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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

Initial Date: 10/15-/97	Determination (Circle Number):
Authority: X DD	1. Classification Retained
Name: W. H. LAWRENCE	2. Classification Changed to: UNCL
	3. Contains No DOE Classified Information
Review Date: 10/16/97	4. Coordinate With:
Authority: ADD	5. Contains UCAI:
Name: W. Layne	6. Comments:
	UNCLASSIFIED

AUG 20 1964

Lt. Col. W. K. Kern
Chief, Aerospace Safety Section
Engineering and Test Branch
Division of Reactor Development
U.S. Atomic Energy Commission
Washington, D. C. 20545

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP

CLASSIFICATION CHANGED TO: UL	AUTHORITY: W. C. Layne
Emilda Selph 11/03/97	
PERSON CHANGING MARKING & DATE	RECORD ID: 98SN0311
Carmela Gallegos 11/11/97	
PERSON VERIFYING MARKING & DATE	DATED: 10/15/97

Re: SNAP 15C Fuel Capsule Impact Test

Ref: Letter, A. J. Clark, Jr., Sandia Corp., to Lt. Col. W. K. Kern, DRD, dtd Apr. 23, 1964, subject, Meeting Report and Proposed Test Plan for SNAP 15C

Thirteen SNAP 15C fuel capsules furnished by Nuclear Products Division of the Minnesota Mining and Manufacturing Company have been impacted. Six of the capsules ruptured when impacted at 201 to 205 fps (feet per second). The critical capsule attitudes were 45° on the fuel end and side-on. The remaining seven capsules impacted at 252 to 305 fps end-on (both fuel and void ends) and 45° on the void end did not rupture. The results are tabulated in Figure 1 and plotted in Figure 2.

The Sandia Corporation estimate of the temperature and velocity of an unprotected capsule released from 10,000 feet is shown in Figure 3. The temperatures of four points in the capsule (three in the outer capsule and one at the center of the fuel), the capsule velocity, and capsule altitude are plotted vs time from release.

The test velocity for the initial impact at each attitude was approximately 255 fps (125 per cent of sea level terminal velocity) and the capsule temperature was approximately 720°F (terminal temperature plus 50°F) as specified in the referenced meeting report and test plan.

Each capsule was weighed and leak checked using both Radiflo and acetone before impact. After impact the capsules were cleaned, weighed, leak tested with acetone, and weighed again. The volume of acetone absorbed was then calculated. The leak check data is tabulated in Figure 4. The estimated void volumes of the capsules are shown in Figure 5.

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Comparison of the data in Figures 4 and 5 indicates that for capsule numbers 37, 40, 42, 44, 45, and 50 both the inner and outer capsules ruptured. The acetone absorbed by capsule 49 indicates a rupture of the outer capsule only. Because of the possible deformation of the inner capsule in a manner which would increase the void volume between the inner and outer capsules or the possibility of the fuel simulant obstructing a break in the inner capsule, the leak tests are not conclusive evidence of the degree of rupture. Additional evaluation involving sectioning of the capsules and/or separation of the outer capsule from the intact inner capsules and leak checking the inner capsule is recommended.

Photographs of each capsule taken after impact are included on pages 8-20.

The capsules have been returned to the 3M Company for their evaluation.

Original Signed By
A. J. CLARK, JR.

A. J. Clark, Jr.
Supervisor
Division 7412

WJB:7412-1:di

Enc. with all copies

Copy to:
R. T. Carpenter, DRD
B. J. Rock, DRD
C. E. Stable, NYOO
Attn: D. Axelrod, Project Engineer
J. A. Ramberg, 3M Company
D. L. Kranz, 7331 w/o photographs
V. E. Blake, 7410
A. J. Clark, Jr., 7412

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SNAP 15C FUEL CAPSULE IMPACT TEST

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TEST NO.	CAPSULE NO.	IMPACT ATTITUDE	VELOCITY (feet/sec.)	TEMP. °F	RESULTS
1	54	FUEL END END-ON	254	715-725	INTACT
2	38	VOID END END-ON	255	710-730	INTACT
3	44	FUEL END 45°	250	715-725	RUPTURE
4	47	VOID END 45°	252	715-725	INTACT
5	42	SIDE-ON	254	710-730	RUPTURE
6	46	VOID END END-ON	304	715-725	INTACT
7	43	FUEL END END-ON	305	715-725	INTACT
8	41	VOID END 45°	302	710-730	INTACT
9	50	FUEL END 45°	205	710-730	RUPTURE
10	49	SIDE-ON	201	715-725	RUPTURE
11	37	SIDE-ON	257	710-730	RUPTURE
12	45	FUEL END 45°	206	710-730	RUPTURE
13	40	FUEL END 45°	205	715-725	RUPTURE

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FIGURE 1

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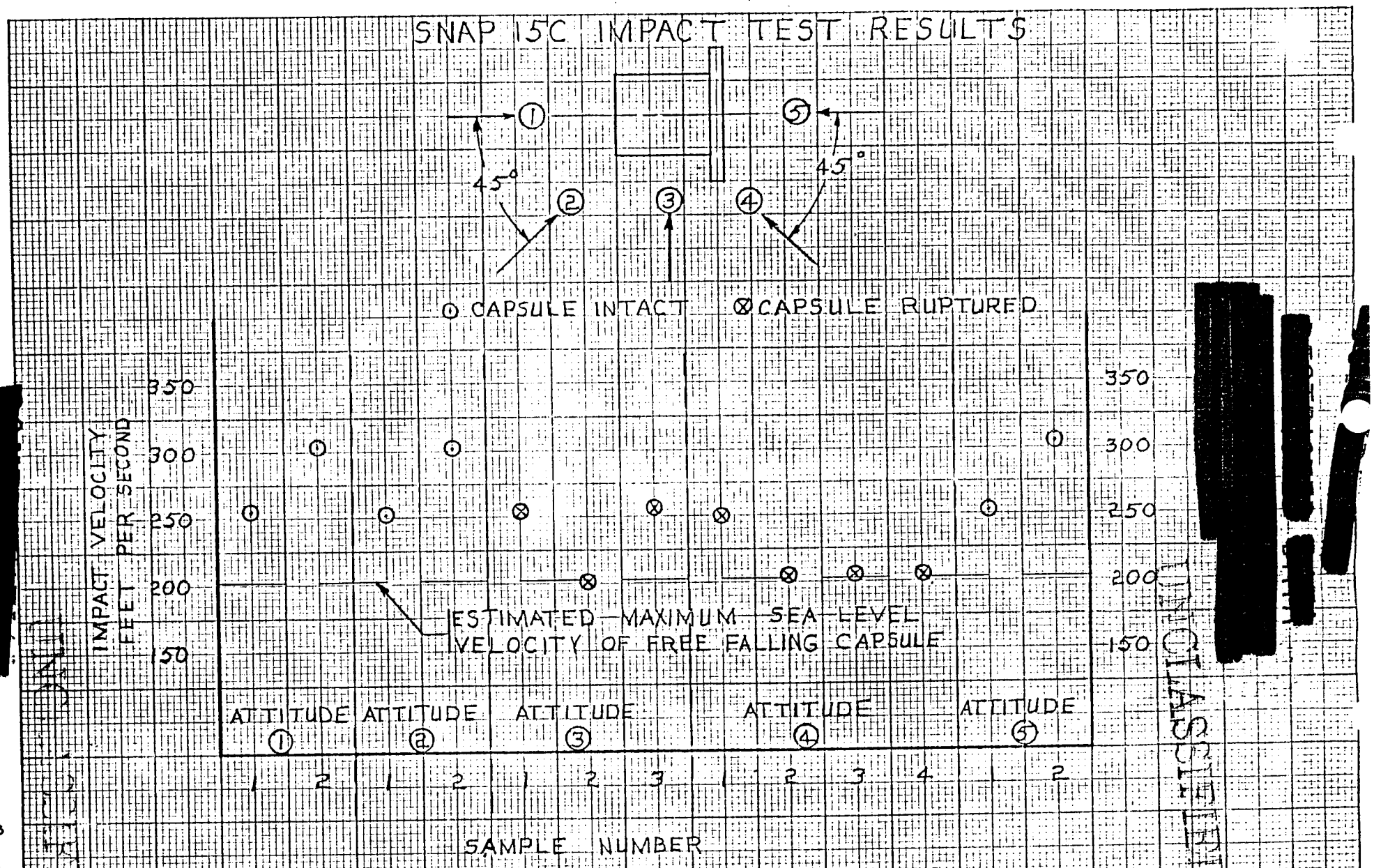

FIGURE 2

W.J.D. 7/29/64

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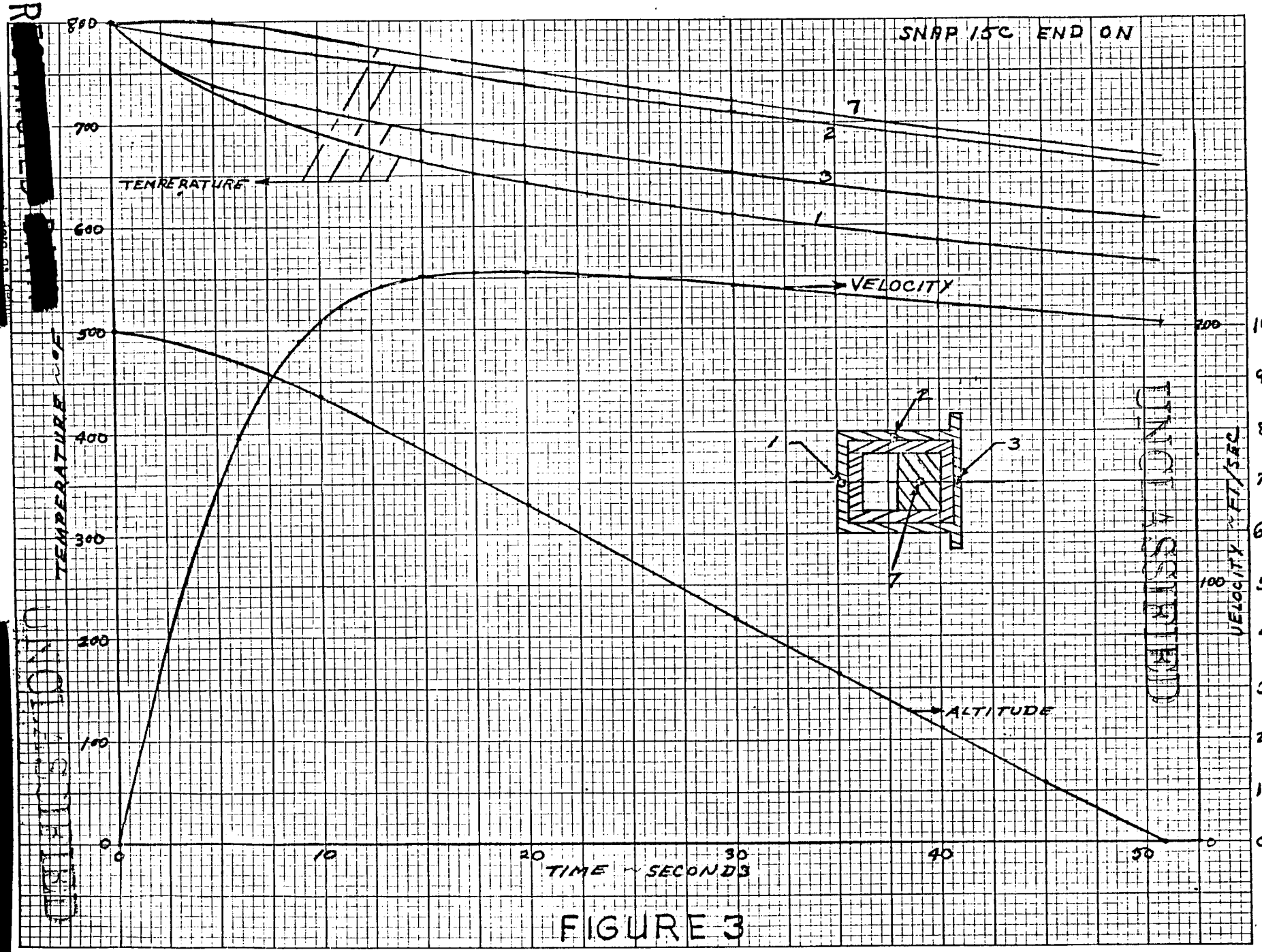

FIGURE 3

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NUMBER		CAPSULE WEIGHT IN GRAMS				ACETONE TEMP. °F	①ACETONE ABSORBED IN.^{3}
TEST	CAPSULE	BEFORE IMPACT	AFTER IMPACT	AFTER SOAK	CHANGE		
11	37	44.7182	44.6364	45.7435	1.1071	68	.08545
2	38	45.1014	45.0935	45.0937	.0002	61	—
13	40	44.9489	44.9491	45.1555	.2064	63	.01593
8	41	44.9791	44.9785	44.9785	.0000	61	—
5	42	44.9241	44.8510	45.0330	.1820	68	.01405
7	43	45.2375	45.2356	45.2357	.0001	61	—
3	44	44.8120	44.8113	44.9786	.1673	68	.01291
12	45	45.1427	45.1421	45.3835	.2414	63	.01863
6	46	45.1645	45.1634	45.1634	.0000	62	—
4	47	44.9669	44.9670	44.9671	.0001	61	—
10	49	44.7237	44.6501	44.7783	.1282	63	.009895
9	50	45.0687	45.3031	46.0451	.7420	68	.0573
1	54	44.6973	44.6966	44.6967	.0001	61	—

① SPECIFIC GRAVITY OF ACETONE ASSUMED CONSTANT AT .79 FOR ALL TEMPERATURES

Page 4

FIGURE 4

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BY _____ DA _____
CHKD. BY _____ DATE _____
SUBJECT SNA 15C FUEL CAPSULE IMPACT TESTS.
SHEET NO. _____ OF _____
JOB NO. _____

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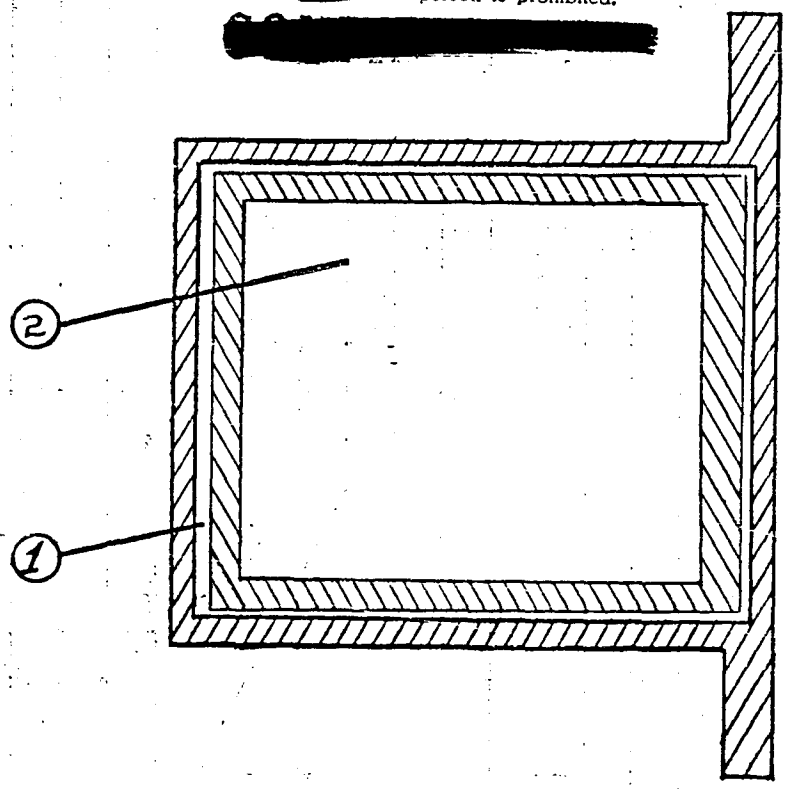

① Estimated void volume between inner and outer capsule (cubic inches)

a. Max. 0.01168
b. Min. 0.007281

② Estimated volume of inner capsule without filler (cubic inches)

a. Max. 0.1153
b. Min. 0.1138

REF. MINNESOTA MINING & MANUFACTURING CO. drawings
31-A-20 Issue 1
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2
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FIGURE 5

W.J.D. 8/7/64

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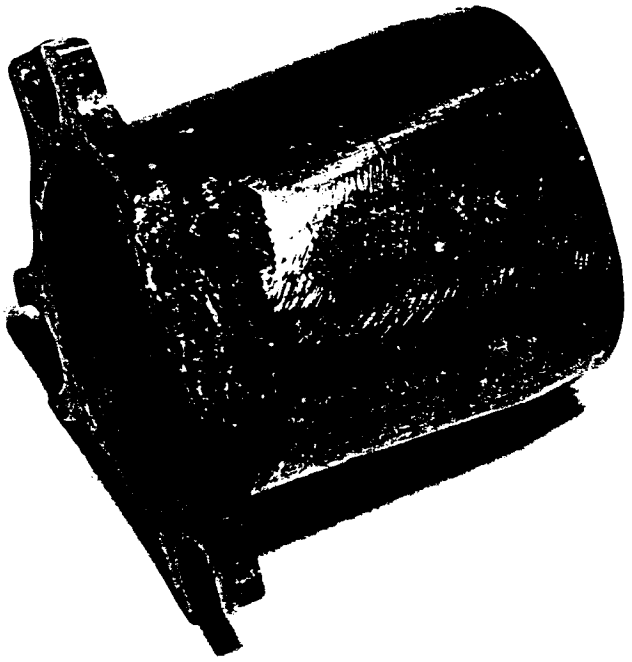

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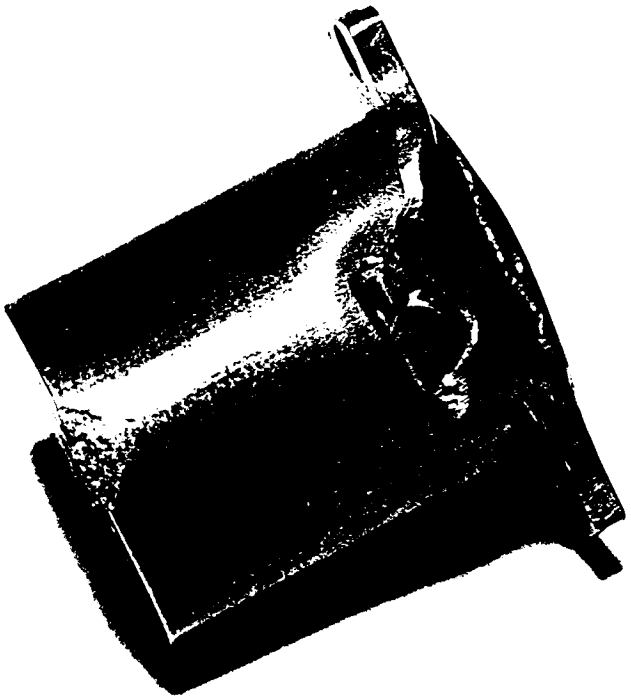

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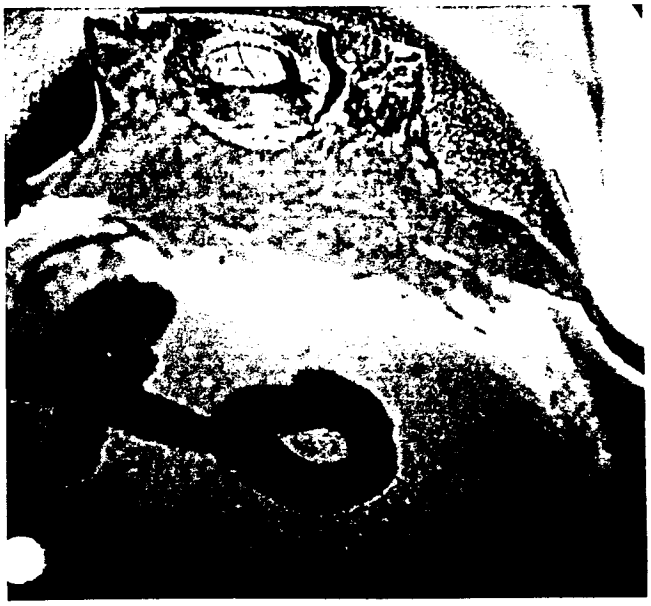

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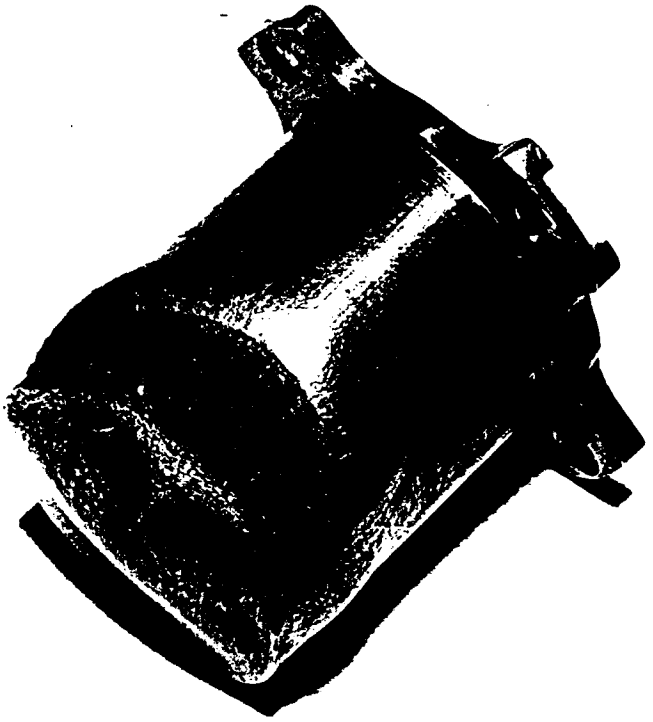

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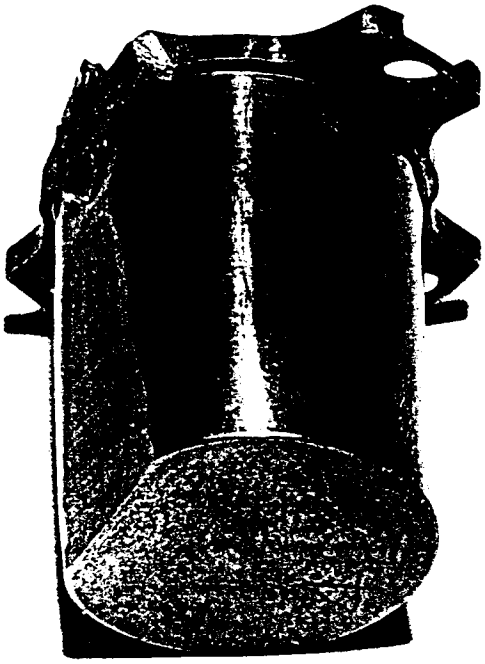

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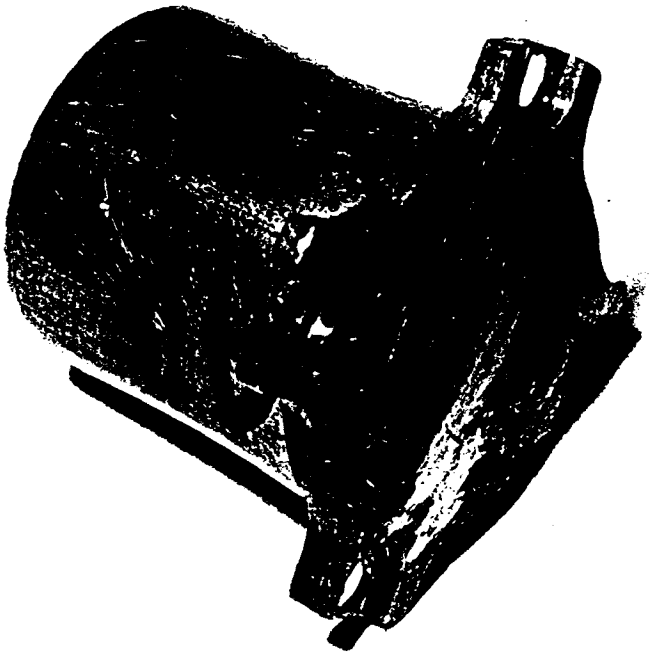

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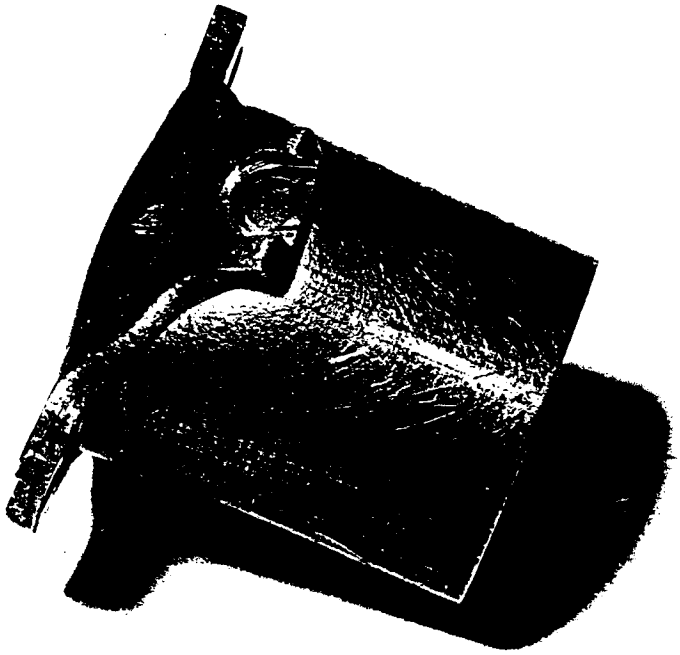

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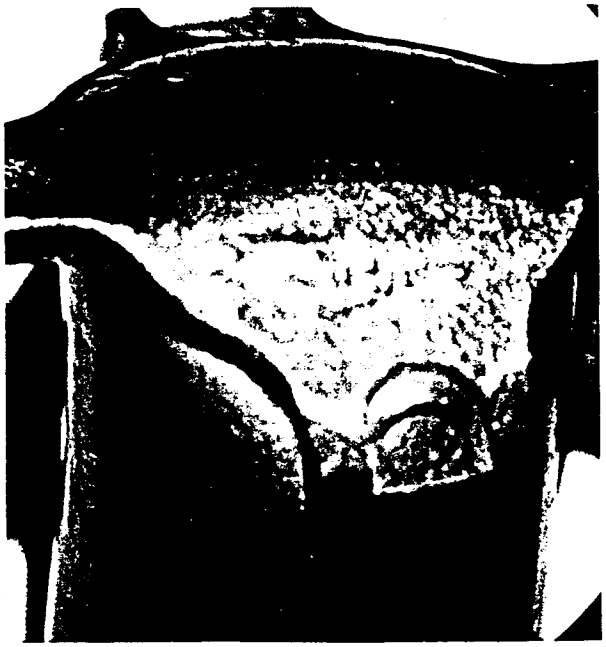

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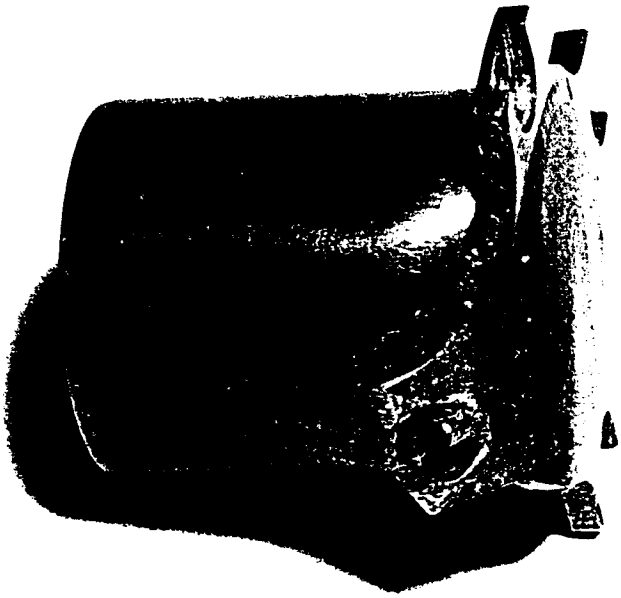

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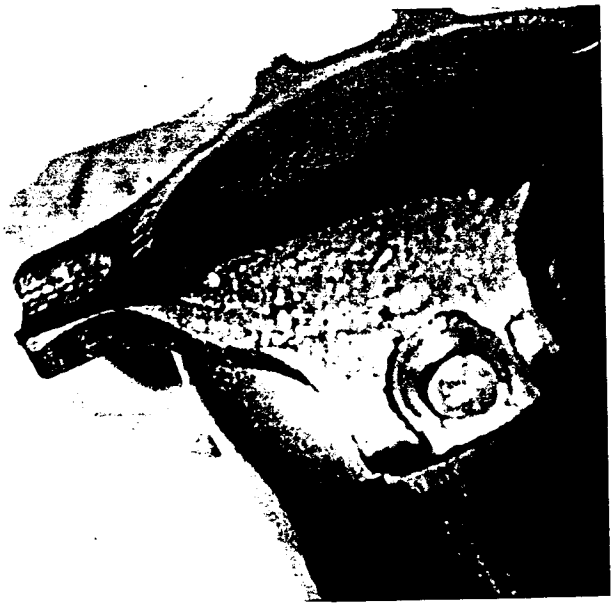

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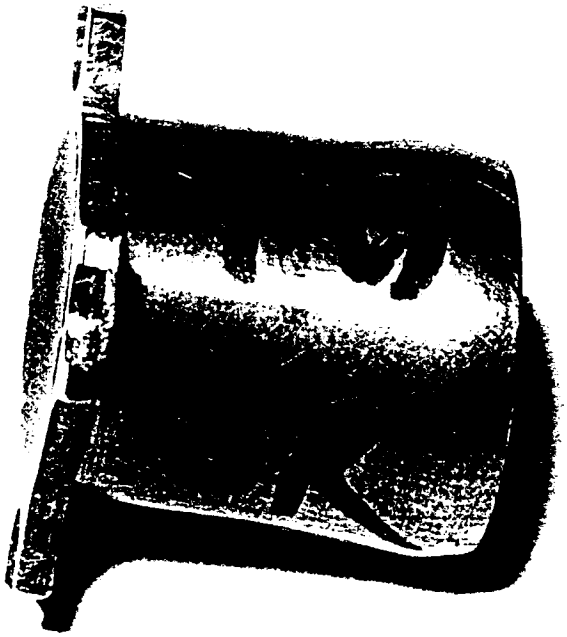

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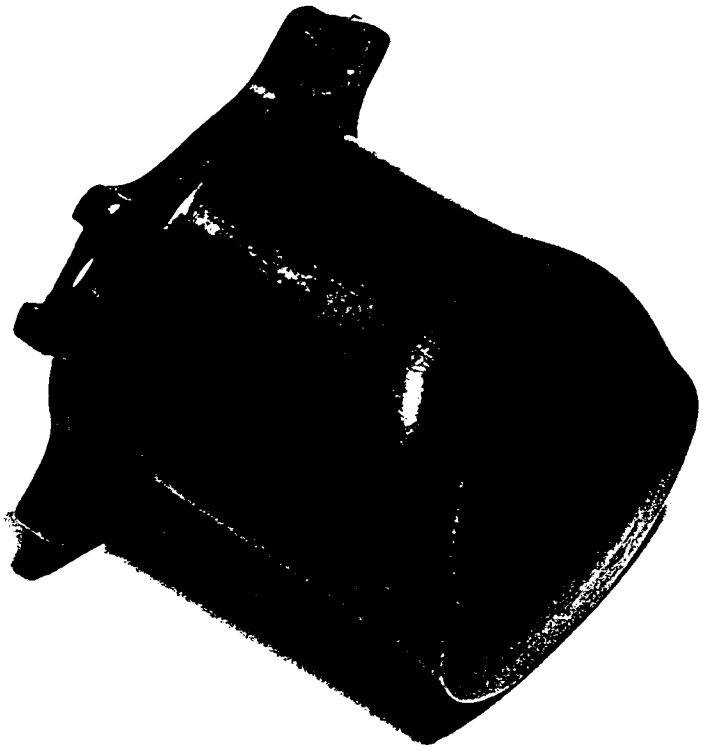

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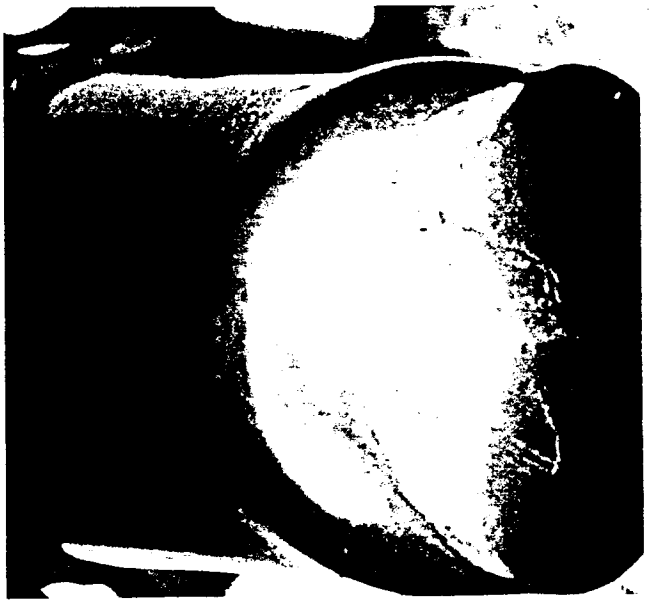

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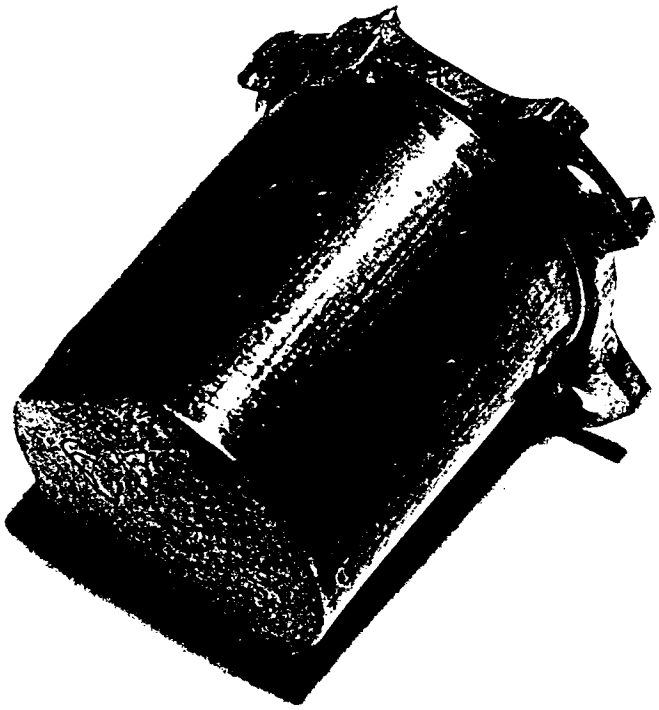

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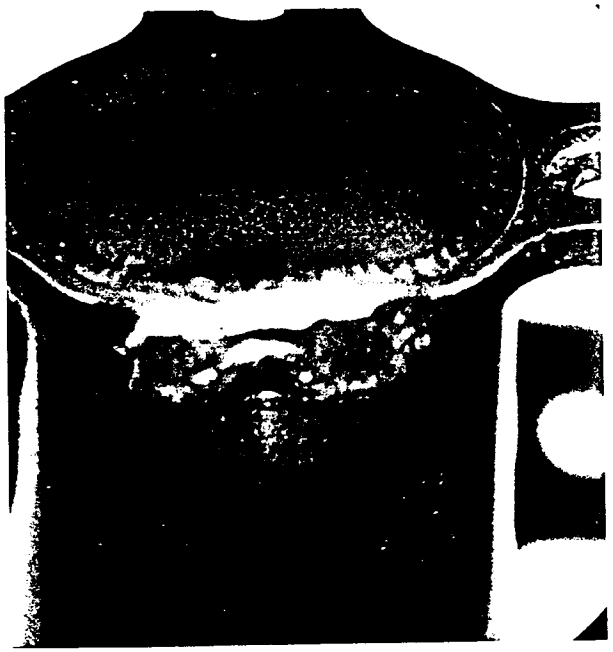

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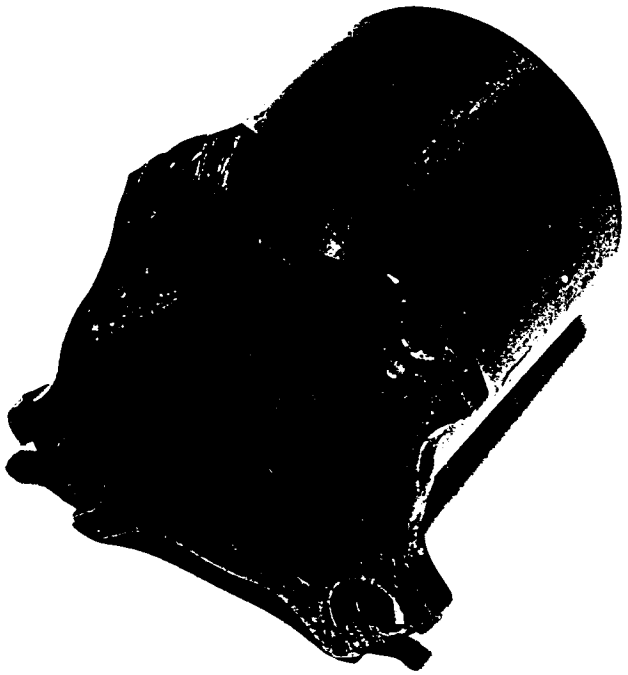

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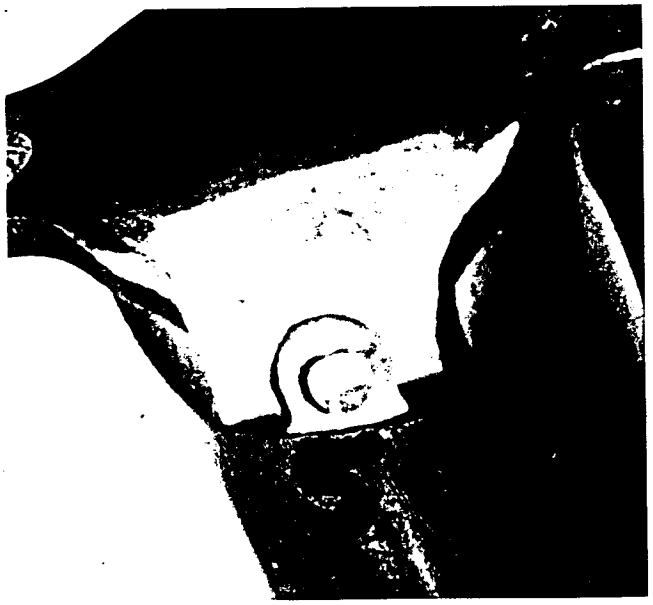

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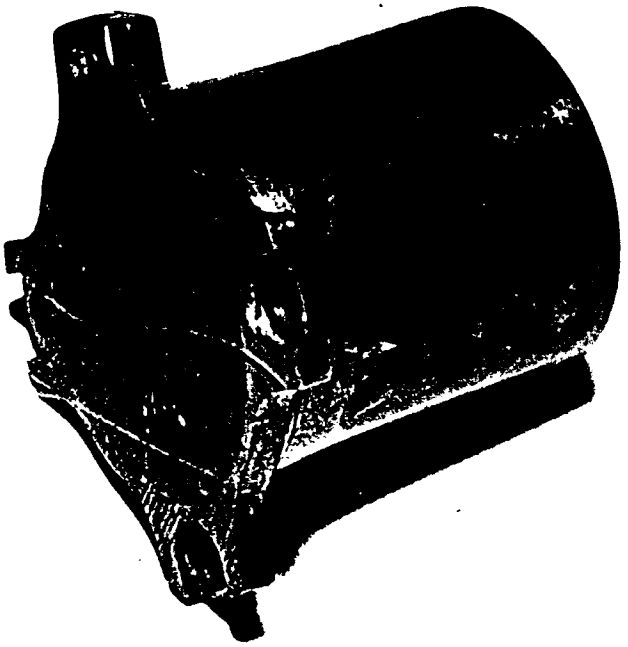

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