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IMPLANTING OF THE FIXED ACOUSTIC BUOY (FAB) OFF BERMUDA.(U)
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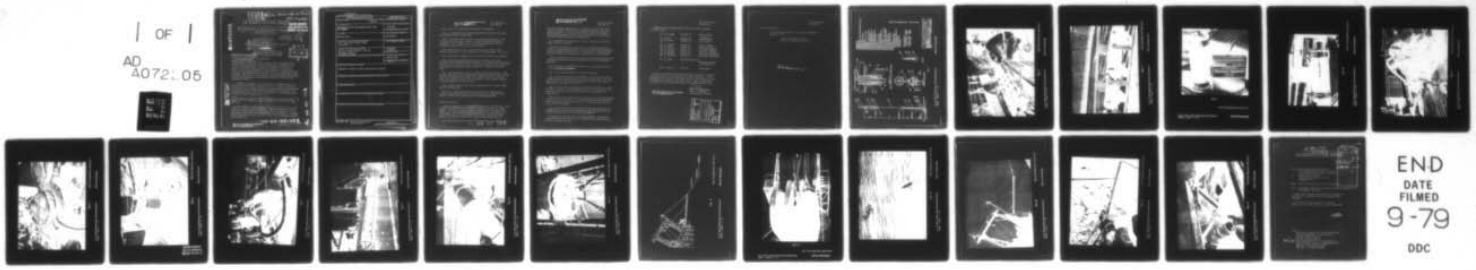

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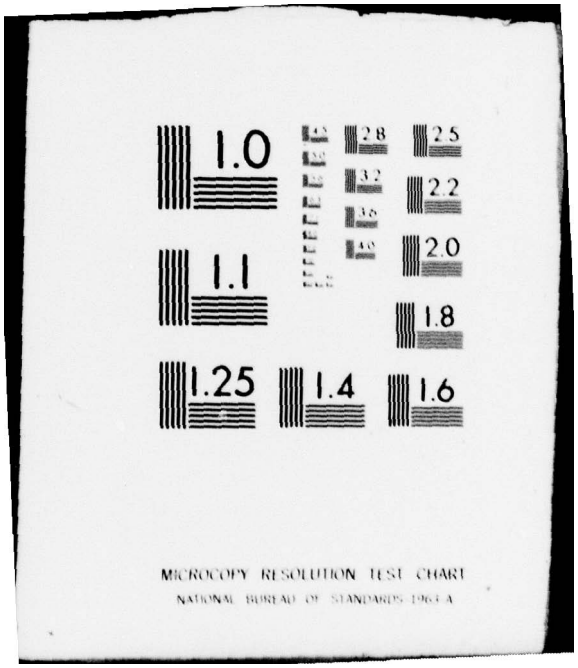
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NATIONAL BUREAU OF STANDARDS 1963-A

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U. S. NAVY UNDERWATER SOUND LABORATORY
FORT TRUMBULL, NEW LONDON CONNECTICUT

(6) IMPLANTING OF THE FIXED ACOUSTIC BUOY (FAB) OFF BERMUDA

by

(10) Paul T. Misisco

(12) 25p.

(1)

(9) USL TECHNICAL MEMORANDUM No. 953-12

(11) 10 Feb[redacted]61

(14) USL-TM-953-12

Background

The Fixed Acoustic Buoy (FAB) was designed and constructed by Martin Company (formerly Martin Aircraft Corp., Baltimore, Md.) to study various parameters relating to ambient noise in the deep ocean. In December 1960 the unit was implanted in 13,700 feet of water in an area approximately 19 miles southwest of Plantagenet Bank, Bermuda. This technical memorandum describes the FAB unit and the technique used to place it on the bottom. ~~A 16 mm. motion picture film report of the operations is also available at USN USL Photo-Optical Techniques Branch.~~

A complete description of the electrical and mechanical features of the array may be found in reference (a). Fig. 1, which is reproduced from that document, gives a schematic representation of the mechanical arrangement involved. The array is described as a "steerable, symmetrical linear array of twenty-one hydrophones with individual inputs to a beam forming system". (Ref. (a)).

The array was designed to study ambient noise in the deep ocean, with reppect to "level, spectrum, angle of arrival, sea state and season". (Ref. (a)).

Some mechanical modifications which are not shown in Fig. 1, were made to the system prior to implanting. These include the addition of a 4600 lb. cement anchor; the enlargement of the buoyancy tank to hold 562 gallons of gasoline; and the lengthening of the cable between the float and the mast from 25 feet to 250 feet. There were no reported changes to the electronics.

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1. REPORT NUMBER	2. GOVT ACCESSION NO. 953-12	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* IMPLANTING OF THE FIXED ACOUSTIC BUOY (FAB) OFF BURMUDA		5. TYPE OF REPORT & PERIOD COVERED Tech memo
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Misisco, Paul T.		8. CONTRACT OR GRANT NUMBER(s) Nonr-266(84)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Underwater Systems Center New London, CT		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research, Code 220 800 North Quincy St. Arlington, VA 22217		12. REPORT DATE 10 FEB 61
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Fig. 2 shows the mast and the hydrophone arrangement.

Fig. 3 is a detail shot showing the hydrophone placement in the mast and a portion of the wiring harness.

Figs. 4 and 4a present two views of an individual hydrophone. The film box is 4 inches square, and it is included to give some idea of hydrophone size. In Fig. 4a can be seen the preamplifier which was mounted concentric with the axis of the element.

Fig. 5 shows a general view of the pressure-proof sphere which housed the electronics. In the background the cement anchor can be seen.

Fig. 6 shows the arrangement of the electronics nested in the sphere.

Fig. 7 shows the general arrangement of the battery box which housed two sets of Nickel-Cadmium batteries. The main feeder cable to the the mast can be seen on the right. The articulated chain in the foreground was connected to the sphere to prevent excessive strain on the feeder cable.

Fig. 8 shows the anchor, sphere, battery box and feeder cable. Note that the cable has been protected against chaffing by several layers of high-pressure steam hose and a manila rope whipping. Note also, the link chain used to join the battery box to the sphere. This was later replaced by the articulated chain shown in Fig. 7.

Fig. 9 shows a general view of the buoyancy tank in its cradle, alongside the launching ship.

Fig. 10 is a close-up view of the tank, and Fig. 11 shows the two pressure-relief valves mounted on the tank to permit continuous equalization of pressure with depth during the implanting operation.

Launch Procedures:

Implanting operations were originally scheduled for mid November, 1960, using the USS AEOLUS and a chartered commercial vessel, the Inagua Ranger. The unit was placed on board at Norfolk Va., and transported to Bermuda. While making detailed photographs of the hydrophone mast, several fractures in the poly-ethylene "tee-joints" used in the wiring harness were noticed. These were reported and promptly repaired.

The AEOLUS then proceeded to the operational area, and laid the first

leg of the coaxial cable which was to be used to link the FAB to the monitoring station. While enroute, additional fractures in the poly-ethylene harness were discovered and the operations were halted. The AEOLUS returned to Norfolk, and the harness was removed and returned to Martin Company for refabrication.

It was ultimately learned that the fractures were due to improper curing of the poly-ethylene.

Because of operational commitments, the AEOLUS was unable to continue its participation and the FAB unit and its associated equipment was transferred to USS NEPTUNE. On November 28, the NEPTUNE departed Norfolk for Bermuda with the repaired FAB unit on board.

While at Bermuda, the unit was checked out electronically and a test launching was made at dockside to familiarize the crew with launch procedures.

On 9 December, the NEPTUNE arrived on station at the FAB site and began launching operations.

Fig. 12 is a sketch showing the method of launching.

Fig. 13 shows the unit prior to launching. Two-and-one-half miles of nylon line were attached to the buoy by a corrosive link. The other end of the line was given to the Inagua Ranger which opened range to approximately two and one-half miles.

Fig. 14 shows the buoy being towed from the NEPTUNE by a small PR Boat. Two lines may be seen attached to the nose of the buoy. One leads to the PR Boat, while the other is the nylon line attached to Inagua Ranger.

Once the buoy was afloat the mast was lowered from the NEPTUNE by three lines as shown in Fig. 15. An additional line was attached to the cement anchor and may be seen in Fig. 16. In this manner, the unit was lowered to the bottom.

Two abortive attempts to place the unit were made on December 9. In both instances the corrosive link shown in Fig. 17 broke during the original streaming operation, and had to be replaced.

On December 10 the unit was successfully planted. The coaxial cable link between the FAB and the monitoring station was completed, and the unit began operating.

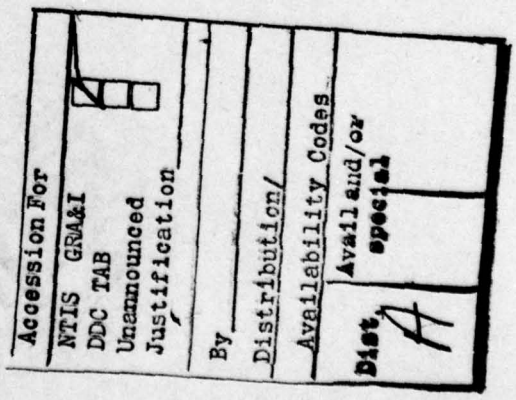
Civilian personnel aboard ship to take part in these operations are listed below:

Mr. H. Wyeth	Simplex Co.	Senior Project Leader
Mr. J. Roe	Simplex Co.	Liaison Officer
Mr. Earl Goss	Simplex Co.	Cable Splicer
Mr. L. Blickley	Martin Co.	Project Leader
Mr. D. Webb	Martin Co.	Electronic Engineer
Mr. R. Oberlin	Martin Co.	Electronic Engineer
Mr. G. Gerlach	Martin Co.	Electronic Engineer
Mr. J. Hawkins	Martin Co.	Electronic Technician
Mr. G. Overman	Martin Co.	Electronic Technician
Mr. F. Gibbs	Hastings Raydist Co.	Navigational Equipment Engineer
Mr. P. Misisco	USN USL	Photographer

While aboard the USS AEOLUS and the USS NEPTUNE I arranged to ride the helicopters assigned to assist on these operations. Aerial photographs were taken, of the Naval facilities in Bermuda, the ships assigned to this operation, and Argus Island. Negatives and prints are on file at the USN USL Photo-Optical Techniques Branch office.

Paul T. Misisco

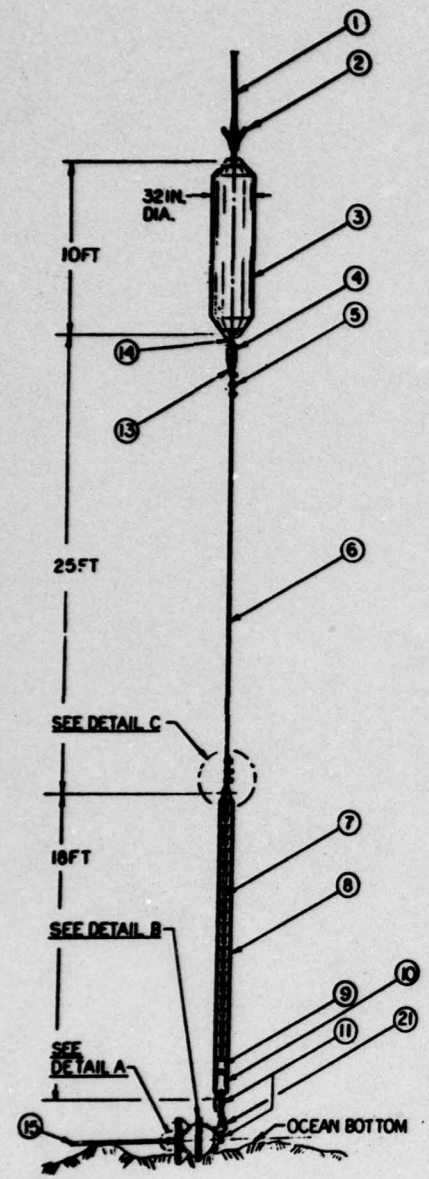
PAUL T. MISISCO
Photographer (Scientific)

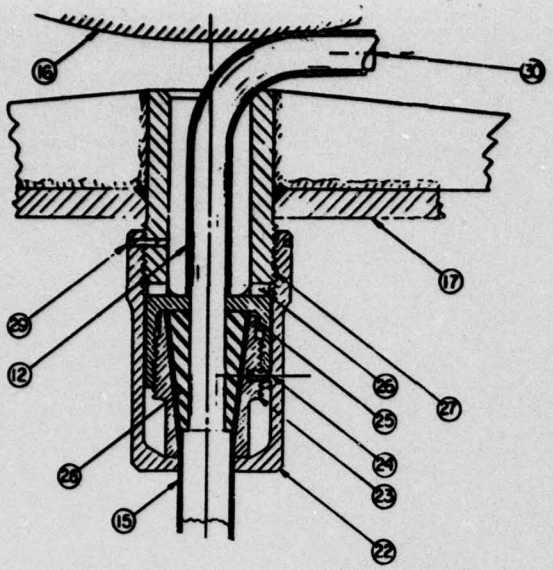


List of References:

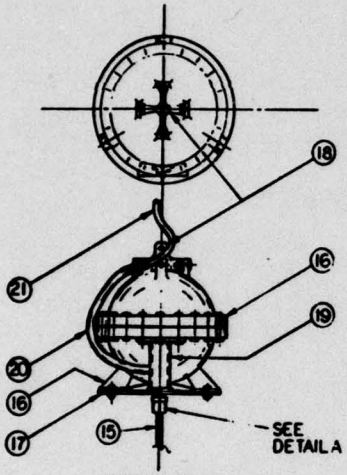
(a) Fixed Acoustic Buoy, by L. Buckley, Martin Co. Baltimore, Md.

Engineering Report 11213,
USL Acc. #34807, of May 1960

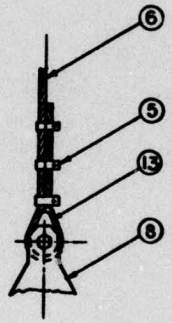




DETAIL A
ARMOR TERMINAL FITTING -SUBMARINE CABLE



DETAIL B
PRESSURE VESSEL ASSEMBLY



DETAIL C

NOMENCLATURE:-

1. LOWERING CABLE
2. DISCONNECT FOR LOWERING CABLE (CORROSIVE LINK)
3. BUOYANCY TANK.
4. MILLER BALL BEARING SWIVEL
5. WIRE ROPE CLIP.
6. GALVANIZED WIRE ROPE (⅜ DIAM.)
7. HYDROPHONE.
8. HYDROPHONE SUPPORT STRUCTURE
9. TILT INDICATOR & CONTAINER.
10. BATTERIES & CANNISTER (EXISTING)
11. CHAIN & ANCHOR SHACKLES
12. COAX CABLE RUBBING WEAR SHIELD.
13. SOLID STEEL CABLE THIMBLE
14. LINK PLATES.
15. ARMORED SUBMARINE CABLE
16. PRESSURE VESSEL (EXISTING)
17. CABLE TERMINAL SUPPORT BRACKET.
18. HOISTING FITTING
19. SHIELD & SUPPORT FOR ELECT. WIRING
20. STEEL TUBE FOR ELECTRICAL CONDUIT.
21. FLEXIBLE CONDUIT TUBE
22. NUT - CABLE ARMOR SUPPORT
23. TAPERED-HOLE CABLE FITTING
24. LOCK SCREW.
25. CABLE ARMOR HOOK SHAPE
26. ANTI-ROTATION KEY WAY
27. THREADED STRUCTURAL NIPPLE
28. CONICAL BUSHING
29. LOCK RING AN 996
30. COAX CABLE

FIXED ACOUSTIC BUOY
WET NET WEIGHT ..... 690 LB
TOTAL DRY WEIGHT .... 4390 LB

BUOYANCY OF BUOY .... 450 LB
CAPACITY OF BUOY ..... 385 GAL.

USL Tech Memo No. 953-12-61

THE MARTIN COMPANY BALTIMORE, MARYLAND		
DRAWN 2-12-60	DEEP WATER STATION FIXED ACOUSTIC BUOY PROGRAM FIGURE 1	A00-0000036
TRACED BOUVELLAT		
CHECKED J. C. HART		

Fig. 1

U. S. Navy Underwater Sound Laboratory
NP24 - 19856 - 3 - 61

Official Photograph

Fig. 2

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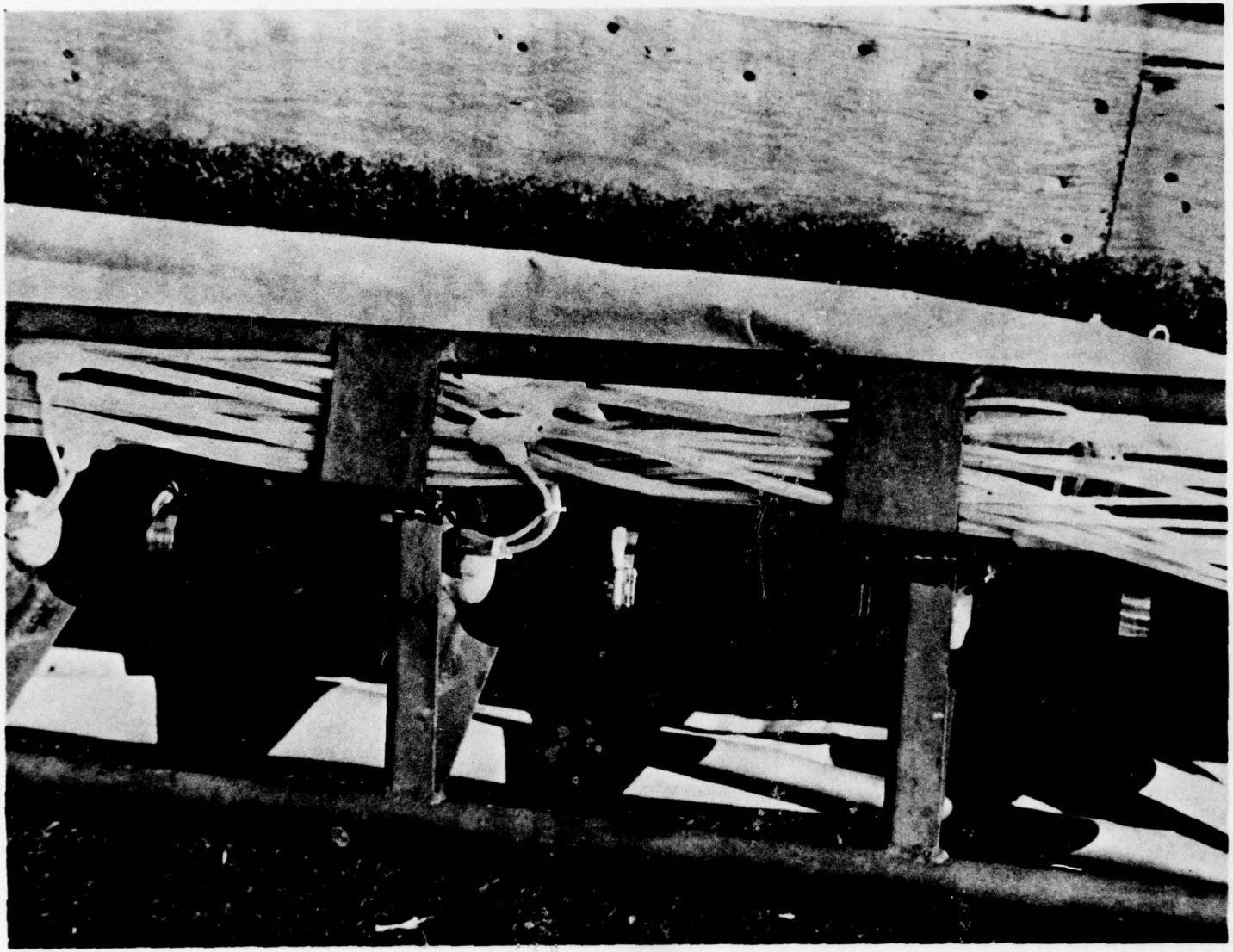

Fig. 3

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NP 24 - 19858 - 3 - 61

Official Photograph

Fig. 4

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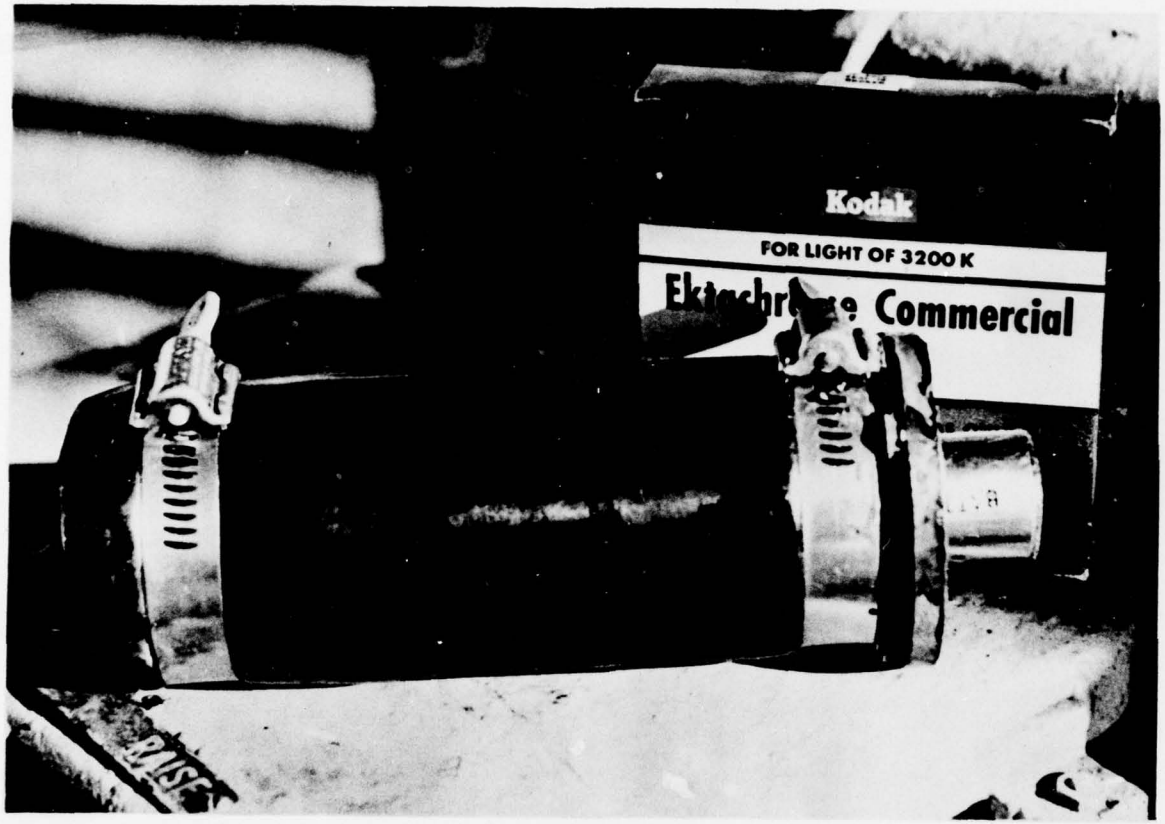

Fig. 4A

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Official Photograph

Fig. 5

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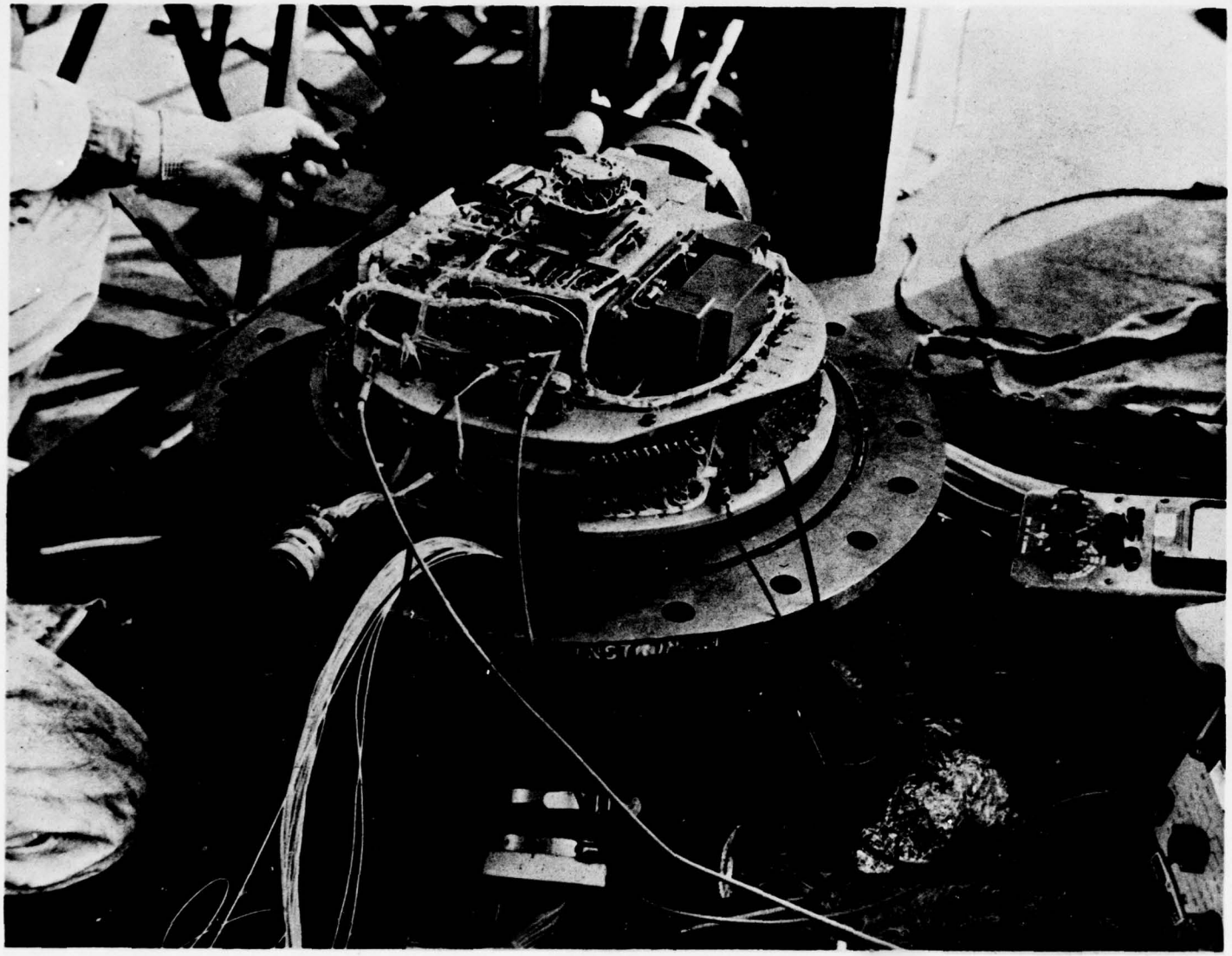

Fig. 6

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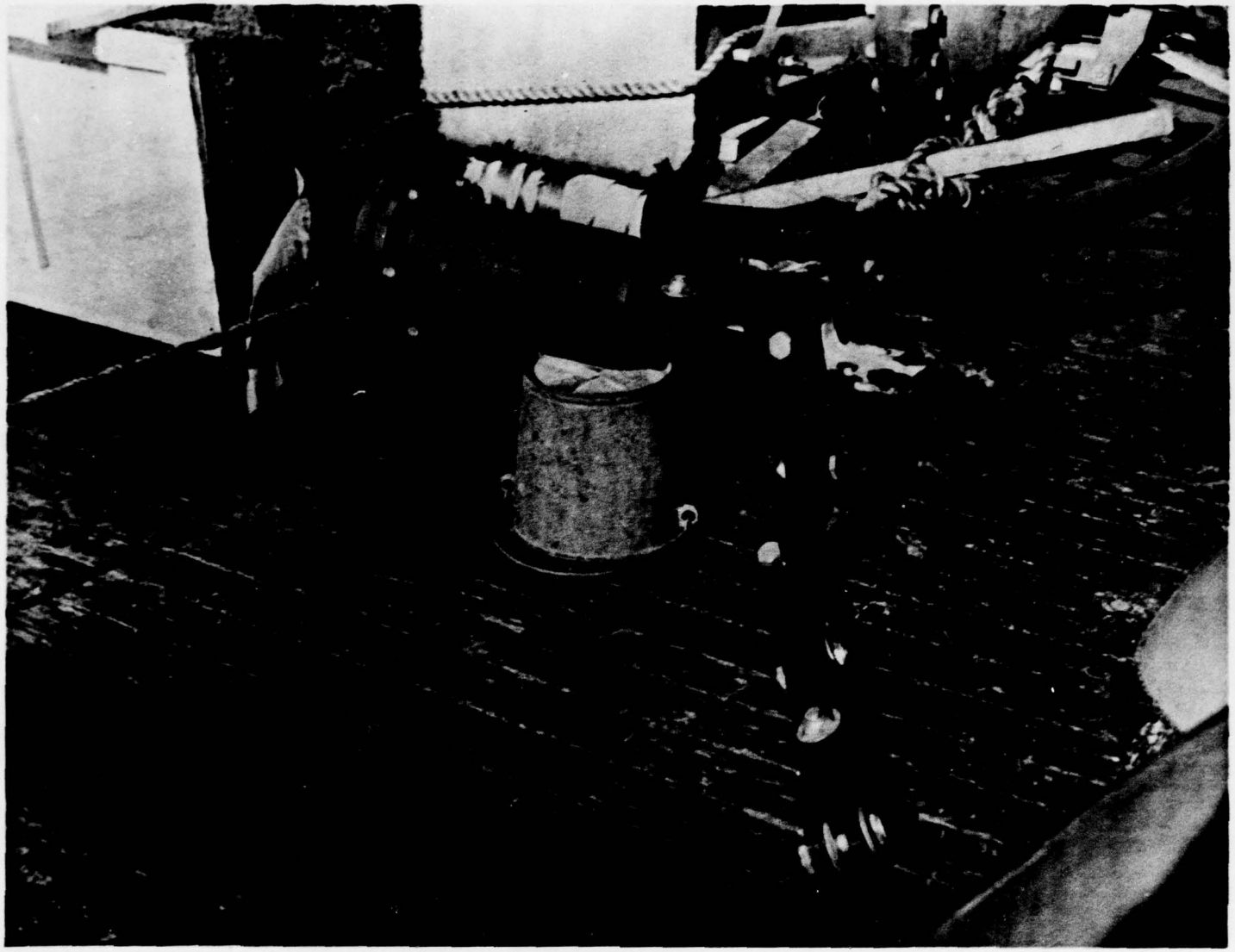

Fig. 7

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Official Photograph

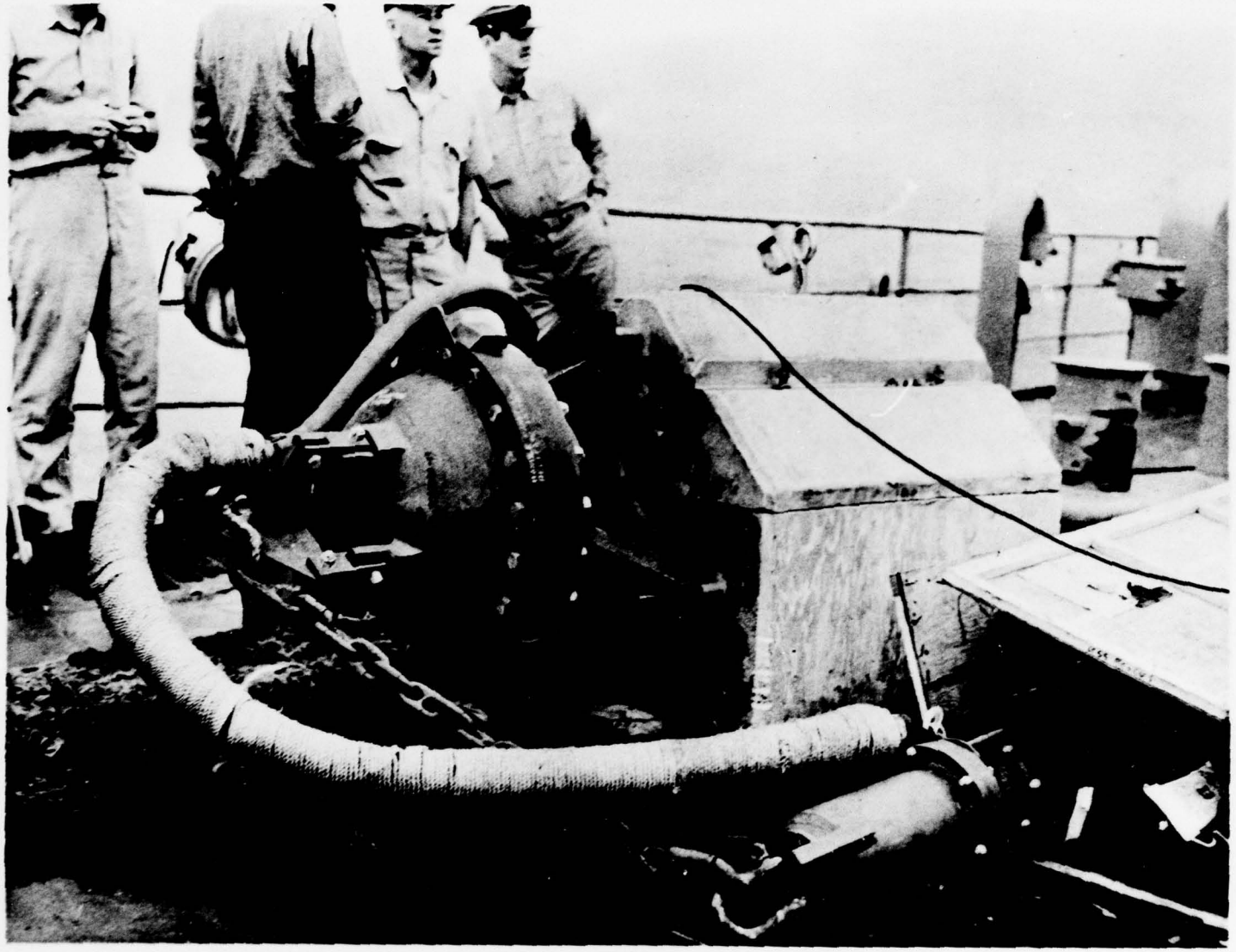

Fig. 8

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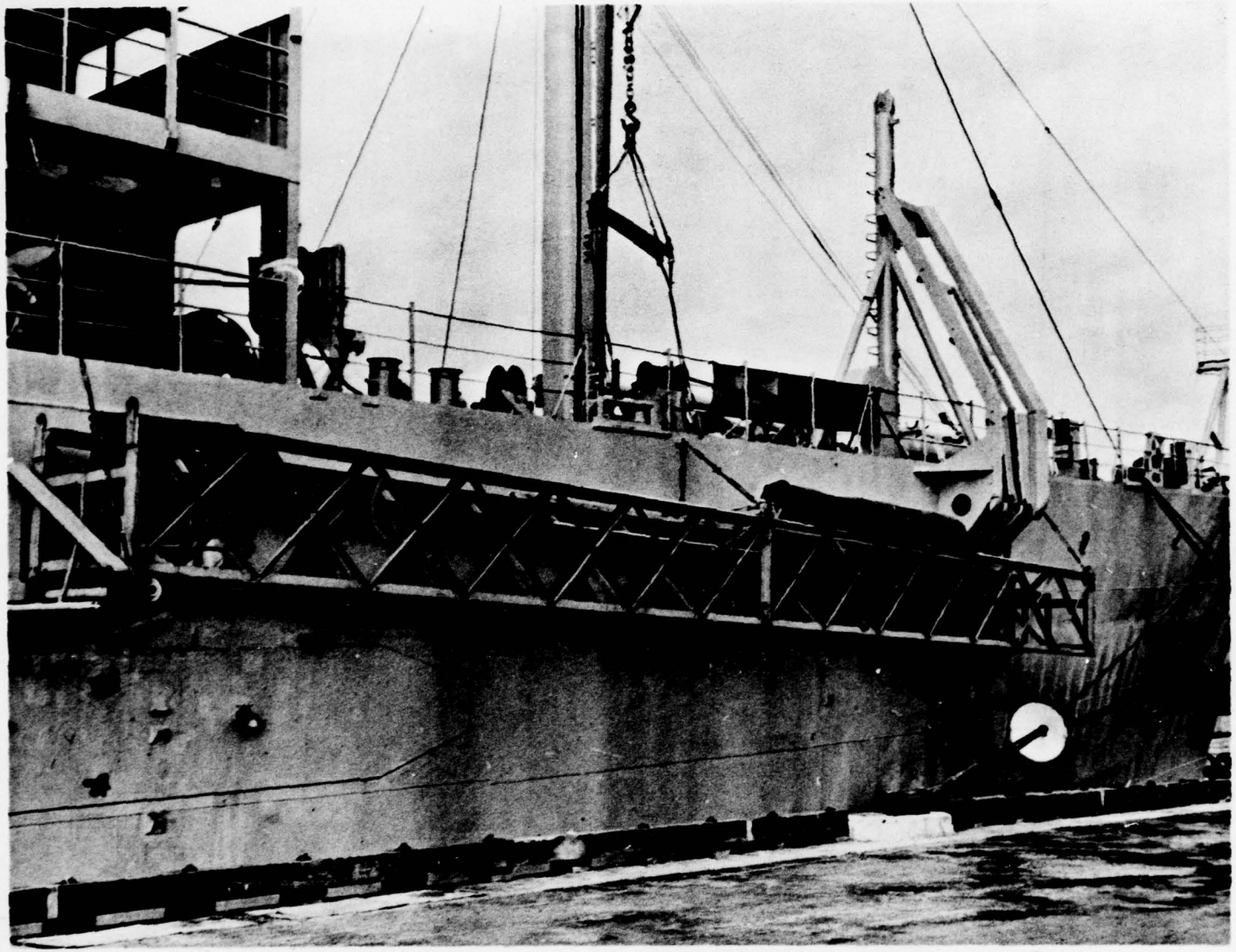

Fig. 9

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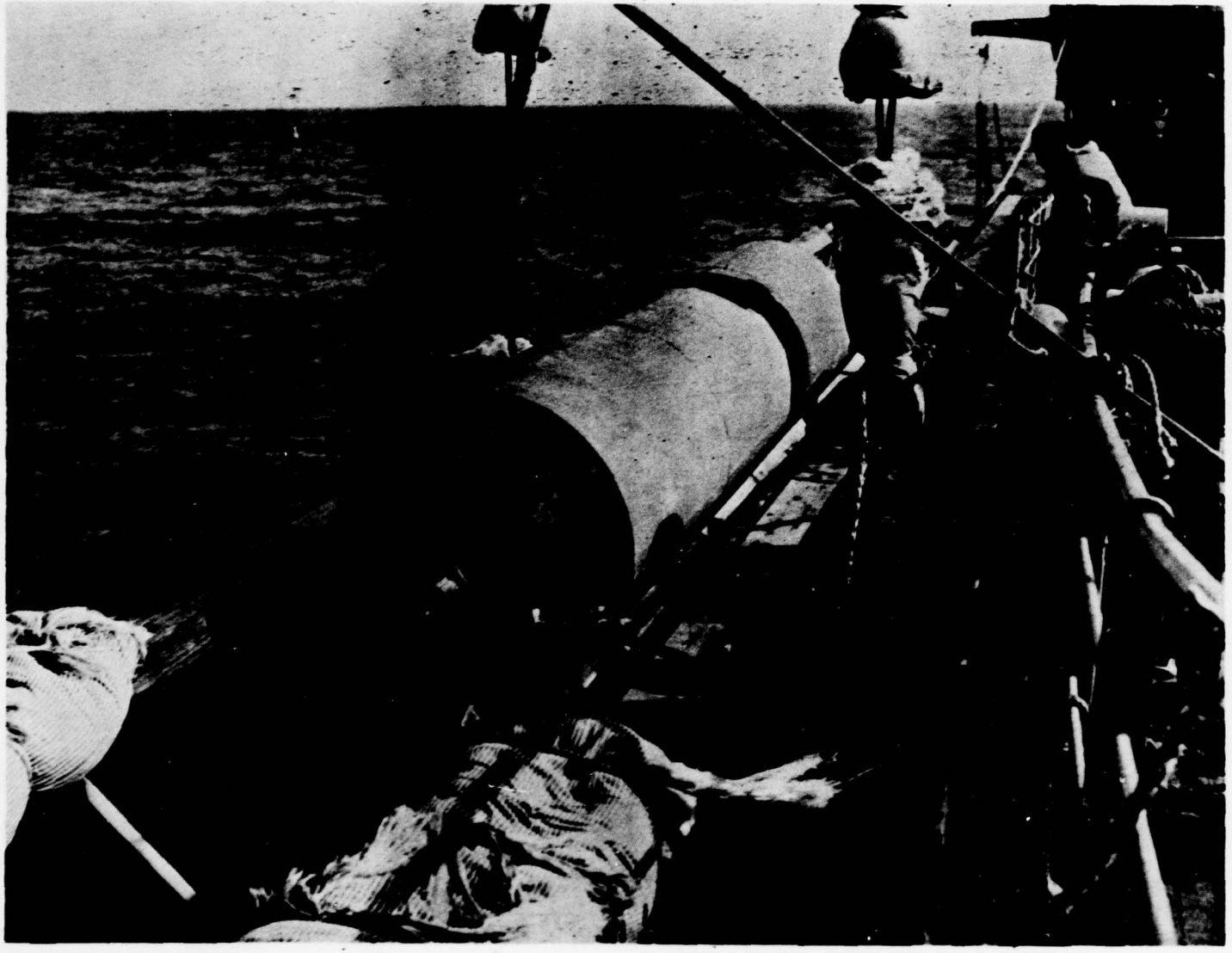

Fig. 10

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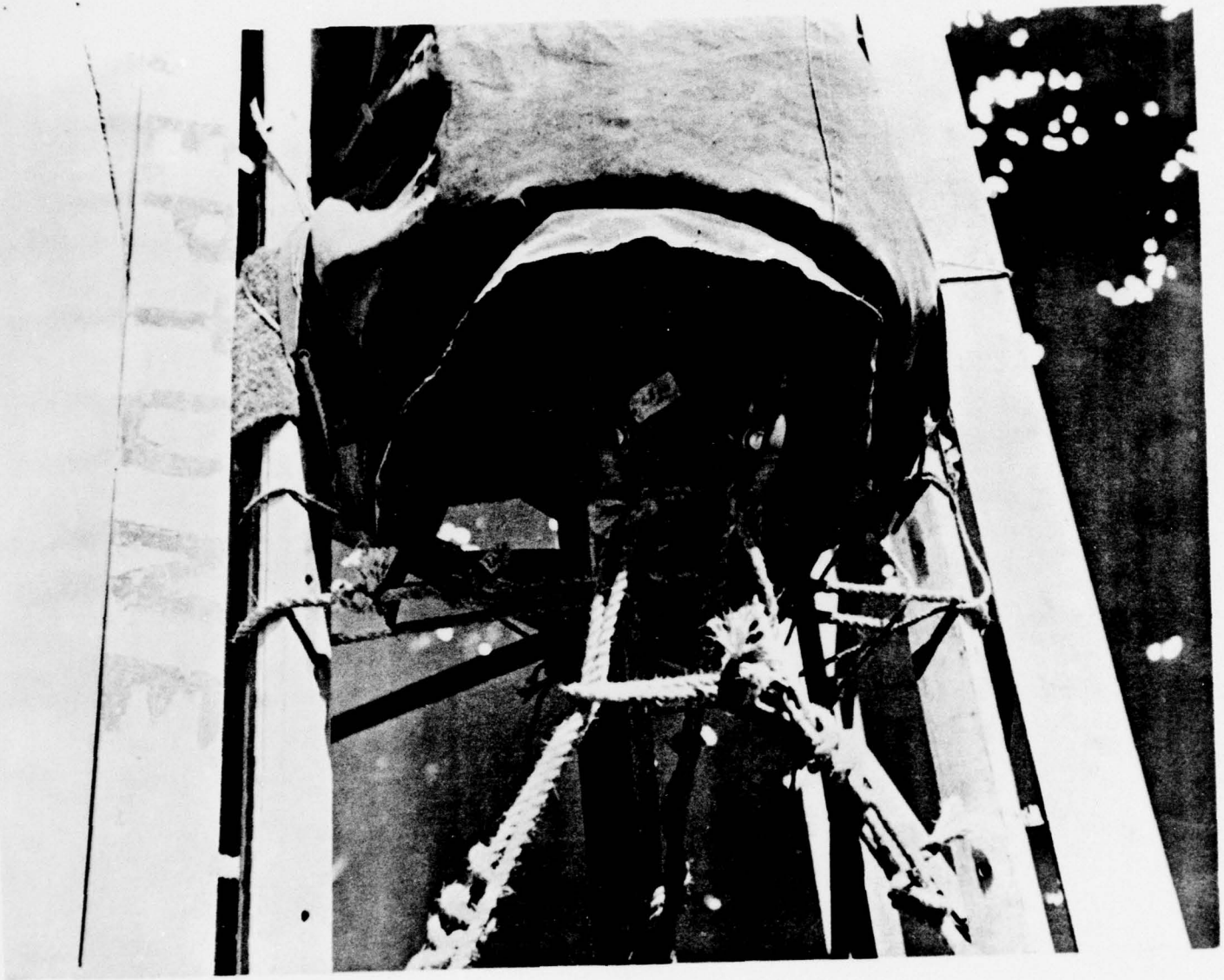

Fig. 11

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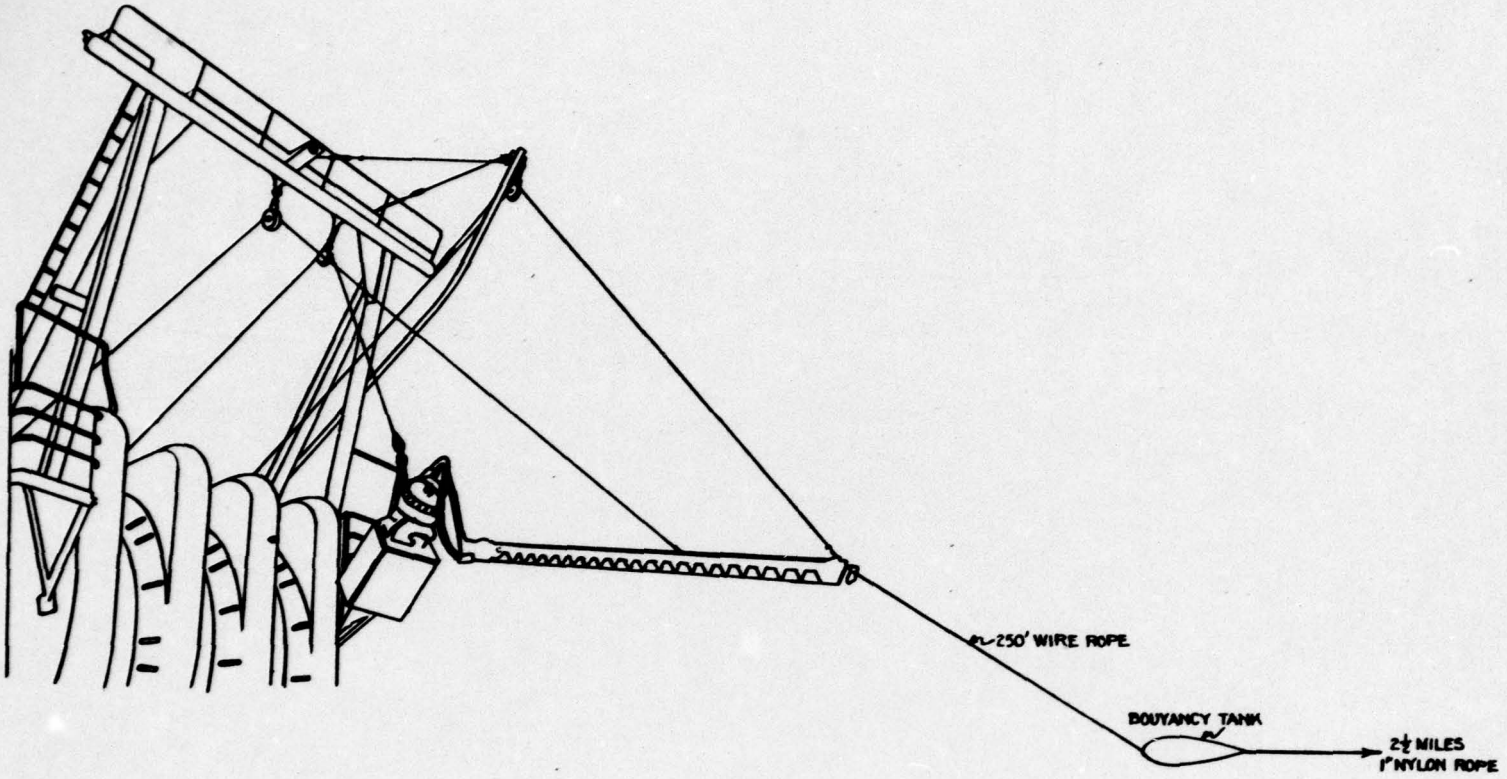

Fig. 12

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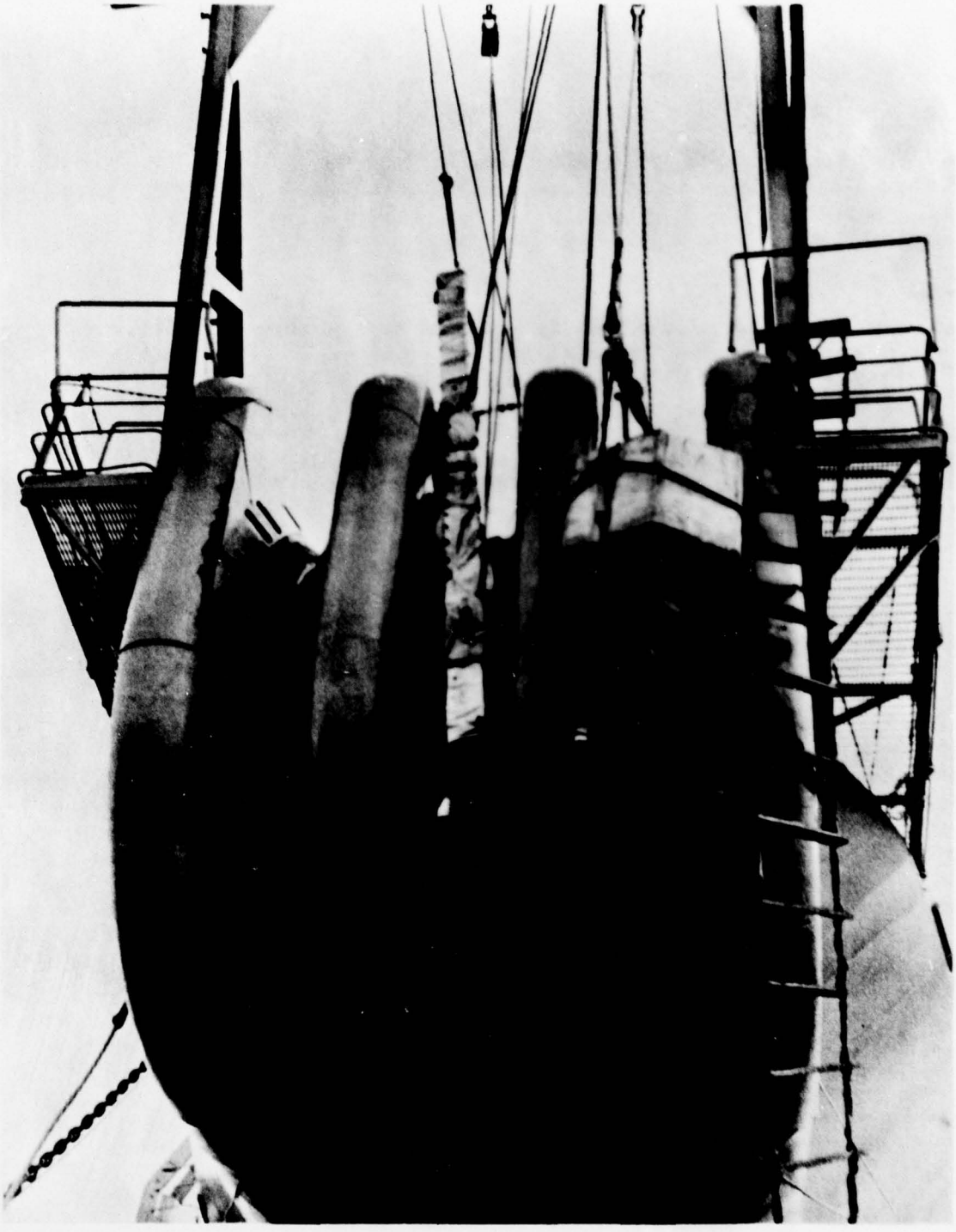

Fig. 13

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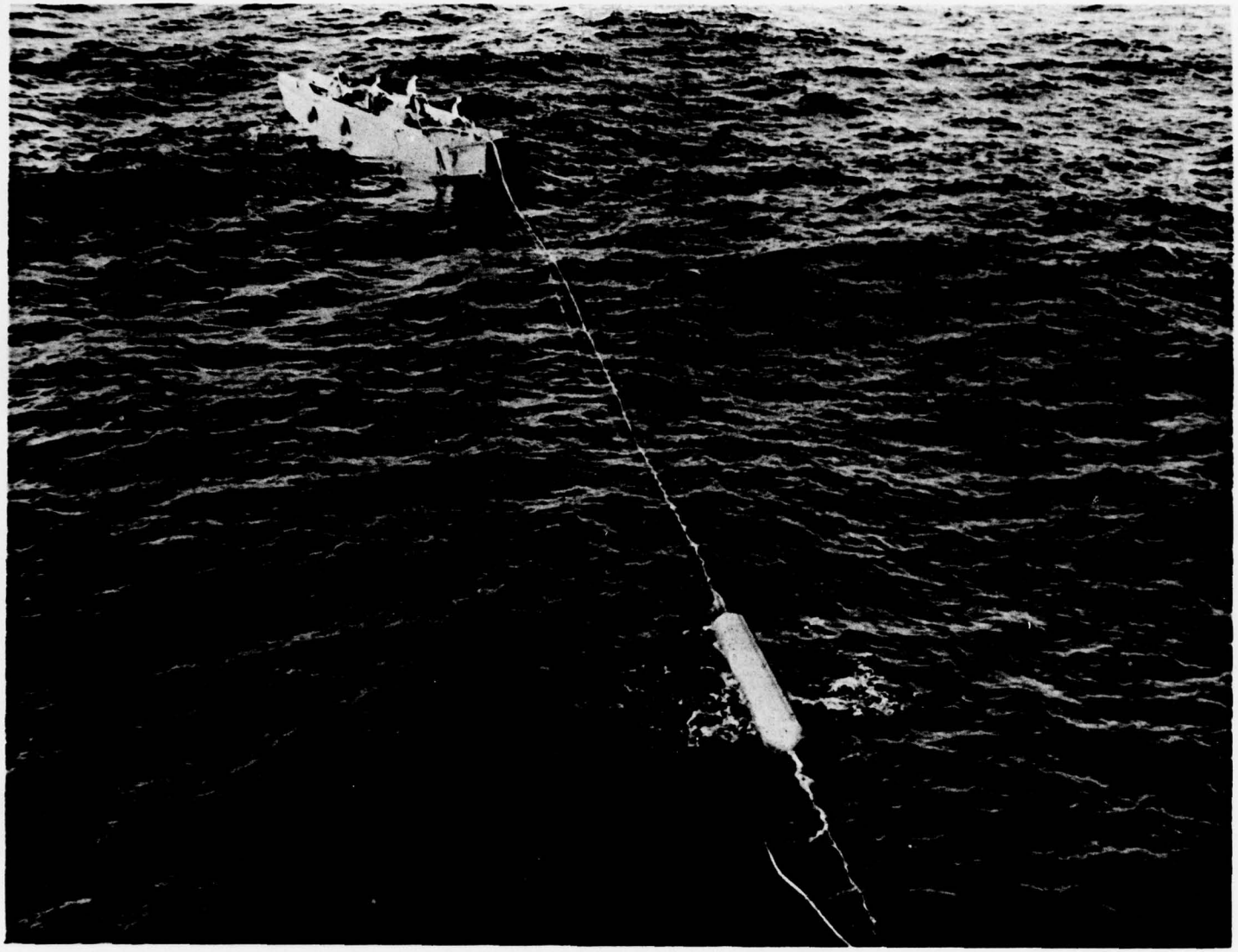

Fig. 14

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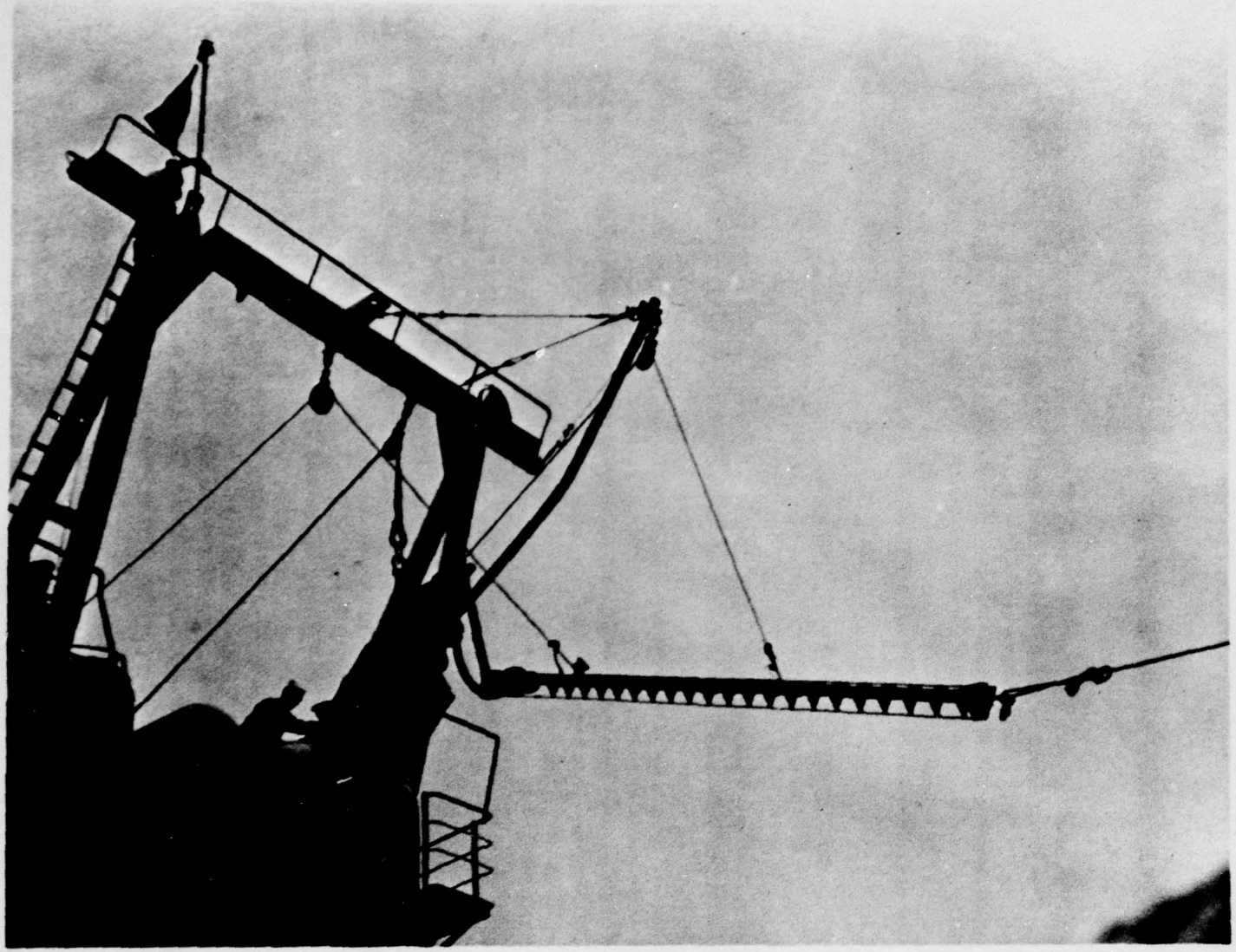

Fig. 15

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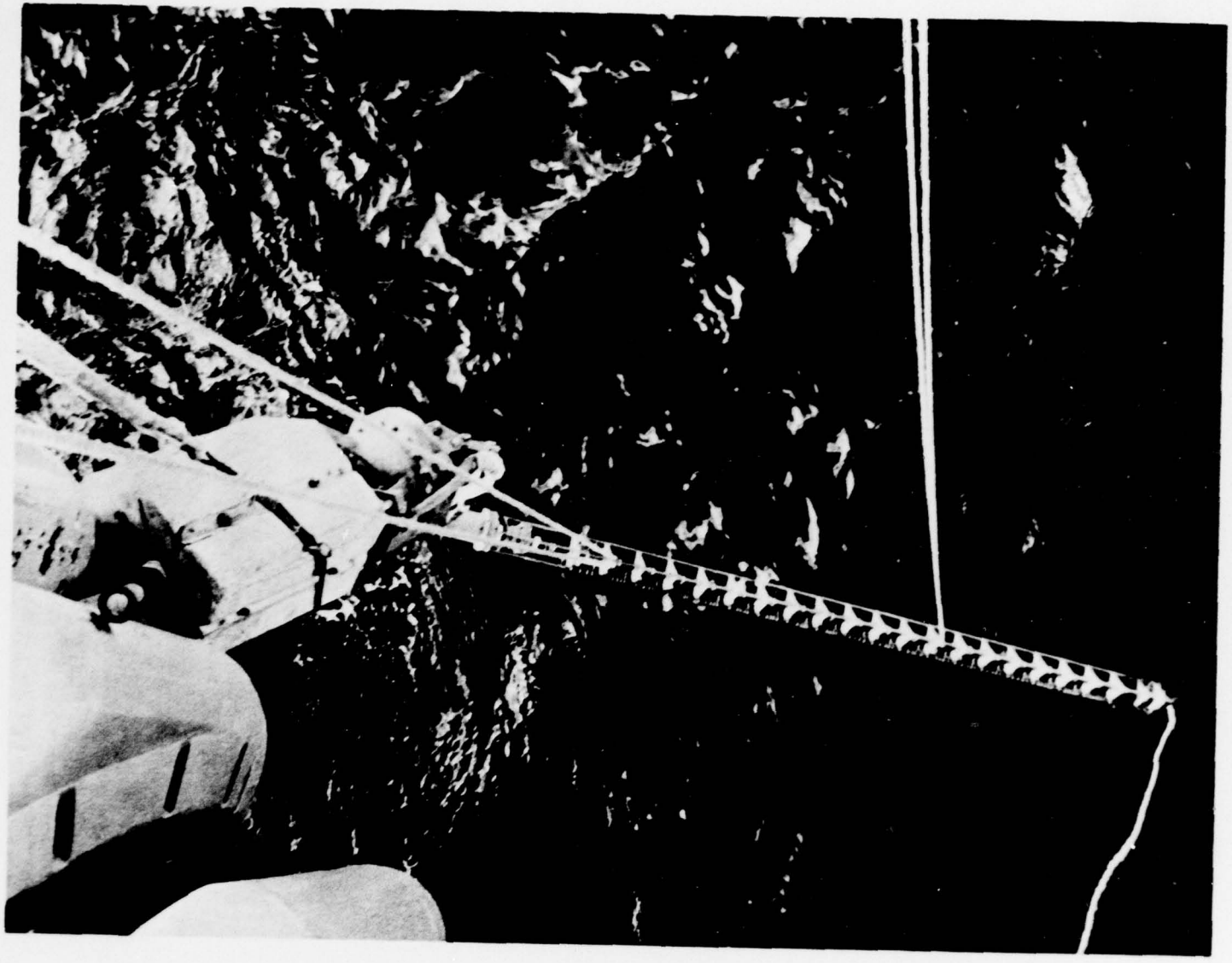

Fig. 16

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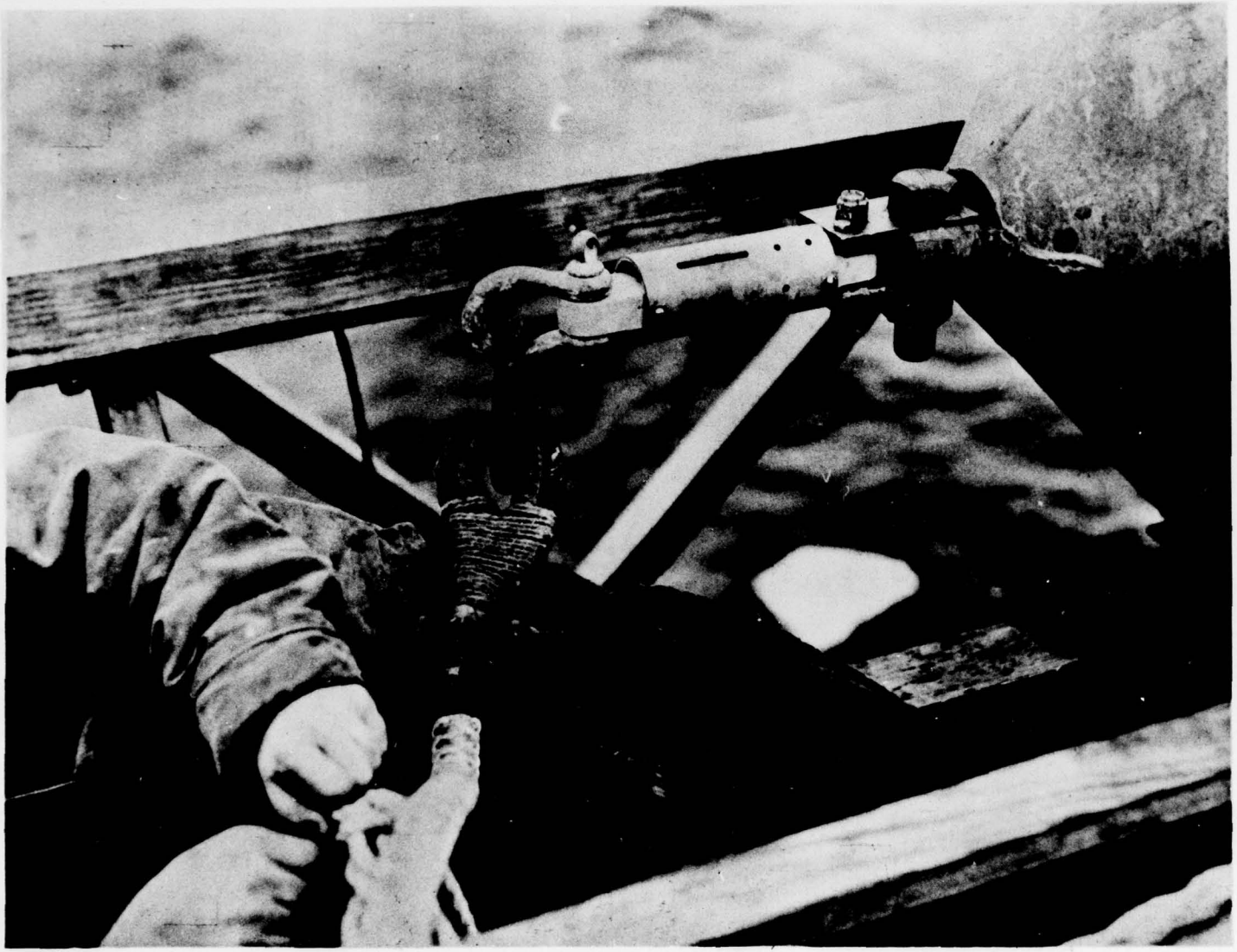

Fig. 17

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Mr. Mongelli	
J. Cestone	

U. S. NAVY UNDERWATER SOUND LABORATORY
FORT TRUMBULL, NEW LONDON CONNECTICUT

Project T-130-00-00
Serial 953-28-61

28 MAR 1961

From: Commanding Officer and Director
U. S. Navy Underwater Sound Laboratory
Fort Trumbull, New London Connecticut
To: Department of the Navy
Chief, Bureau of Ships (Code 370)
Washington D. C.

Subj: USL Technical Memorandum, forwarding of

Encl: (1) Subject Technical Memorandum Serial 953-12-61, dtd Feb 10, 1961
Unclassified Copy #42

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2. This Technical Memorandum was written by Paul T. Misisco of this Laboratory, and is unclassified.

F. H. Hunt
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