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(12) **United States Design Patent**  
**Wakamatsu**

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(54) **CRYSTAL RESONATOR FOR QCM MEASUREMENT OF TOXIC MATERIALS**

(75) Inventor: **Shunichi Wakamatsu**, Hokkaido (JP)

(73) Assignee: **Nihon Dempa Kogyo Co., Ltd.**, Tokyo (JP)

(\*\*) Term: **14 Years**

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(30) **Foreign Application Priority Data**

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(51) **LOC (8) Cl.** ..... **10-04**

(52) **U.S. Cl.** ..... **D10/46**

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73/24.06, 580, 778; 310/8.2, 8.9, 320, 344,  
310/353, 361, 370; 324/715-719; 333/72;  
370/311, 357; 455/343, 574, 88, 334, 255,  
455/571-573, 575

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,872,411	A	*	3/1975	Watanabe et al.	.....	310/312
3,931,388	A	*	1/1976	Hafner et al.	.....	310/344
4,124,809	A	*	11/1978	Engdahl et al.	.....	310/361
5,436,523	A	*	7/1995	Staudte	.....	310/348
6,295,861	B1	*	10/2001	Tom et al.	.....	73/24.06
6,525,549	B1	*	2/2003	Poellmann	.....	324/717
6,798,222	B2	*	9/2004	Tanaka et al.	.....	324/715
6,987,347	B2	*	1/2006	Yoshio et al.	.....	310/320

D526,583 S \* 8/2006 Wakamatsu et al. .... D10/46

\* cited by examiner

*Primary Examiner*—Antoine D. Davis

(74) *Attorney, Agent, or Firm*—Scott D. Wofsy; Edwards Angell Palmer & Dodge LLP

(57) **CLAIM**

The ornamental design for a crystal resonator for QCM measurement of toxic materials, as shown and described.

**DESCRIPTION**

FIG. 1 is a top plan view of a crystal resonator of a new design;

FIG. 2 is a bottom plan view of the crystal resonator shown in FIG. 1;

FIG. 3 is a left side view of the crystal resonator shown in FIG. 1;

FIG. 4 is a right side view of the crystal resonator shown in FIG. 1;

FIG. 5 is a front elevational view of the crystal resonator shown in FIG. 1;

FIG. 6 is a cross-sectional view taken along line 6—6 of FIG. 1.

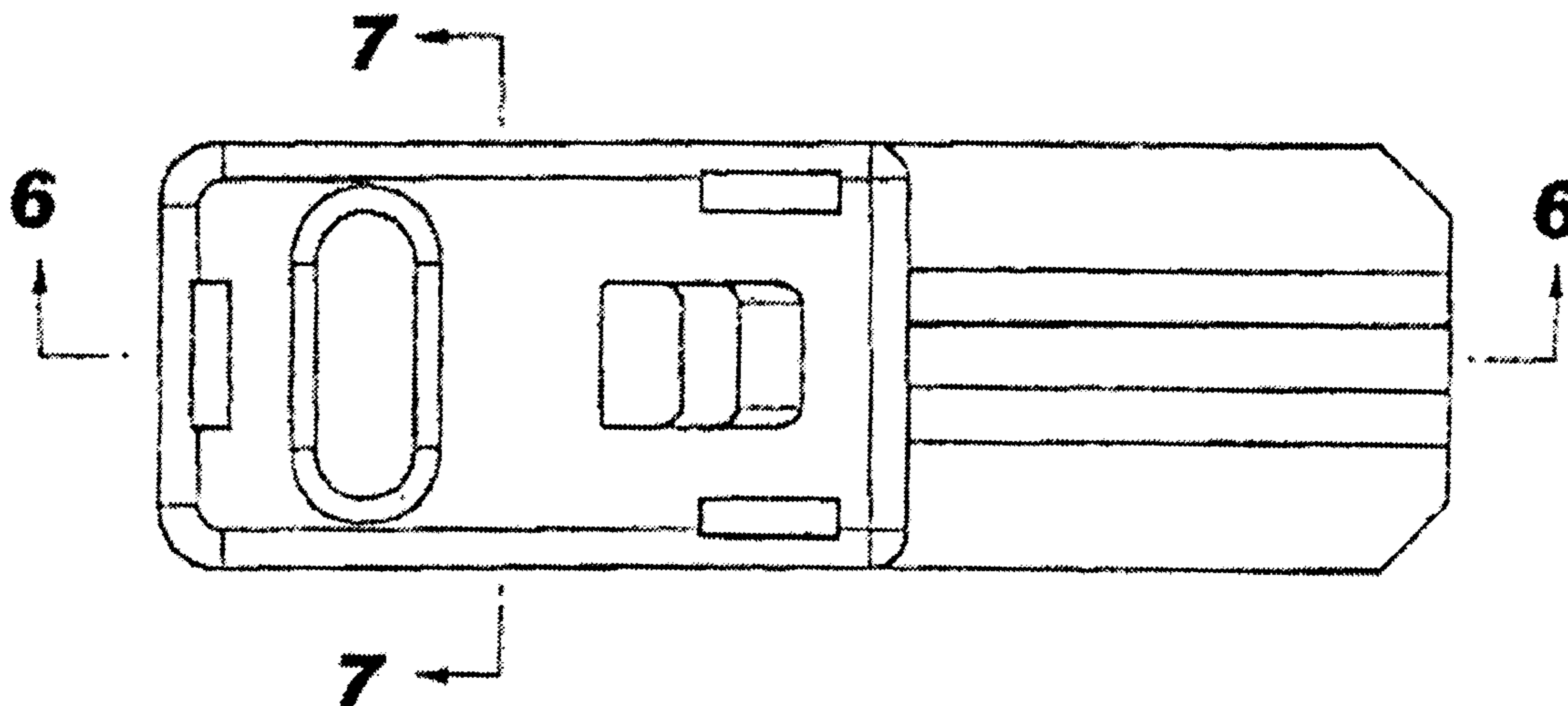
FIG. 7 is a cross-sectional view taken along line 7—7 of FIG. 1.

FIG. 8 is a perspective view of the crystal resonator shown in FIG. 1,

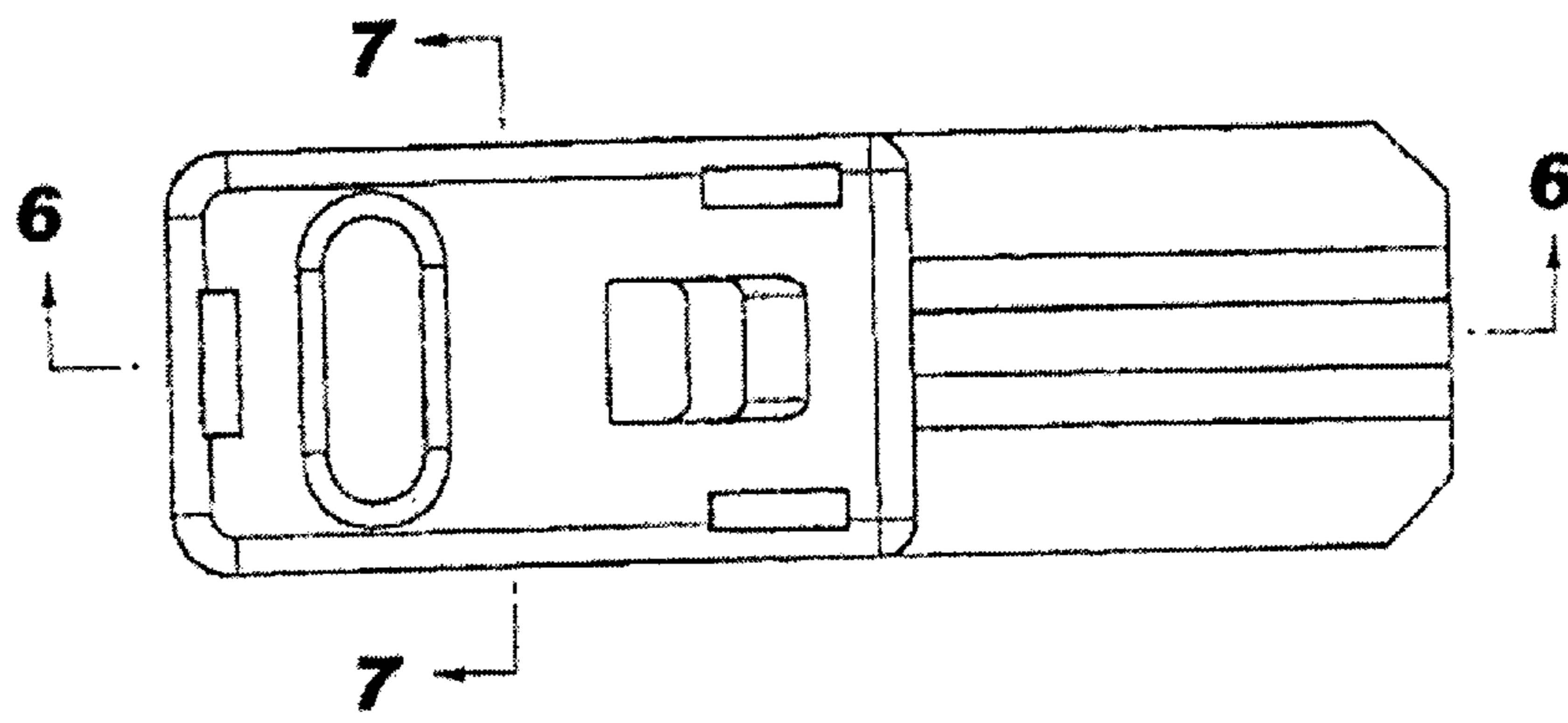
FIG. 9 is a perspective view showing the assembling components of the crystal resonator; and,

FIG. 10 is a perspective view showing the assembling components of the crystal resonator.

**1 Claim, 4 Drawing Sheets**



**Fig. 1**



**Fig. 2**

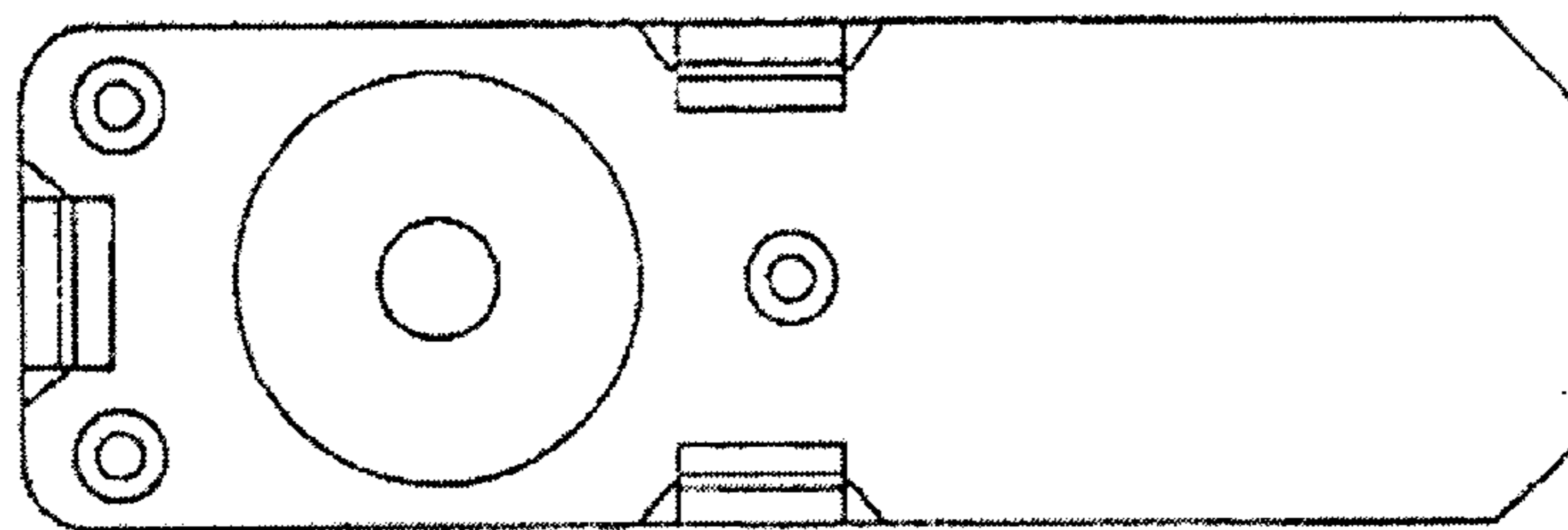


FIG. 3

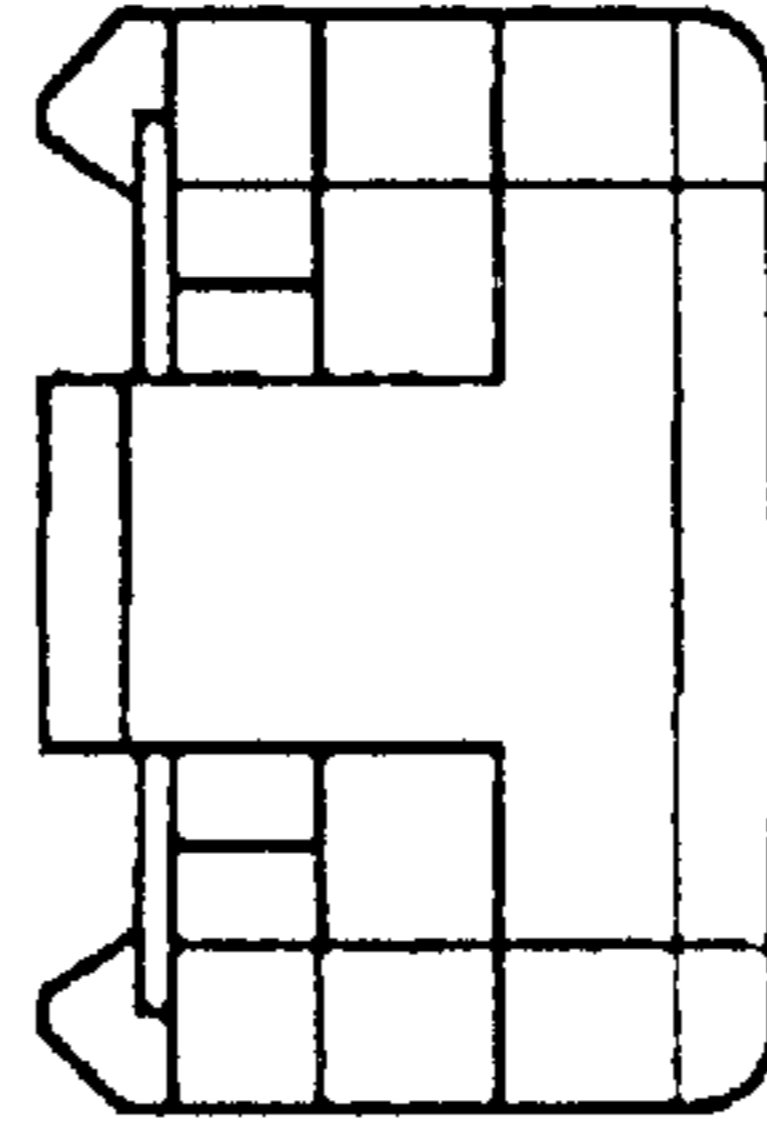


FIG. 4

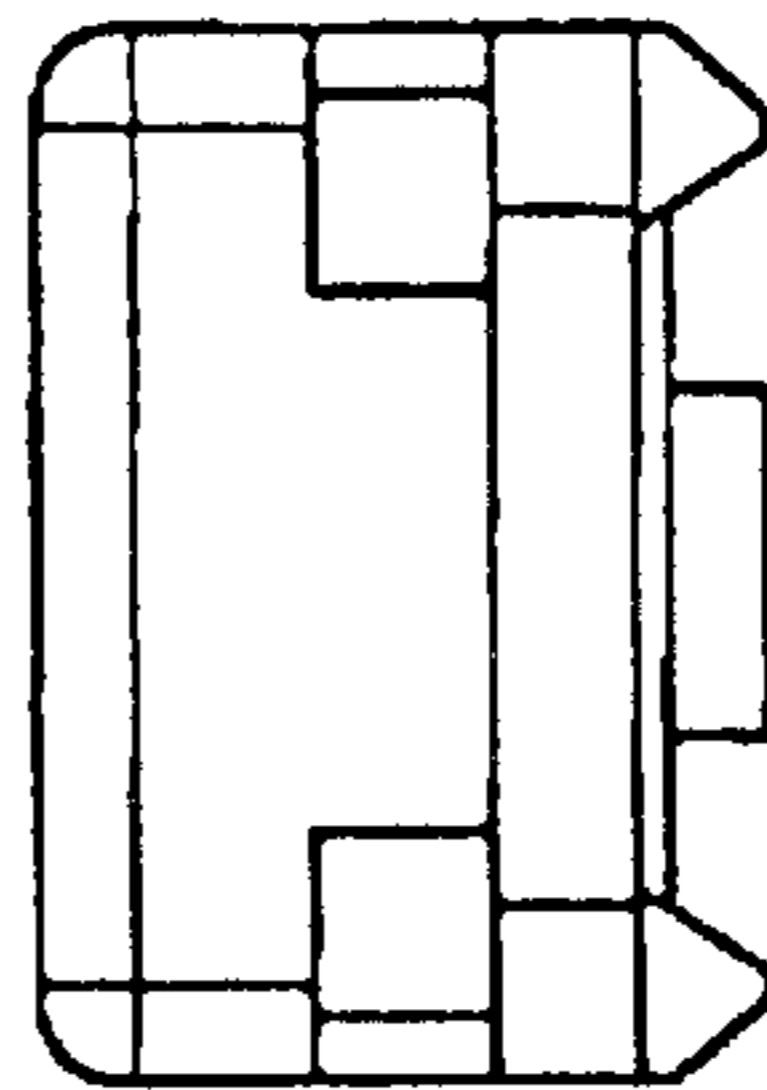


FIG. 5

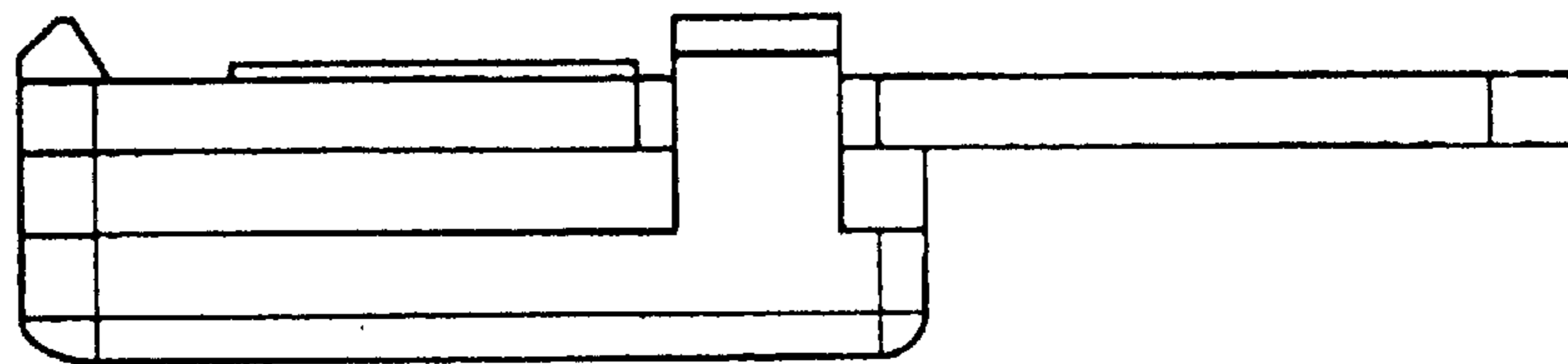


FIG. 6

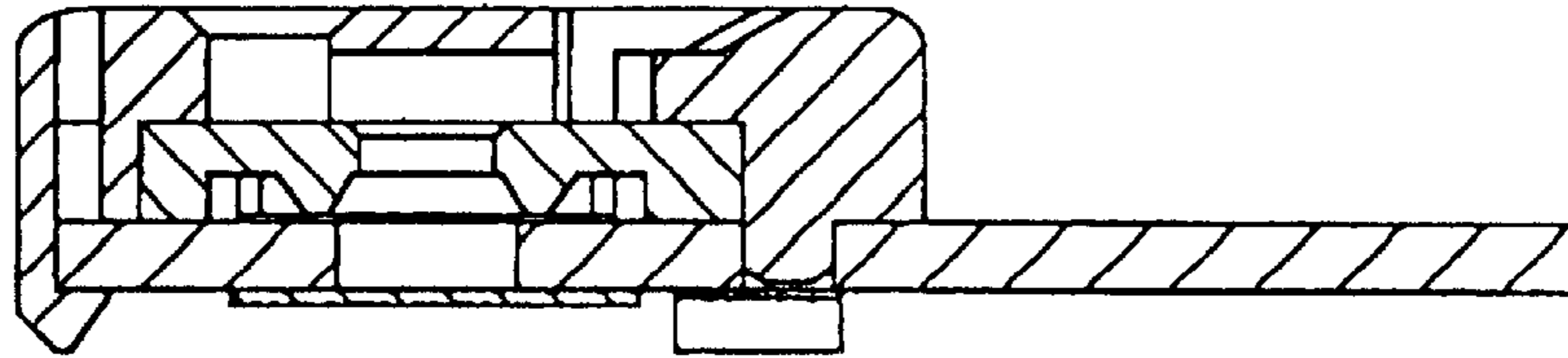


FIG. 7

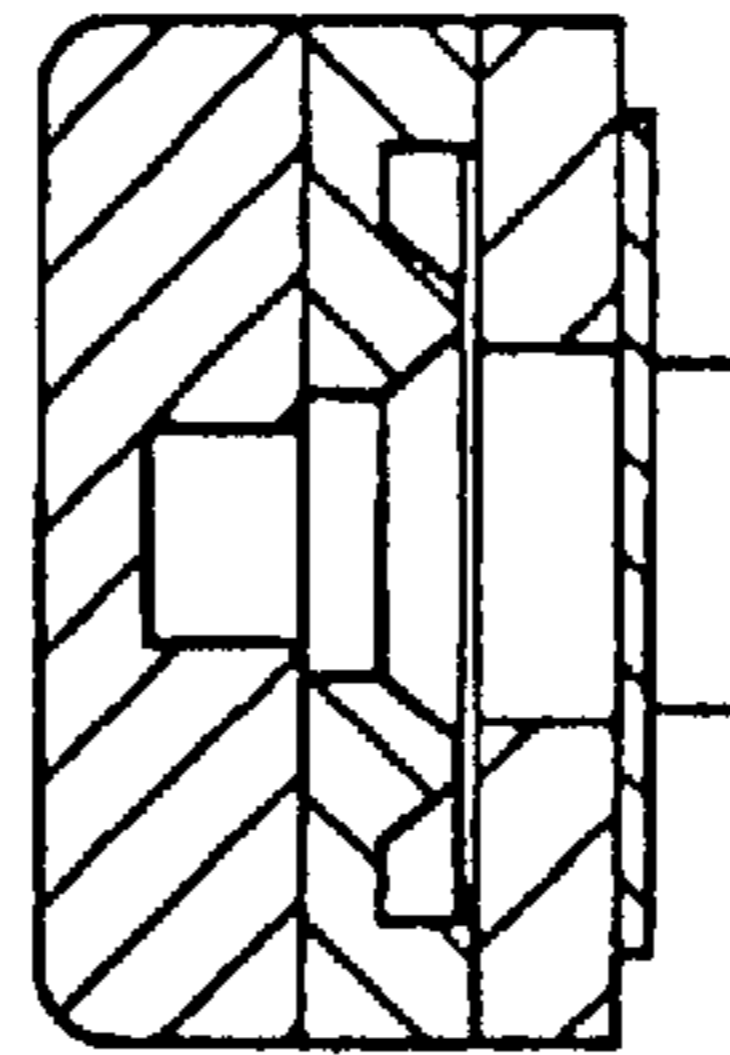
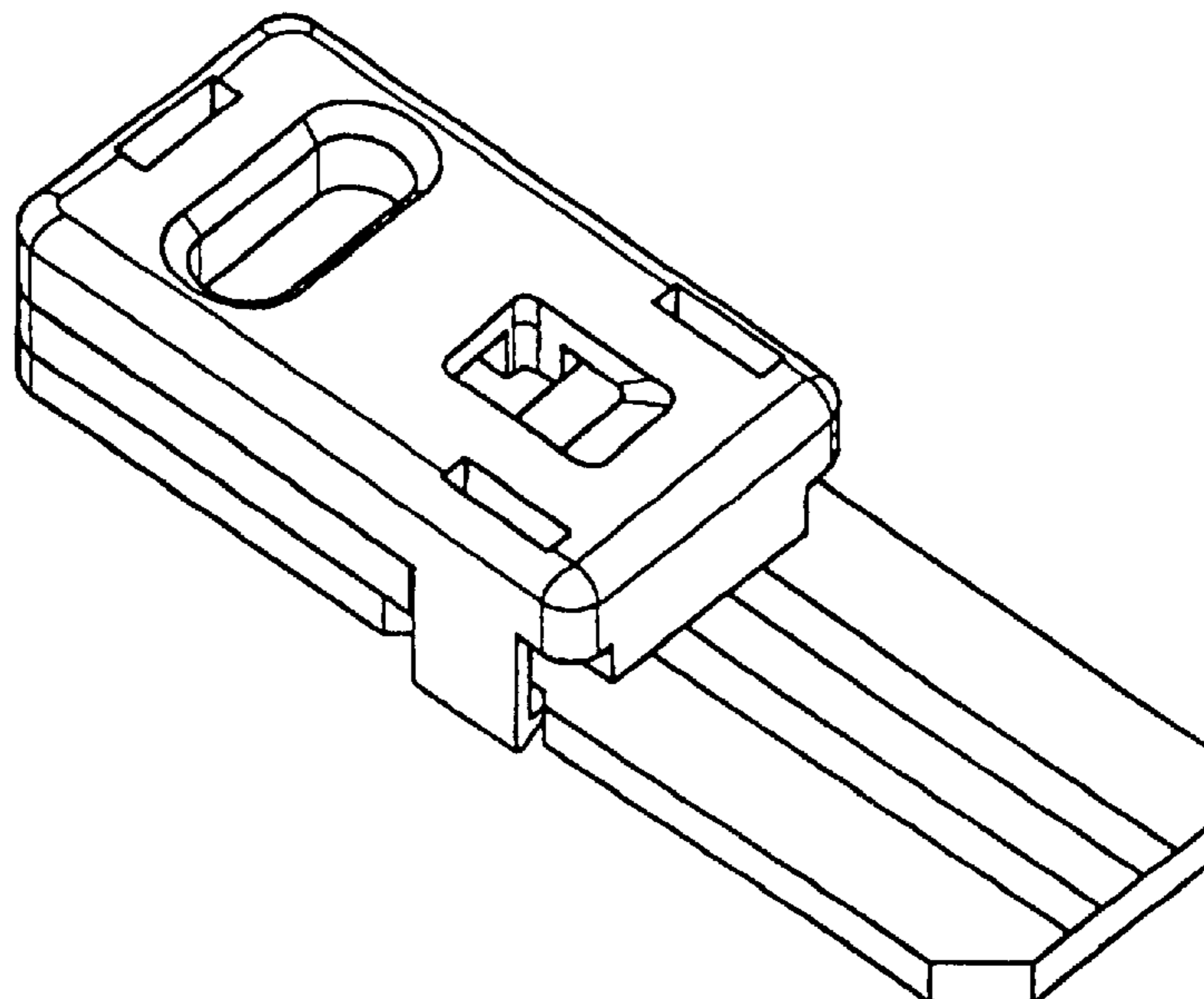
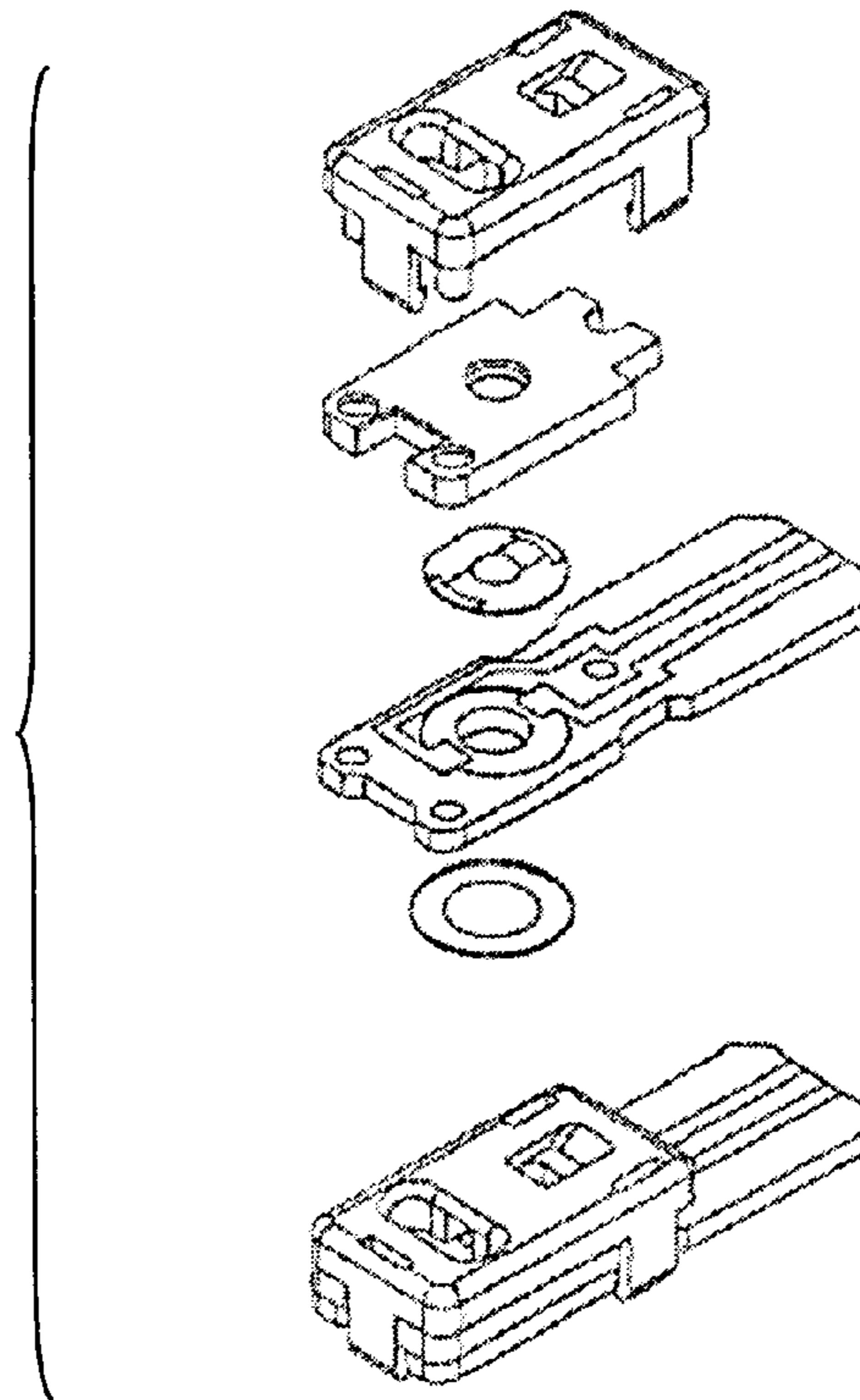


FIG. 8



**Fig. 9**



**Fig. 10**

