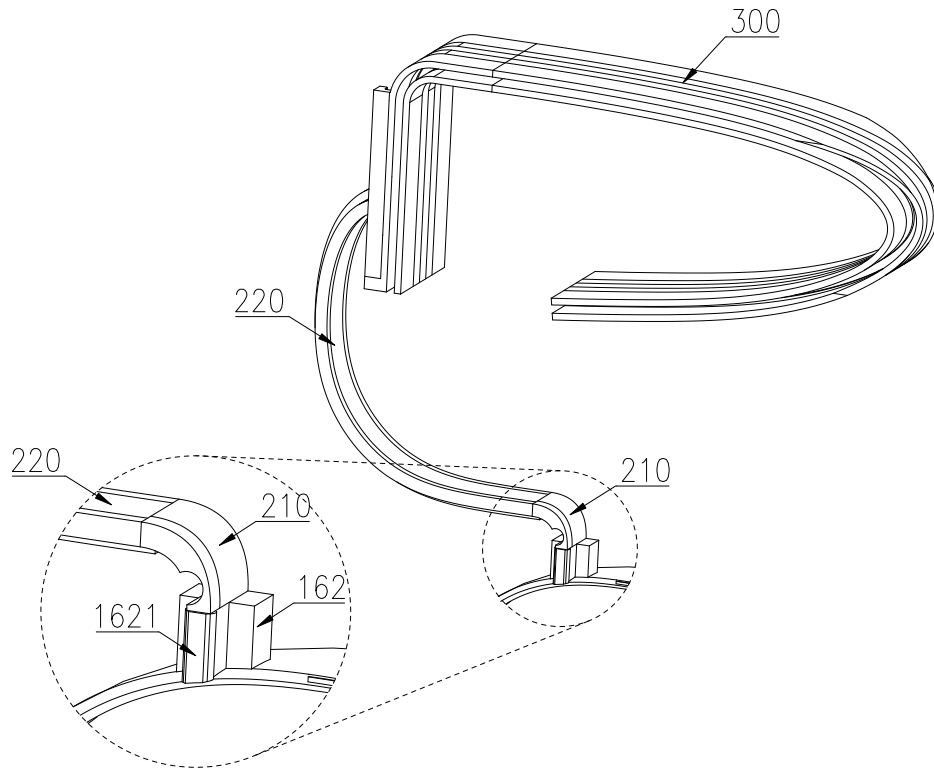


FIG. 9

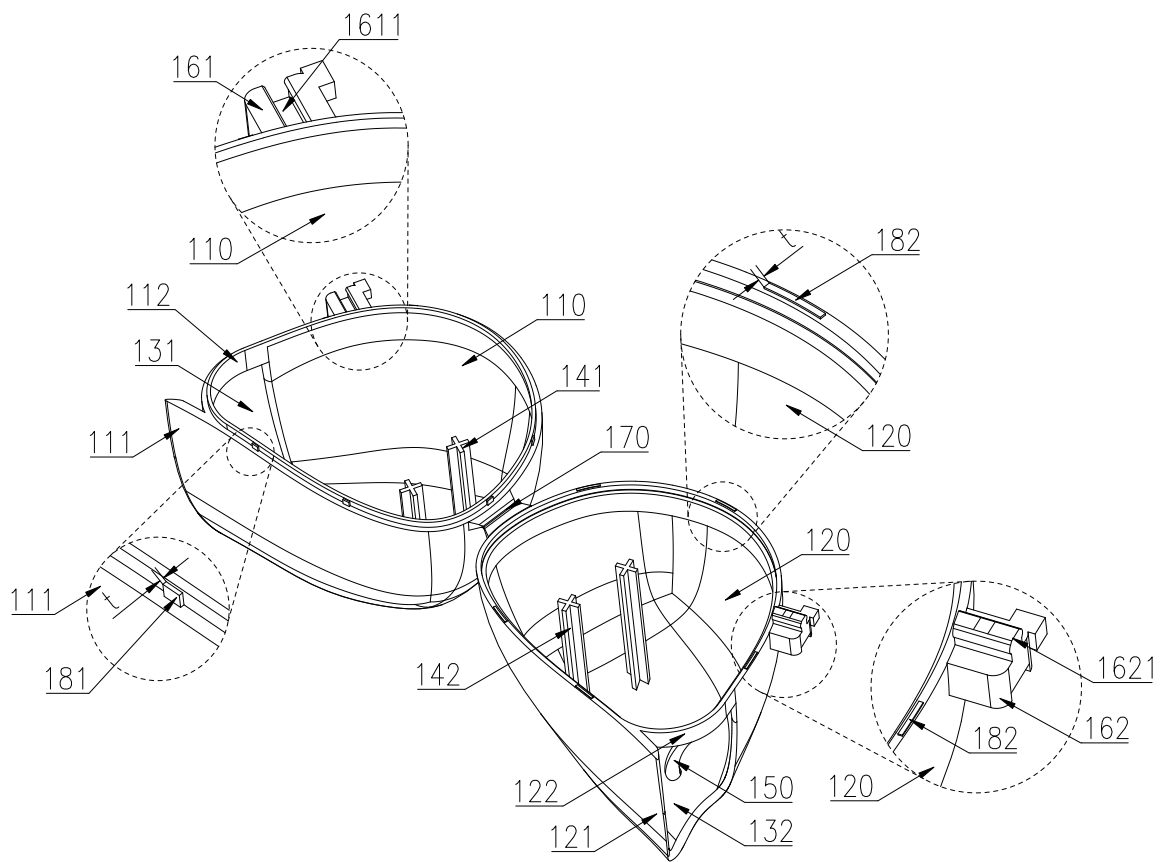


FIG. 10

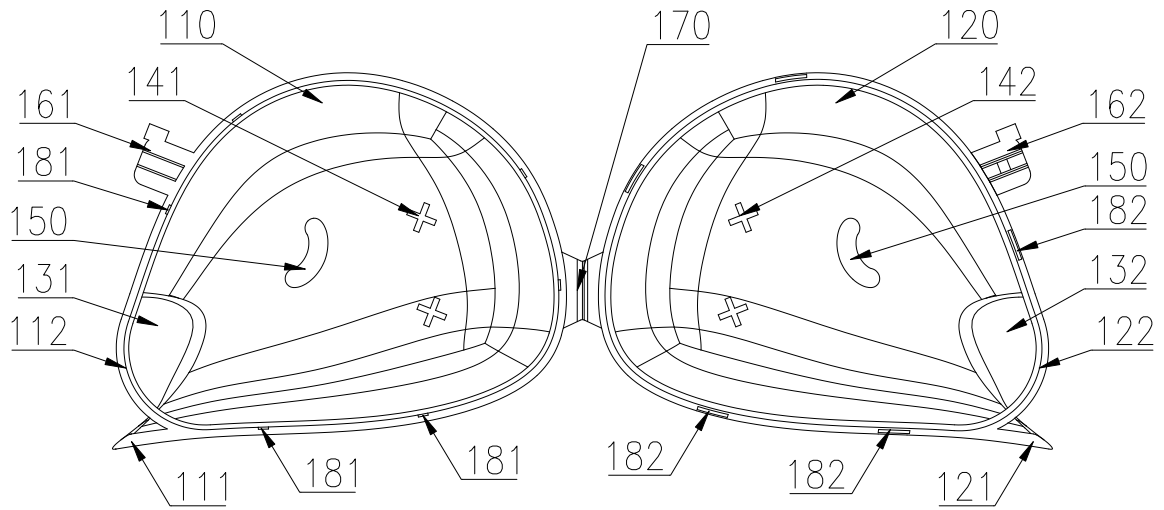


FIG. 11

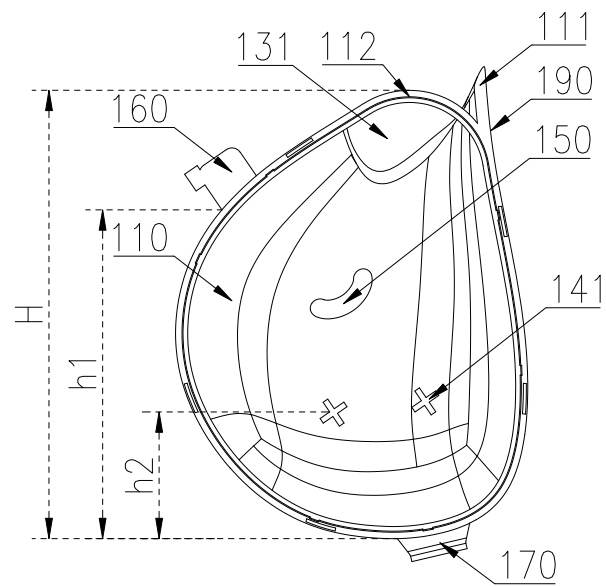


FIG. 12

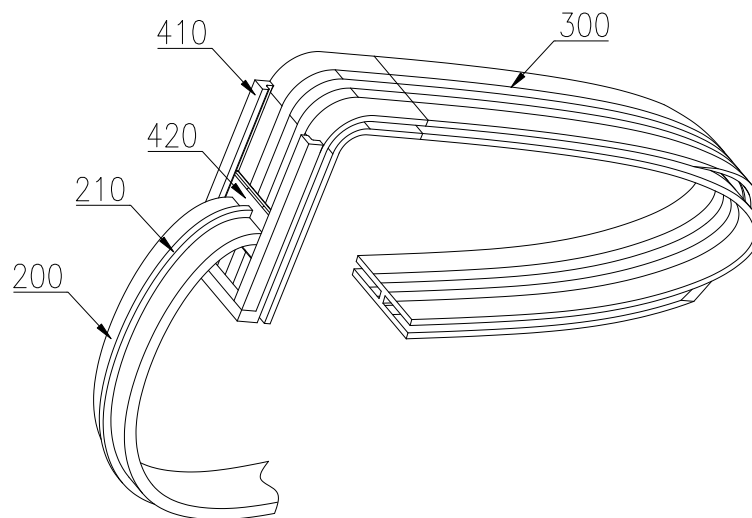


FIG. 13

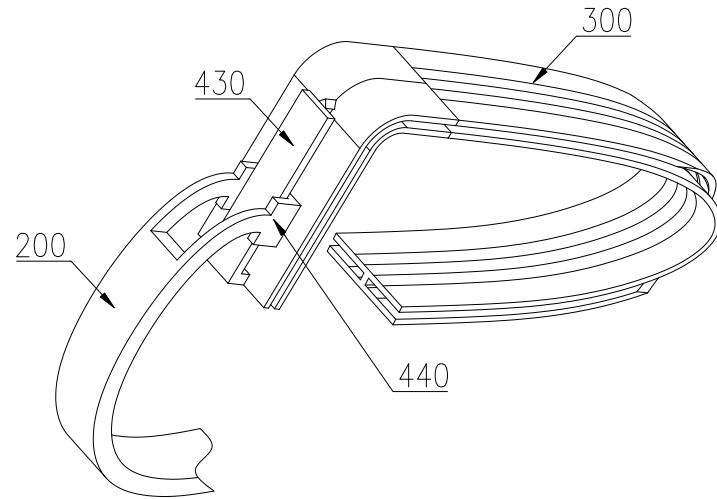


FIG. 14

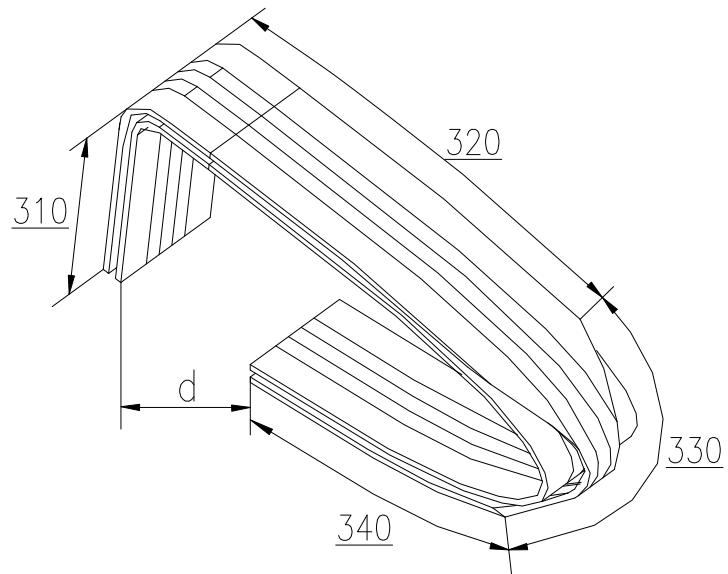


FIG. 15

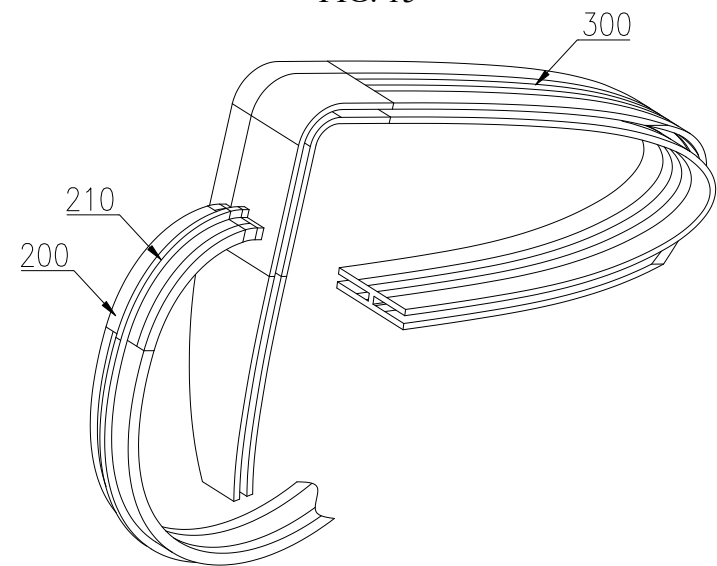


FIG. 16

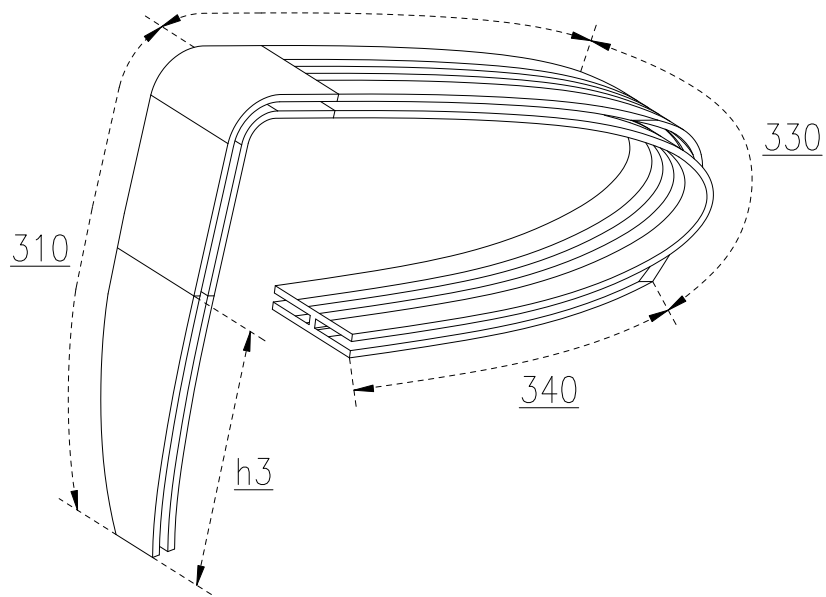


FIG. 17

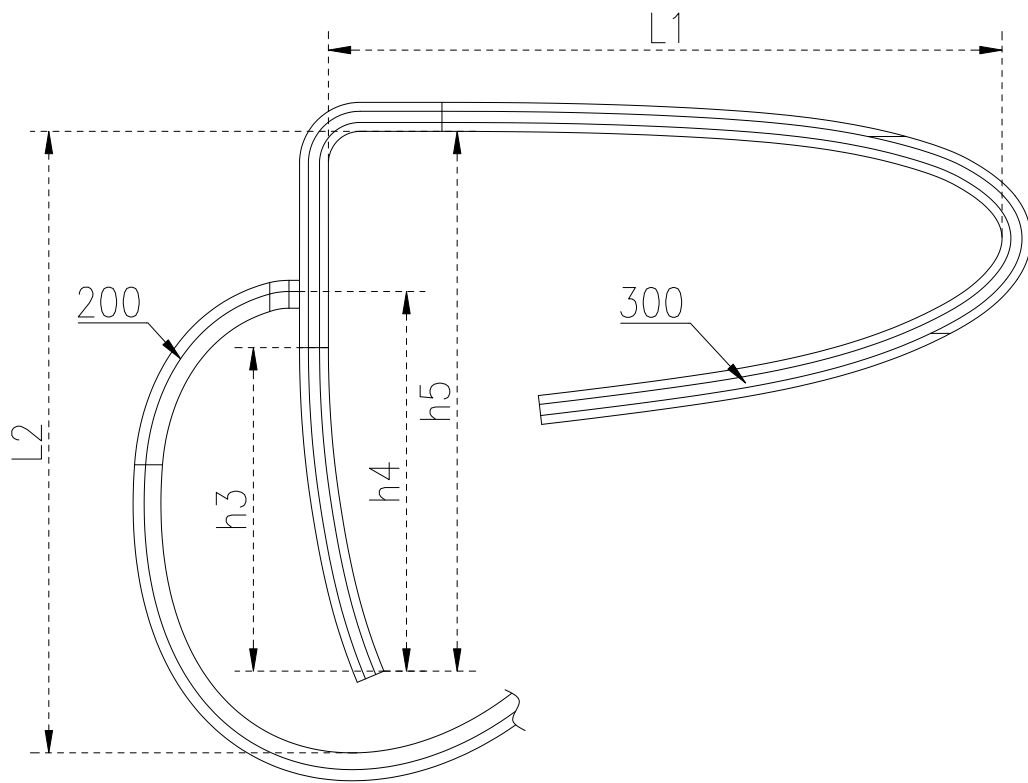


FIG. 18

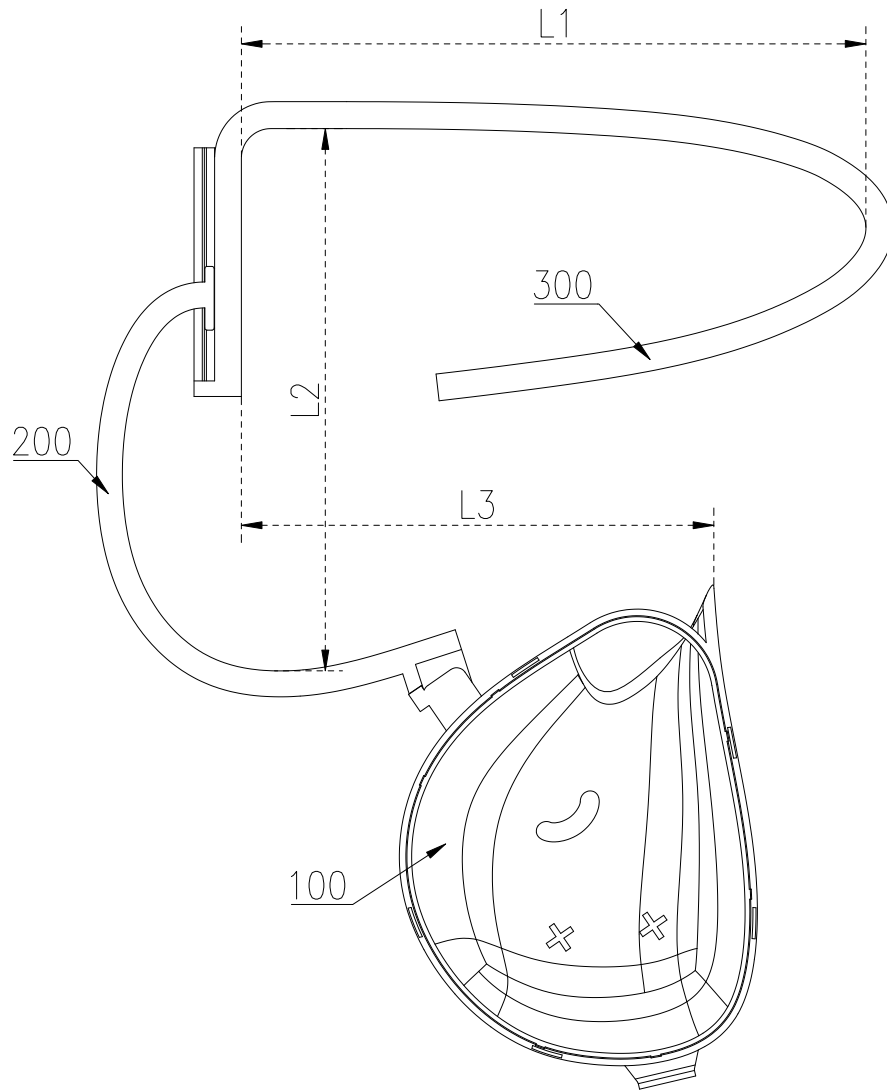


FIG. 19

Samples	Sample one	Sample two	Sample three	Sample four	Sample five
Composition of toilet cleaner	1-bromo-3-chloro-5,5-dimethylhydantoin (BCDMH)	A mixture of 1-bromo-3-chloro-5,5-dimethylhydantoin, 1,3-dichloro-5,5-dimethylhydantoin, 1,3-dichloro-5-methyl-5-ethylhydantoin (in which 1-bromo-3-chloro-5,5-dimethylhydantoin content is 60%, 1,3-dichloro-5,5-dimethylhydantoin content is 28%, 1,3-dichloro-5-methyl-5-ethylhydantoin content is 11%, and impurities content is 1%)	A mixture of 1-bromo-3-chloro-5,5-dimethylhydantoin, 1,3-dichloro-5,5-dimethylhydantoin, 1,3-dichloro-5-methyl-5-ethylhydantoin (in which 1-bromo-3-chloro-5,5-dimethylhydantoin content is 60%, 1,3-dichloro-5,5-dimethylhydantoin content is 28%, 1,3-dichloro-5-methyl-5-ethylhydantoin content is 11%, and impurities content is 1%)	1,3-Dichloro-5,5-dimethylhydantoin (DCDMH)	A mixture of 1-bromo-3-chloro-5,5-dimethylhydantoin, 1,3-dichloro-5,5-dimethylhydantoin, 1,3-dichloro-5-methyl-5-ethylhydantoin (in which 1-bromo-3-chloro-5,5-dimethylhydantoin content is 60%, 1,3-dichloro-5,5-dimethylhydantoin content is 28%, 1,3-dichloro-5-methyl-5-ethylhydantoin content is 11%, and impurities content is 1%)
Form of toilet cleaner	Granular	Block	Granular	Granular	Granular
Usage amount (g) of toilet cleaner	5	13	5	5	5
Volume of water accumulated in	60	60	60	60	42
					55
					30
					20
					3

package (mL)													
Whether water is stored or not; storage water volume (mL) if water is stored	30	30	30	30	30	NO	NO	NO	NO	NO	NO	NO	NO
Water release time (min)	4	4	4	4	4	7.5	7.5	7.5	7.5	5	10	5	5
Effective chlorine concentration in water body of bowl	Day 1	4.97	10.31	19.75	3.80	31.00	17.60	19.34	6.70	5.83	6.24	6.24	6.24
	Day 2	3.78	7.64	10.29	2.95	20.79	18.25	21.86	7.78	6.20	6.79	6.79	6.79
	Day 3	4.69	8.56	9.44	4.58	19.53	14.90	17.15	4.46	4.74	3.77	3.77	3.77
	Day 4	4.87	5.95	7.13	3.60	13.13	10.09	11.29	6.11	5.06	4.03	4.03	4.03
	Day 5	4.74	8.81	7.13	4.62	9.20	13.26	8.15	4.30	3.52	3.36	3.36	3.36
	Day 6	4.52	8.02	5.65	3.92	5.93	7.58	8.04	2.92	3.56	3.12	3.12	3.12
	Day 7	5.26	7.88	6.61	4.03	4.86	5.47	5.37	3.29	3.03	2.90	2.90	2.90
	Day 8	4.13	6.71	5.57	4.52	6.77	8.77	7.29	3.14	2.79	2.19	2.19	2.19
	Day 9	4.27	6.15	6.32	4.08	6.64	5.48	5.05	2.75	2.40	2.05	2.05	2.05
	Day10	4.25	7.11	6.73	3.68	4.82	8.24	3.26	2.83	2.57	1.91	1.91	1.91
	Day11	4.46	7.27	5.90	4.69	6.19	7.05	7.22	2.92	3.36	1.89	1.89	1.89
	Day 12	3.67	6.46	5.80	8.20	6.45	7.68	5.17	3.52	3.47	1.99	1.99	1.99

	Day 13	3.30	5.56	5.84	3.78	4.73	4.52	6.94	2.65	2.11	2.36
	Day 14	3.66	6.16	6.70	4.36	6.48	6.11	4.34	3.70	2.91	3.62
	Day 15	3.40	7.42	6.50	5.18	6.04	7.29	5.71	3.19	3.13	2.75
	Day 16	3.54	5.98	3.96	4.53	4.80	7.48	6.83	7.89	5.35	7.04
	Day 17	4.12	5.40	4.52	3.83	4.08	5.62	7.09	3.75	1.97	2.98
	Day 18	3.85	6.21	4.46	3.69	5.46	3.98	6.16	2.92	2.96	2.64
	Day 19	3.88	5.84	4.83	3.47	4.79	4.52	4.37	3.02	2.69	2.46
	Day 20	4.23	5.41	5.20	3.39	4.15	3.86	5.49	3.13	2.22	2.86
	Day 21	3.57	5.82	4.71	2.52	6.52	5.72	5.14	3.04	2.38	2.03
	Day 22	3.55	5.73	4.19	3.24	4.29	4.94	5.43	3.55	2.65	2.66
	Day 23	3.52	5.51	4.86	3.33	3.58	6.53	5.01	3.40	2.88	2.38
	Day 24	3.46	6.92	4.92	3.07	4.23	5.03	8.44	2.77	2.38	2.79
	Day 25	3.03	6.04	3.58	3.21	2.28	4.11	7.16	3.21	3.01	3.21
	Day	3.85	6.18	4.48	3.41	2.22	4.62	4.86	3.26	3.06	3.43

[illegible]

Fig. 20

Search in CNKI Database	1,3-dichloro-5,5-dimethylhydantoin	Solubility is 1.98 g/L at 20 °C
	1,3-dibromo-5,5-dimethylhydantoin	Solubility: 1 L of water dissolves 2.2 g of dibromohydantoin at 20 °C of water temperature
	1-bromo-3-chloro-5,5-dimethylhydantoin	Solubility: 1 L of water dissolves 2.5 g of dibromohydantoin at 20 °C of water temperature
Search in SciFinder Academic (American Chemical Abstracts Database)	1,3-dichloro-5,5-dimethylhydantoin	Solubility is 1.4 g/L at 25 °C
	1,3-dibromo-5,5-dimethylhydantoin	Solubility is 5.4 g/L at 25 °C
	1-bromo-3-chloro-5,5-dimethylhydantoin	Solubility is 7.2 g/L at 25 °C
	1-chloro-3-bromo-5,5-dimethylhydantoin	Solubility is 7.2 g/L at 25 °C
	1,3-dichloro-5-methyl-5-ethylhydantoin	Solubility is 0.63 g/L at 25 °C
	1,3-dibromo-5-methyl-5-ethylhydantoin	Solubility is 2.5 g/L at 25 °C
	3-bromo-1-chloro-5-methyl-5-ethylhydantoin	Solubility is 3.3 g/L at 25 °C
	1-bromo-3-chloro-5-methyl-5-ethylhydantoin	Solubility is 3.3 g/L at 25 °C

FIG. 21

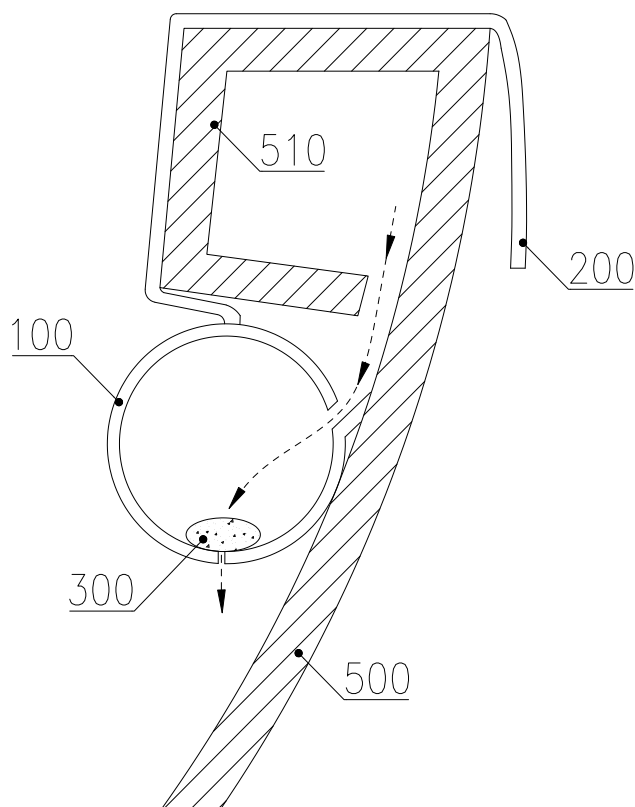


FIG. 22

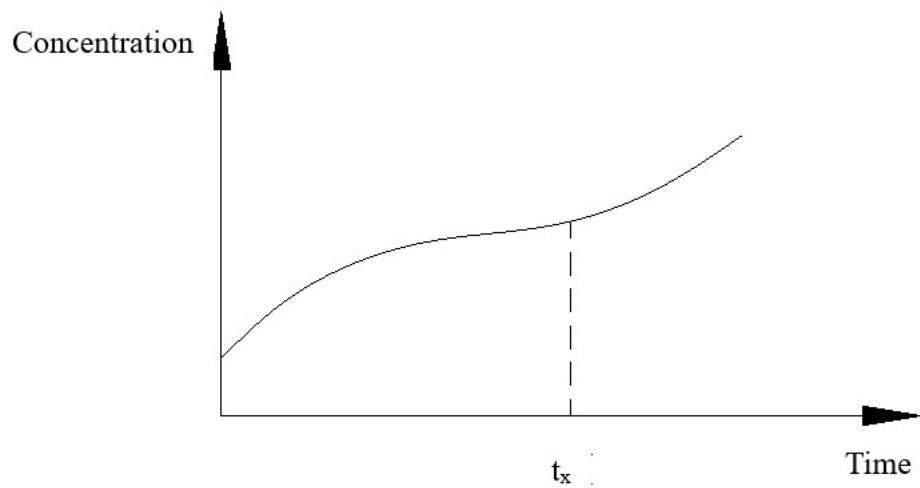


FIG. 23

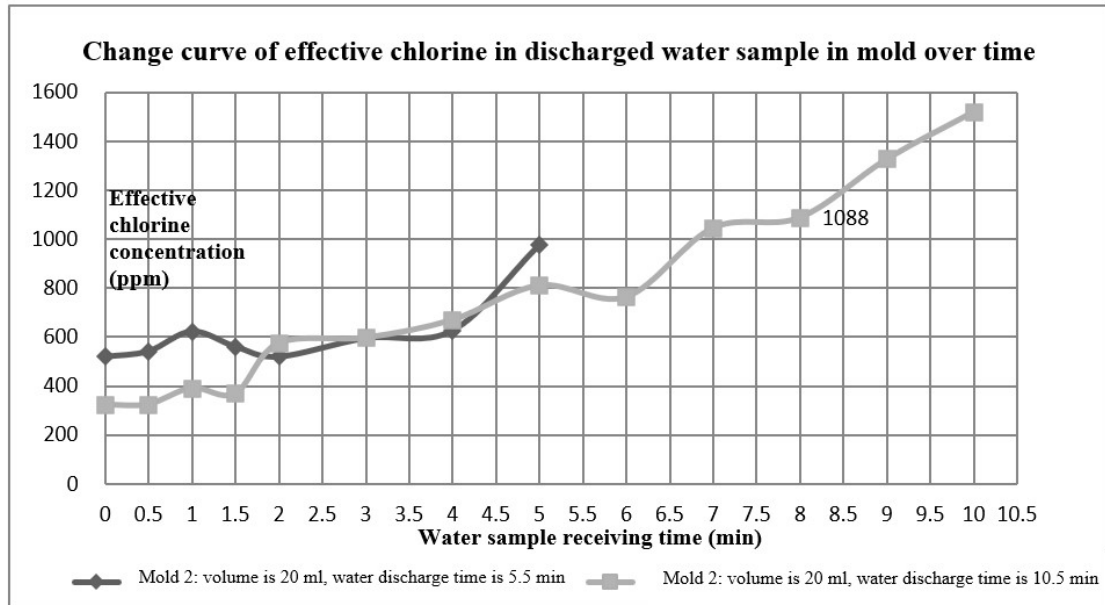


FIG. 24

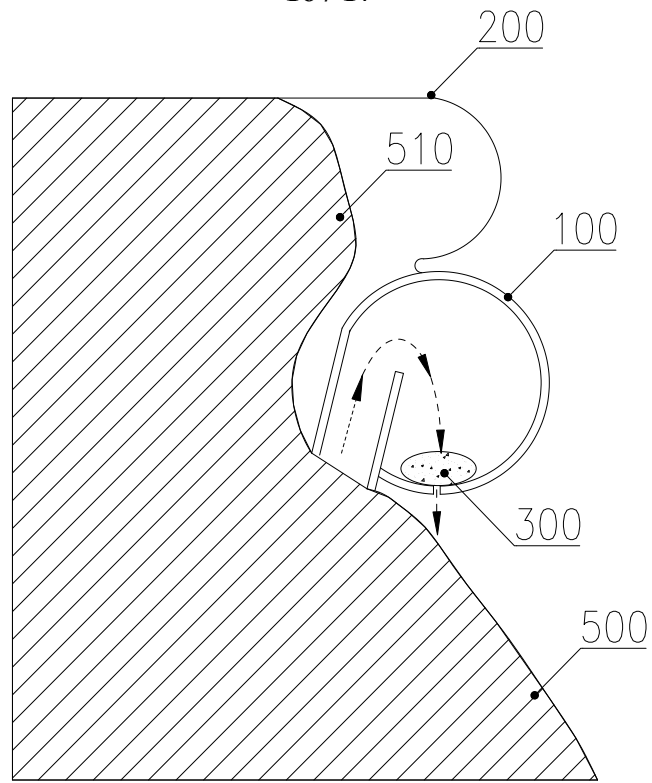


FIG. 25

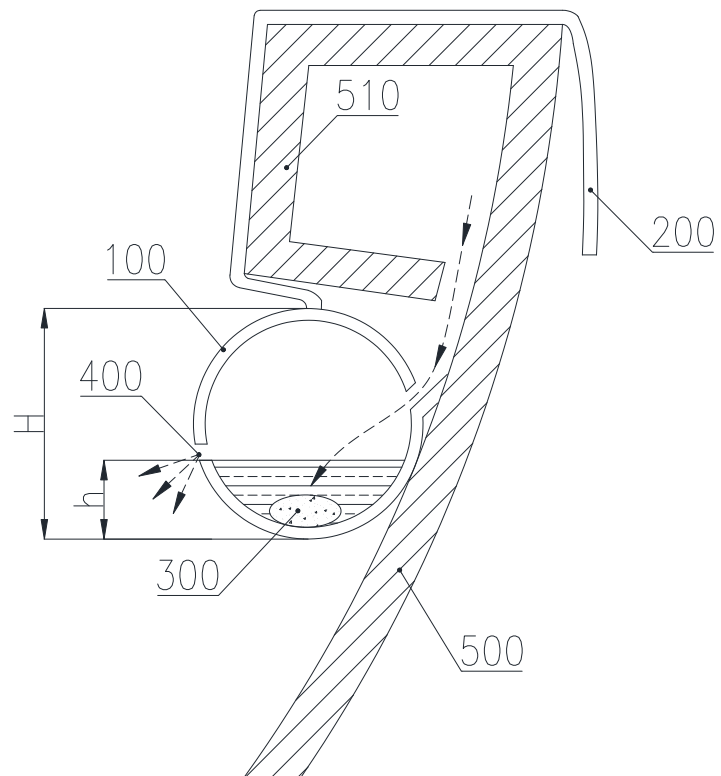


FIG. 26

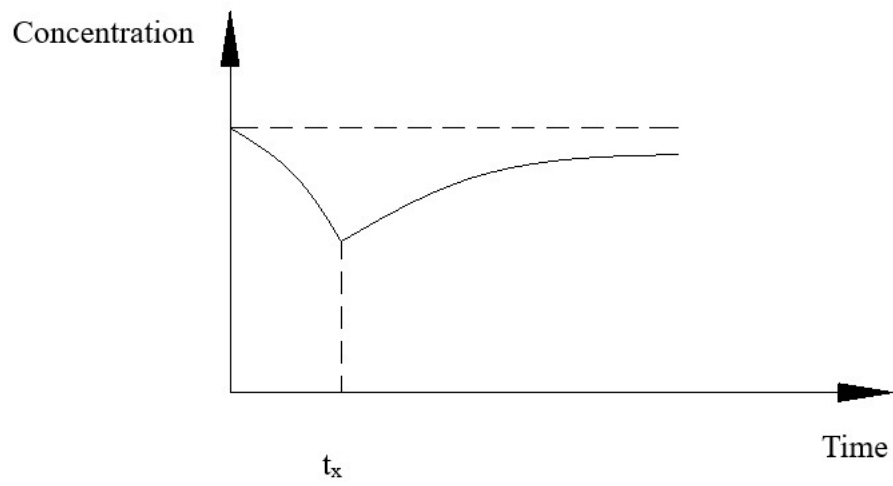


FIG. 27

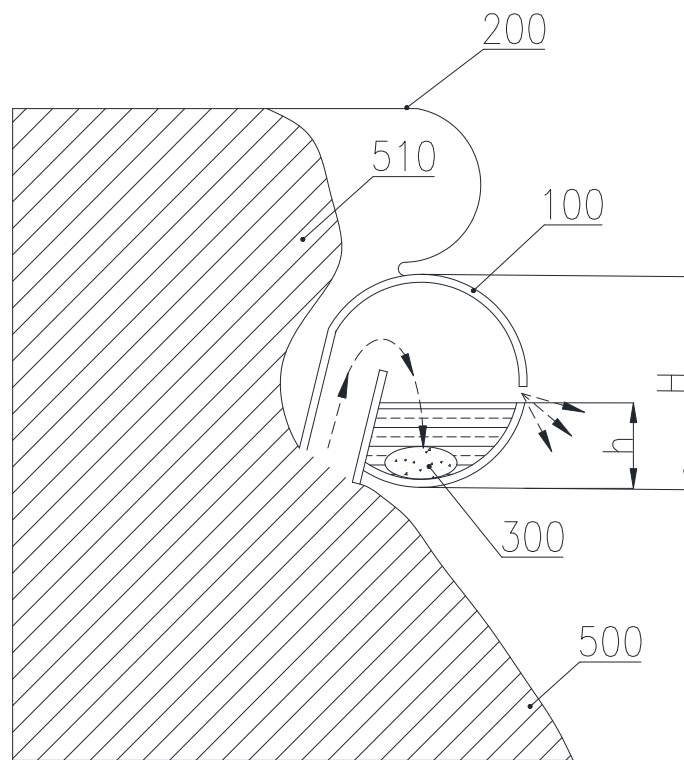


FIG. 28