Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved Budget Bureau No. 38-R02[illegible]4

INSTRUCTIONS.–Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT *(Institution, firm, hospital, person, etc.)*

The Dick X-Ray Company
4000 Olive Street
St. Louis 8, Missouri

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED *(If different from 1 (a).)*

6425 Etzel Avenue
St. Louis 14, Missouri

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering & Service Dept.

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

None

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

W. D. Henry
F. B. Niedner
C. R. Anderson

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

F. B. Niedner

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Cobalt 60

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

Co-60 - 3 sealed sources, 225 curies ea. 675 cur.

Dick X-Ray Company Model #Y-1002
NRD Instrument Co. Model #Y-1002-4D

DUPLICATED
FOR DIV. OF INSP.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

Temproary possession for loading into teletherapy apparatus sold to approved licensees.
Sealed sources will be stored in shipping and loading shield - Dick X-Ray Co., Model "A" and/or Dick X-Ray Co. "Commando" Teletherapy unit Model F-1002, both of which have been approved as shipping containers in interstate commerce by the Bureau of Explosives.

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(Continued on reverse side)

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Enclosure #1		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		Enclosure #1		

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
Victoreen Thyac-389C	1	Bets Gamma	0-0.2/2.0/ 20		Monitoring
Victoreen Gamma	1	Gamma	0-10/100/		Monitoring
Dose Rate Meter 592			1000		Measuring

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.
Periodic check (3 mos.) against calibrated standard. Check against standard immediately preceding and following each source transfer.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)
Indirect reading dosimeters - Victoreen Model 362 with Victoreen Model 287 charger

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes ~~No~~ XX Enclosure 2 & 3

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.
Enclosure #4

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. Enclosure #4

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 6/21/60

RECEIVED JUN 23 1960 U.S.A.E.C. Isotopes Branch Div. of L & R

The Dick X-Ray Company
Applicant named in item 1

By: [signature]

R. C. Hass - President
Title of certifying official

WARNING.—18 U. S. C., Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

GPO - 87 687 3

Enclosure No. 1

AEC 313
Dick X-Ray Co.
6/16/60

Section 8.(and 9.)

W. D. Henry and F. B. Niedner were active participants in the design of the Commando unit and the associated shipping and transfer (loading) mechanism. Each is intimately acquainted with the functions and adjustments of the teletherapy head and shutter mechanism, and with the operation of the shipping and transfer mechanism. They have both executed many "dry - runs" of both loading and unloading procedures.

W. D. Henry has been an observer on at least six, and F.B. Niedner on at least three occasions when hot sources were actually loaded into Commando units.

Both Mr. Henry and Mr. Niedner worked under the direction of M. Ter-Pogossian, Ph.D., in unloading a leaking source capsule from the Commando unit installed at Mallinckrodt Institute of Radiology, St. Louis, Missouri.

Charles R. Anderson is thoroughly familiar with the entire Commando unit system. He is an experienced service engineer who has installed and serviced Commando units. He has performed several "dry - runs" transfers and has observed one actual source transfer.

W. D. Henry, F. B. Niedner and C. R. Anderson will each participate in at least one actual "hot" source transfer before they are permitted to work independently.

W. D. Henry holds a B.S. degree with majors in mathematics and chemistry and has attended a one year series of weekly lectures on Radio-Physics conducted by the Radio-physicist at Mallinckrodt Institute of Radiology for residents in Radiology. He has also attended a two-weeks training course in Radio-Isotopes conducted by the Medical School of the University of Indiana. For three years he has been this Company's technical representative in charge of our Isotopes instrumentation program.

F. B. Niedner holds a B.S. degree in Engineering. He has been in charge of engineering for the Company for the past nine years. In this capacity he has dealt on a continuing basis with problems of radiation protection measurement and monitoring. He is familiar with measuring instruments and their use.

C. R. Anderson has been instructed in the principals of radiation protection, the use of appropriate insturments for the measurement of radioactivity, and monitoring techniques.

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LOADING INSTRUCTIONS FOR

COMMANDO TELETHERAPY UNIT F-1002
(Model "A" Shipping Safe)

Preliminary:-

The transfer of a loaded (hot) source capsule from the shipping safe (Model "A") to the teletherapy head (Model F-1002) requires a working crew of at least two men. In the instructions which follow, these two men are designated as "X" and "Y". The appropriate designation immediately precedes the instruction which applies to that individual. Where the instruction requires joint effort, or allocation is immaterial, the designation "X-Y" is used. "X" is in nominal charge of the loading operation. Both individuals will wear Victoreen 362 dosimeters charged immediately prior to starting work. The entire operation described in the following numbered paragraphs can be performed by a competent crew of two men in one hour or less. The procedure will be substantially expedited if it is reviewed step by step by the crew prior to commencing work. Presence of essential tools and instruments should be verified, and tools should be laid out on mobile tool cart placed in the loading area in a position convenient to the work. Good practice dictates that all operations will be executed at as great a distance from the shipping safe and teletherapy head as is consistent with prompt, convenient and first quality performance. Conferences, if necessary, should be conducted outside the designated boundaries of the loading area.

1. (X-Y) Inspect Teletherapy head to be loaded. Under normal conditions shutter drive housing and shutter drive mounting plate will have been removed. If these components are installed on the unit, remove them before proceeding further. Then invert head so that mounting surface for shutter drive plate is directed downward, and is parallel to floor.

2. (X-Y) Remove welded guard from source shipping safe. Remove the protective covers (A&B),(Fig 1) on the top, and side of shield. Verify that handle (P., fig. 3 & 6) is in position No. 2. Inspect upper end of shield rod, and insure that threads are clean and in good condition.

3. (X) At a distance of at least 40 feet from shipping safe, take background reading with Victoreen Thyac (389C) set on 800 cpm range. Note reading here(_____ cpm). Remove protective cover from bottom of shipping safe, exercising care to hold cover upright. Make thorough wipe of interior of bottom cover with damp gauze swab, and read activity on swab. (Take reading at same location background reading was made.) Note reading here(_____ cpm). If reading of swab less background reading is _____ cpm or more, replace top, side, and bottom covers on shipping safe immediately and notify

Radiation Protection officer at St. Louis, Missouri. Phone Franklin 1-6626. If reading of swab less background reading is _____cpm or less, proceed as follows:

4. (X-Y) Jack up shipping safe so it is supported by caster frame (Q., fig 1 and 2.) Use the (4) 1/2-13 allen head screws (C., fig. 2) to pick the container up from the floor and onto the casters.

5. (X) Move the source shield to a position adjacent to the therapy head to be loaded. Remove the lock pin (D, fig. 3) from the upper end of the shield rod and lower the rod to the floor. Place the pancake optical section (fig. 4) with the handles on top of the safe so that the 1/4" pins (E, fig. 4) align with the holes (F. fig. 3) in the safe, and the center hole aligns with the shield rod hole in the safe. Be sure the alignment is such that the shield rod (G, fig. 3 & 4) slides up and down freely. Tap the 1/4" pins to bottom in the safe.

6. (X-Y) Place the prisms (H, fig. 4) in position in the pancake section. Insert the illuminator (I, fig. 4) so that the bulb is about 1/4" from the adjacent prism. (X) Place the source retaining screw (8-32 x 3/4 with conical points) on the end of the long handled Allen wrench #2. Insert the screw and wrench in the lower of the two ports approximately 1/2 its length. (Shown in upper port of fig. 4 for clarity.) Plug the illuminator into 110 volts AC.

7. (X-Y) Move the safe beneath the therapy head so that the external shutter tube alings with the slot (K, fig. 4) in the pancake section, and the rear of the therapy head is cantered over the recess in the pancake section. Check distance from lower edge of safe to floor. (fig 2) Shim under casters if necessary to obtain required distance.

8. (Y) Lower the therapy head slowly and toggle until it is aligned with pins (E, fig. 4) in pancake section, then lower until it is fully bottomed. (X) Insert the second long handled Allen wrench #1 through the upper of the two ports in the pancake section until it enters the Allen set screw holding the source plug in the back of the therapy head. Loosen screw about 1/4 turn.

9. (Y) Raise the shield rod (L, fig. 5) in the safe and screw it into the source plug (M, fig. 5) until it bottoms. (X) Use wrench #1 to release the source plug. (Y) Lower the shield rod until the third bend (N, fig. 5) rests on the floor.

10. (Y) Withdraw pin (O, figs. 3 & 6) on handle (P, figs 3 & 6) of source indexing mechanism (Fig. 7) Turn handle slowly to position one and reset pin. Raise rod so that first bend (R, fig. 5) rests on floor. Source (T, fig. 5) should now be visible in optical system. (Note: (X) Keep eye at least 12" from optical port (S, fig. 4.)

11. (Y) Apply retainer clamp to shutter cable. Hold shutter cable and

remove emergency trigger. Lower shutter "snake" until it nearly rests on source. Rotate shield rod until source slot aligns with tank on coupling link, and flat side of slot appears to be toward the observer (X) in the left hand image. Mesh parts together. Raise shield rod to place screw hole approximately in center of field. (X) Toggle screw into hole and run screw down hard. Withdraw wrench #2.

12. (Y) Retract shutter "snake" into head by pulling shutter cable, and replace trigger. This will retain source in head.

13. (Y) Raise shield rod to full up position (X) Use wrench #1 to determine when flat on source plug is under the set screw, then tighten the set screw. (Y) Unscrew shield rod and lower to floor.

14. (X-Y) Install 1/4-20 x 1½ shutter blocking screw in external shutter tube adjacent to the recessed emergency return trigger. (Source is now blocked in "safe" position in teletherapy head.) Install lead-wire seal and warning tag through blocking screw.

15. (X) Remove wrench #1 from port in pancake section. (Y) Raise the therapy head to clear the loading device.

16. (X-Y) Reassemble shutter drive mounting plate and housing to teletherapy head in reverse order of step 6.

17. (X-Y) Survey head, using Victoreen Gamma Survey Meter (Model 592). Take readings in two planes, one of which is to be vertical passing through the source and the axis of the collimator socket, and the other horizontal passing through the source with the axis of the collimator socket horizontal. Readings will be taken at a distance of one meter from the source, and at increments of 30 degrees about the head in each of the two aforementioned planes.

18. (X) Read dosimeter and note reading here:-

"X":- _____mr

"Y" _____mr

Checklist of parts to be repacked with pancake optical section.

A. Pancake section - optical section
B. 4 right angle prisms
C. 1 Lamphouse Assembly
D. 2 long handled Allen wrenches #1 & #2
E. Extra source retaining screw.

Checklist of parts to be reinstalled on loading safe.

A. Safety pin for shield rod
B. Top cover and gasket
C. Side cover and gasket
D. Bottom cover and gasket
E. External lead shield
F. Welded shipping gaurd.

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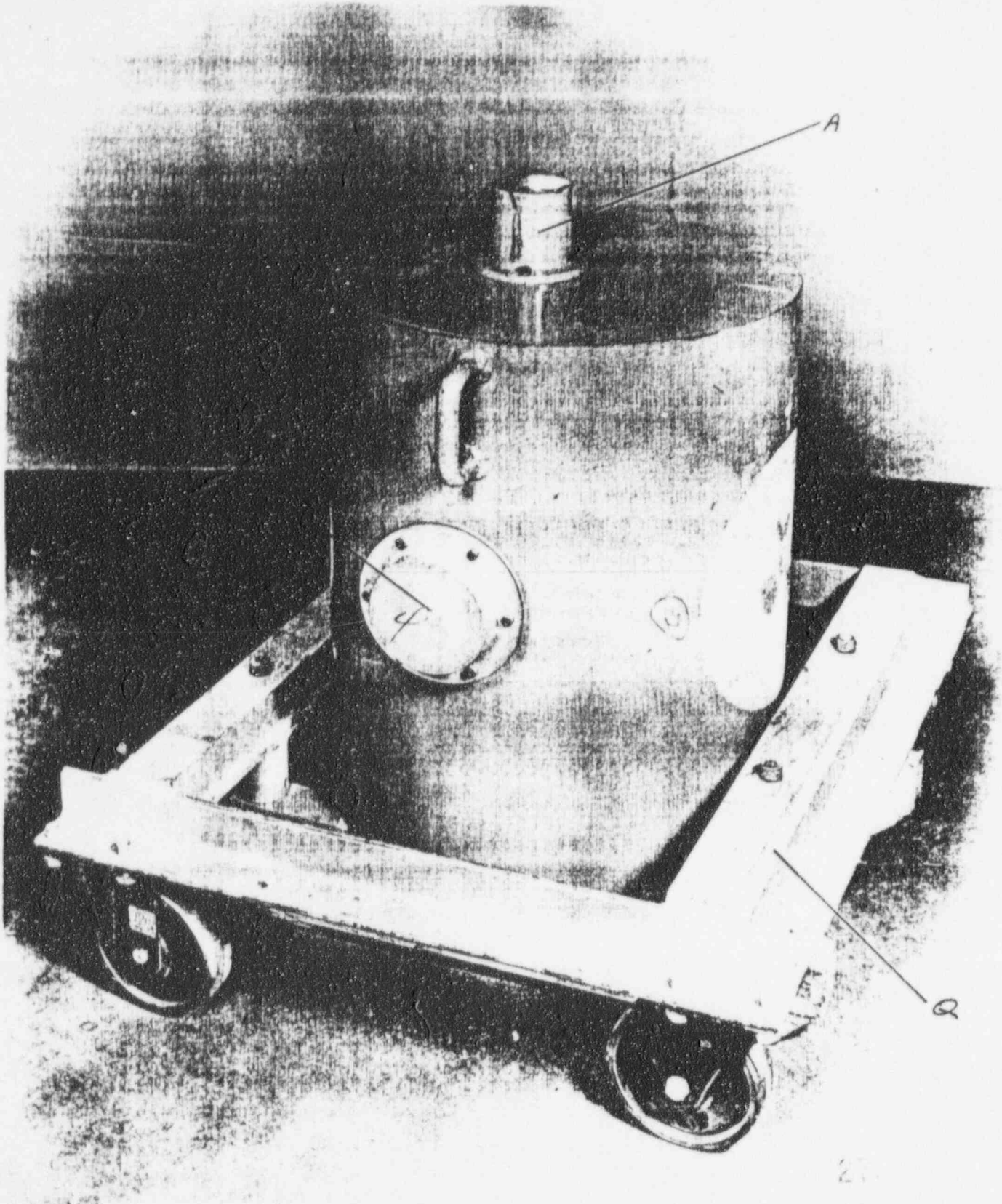
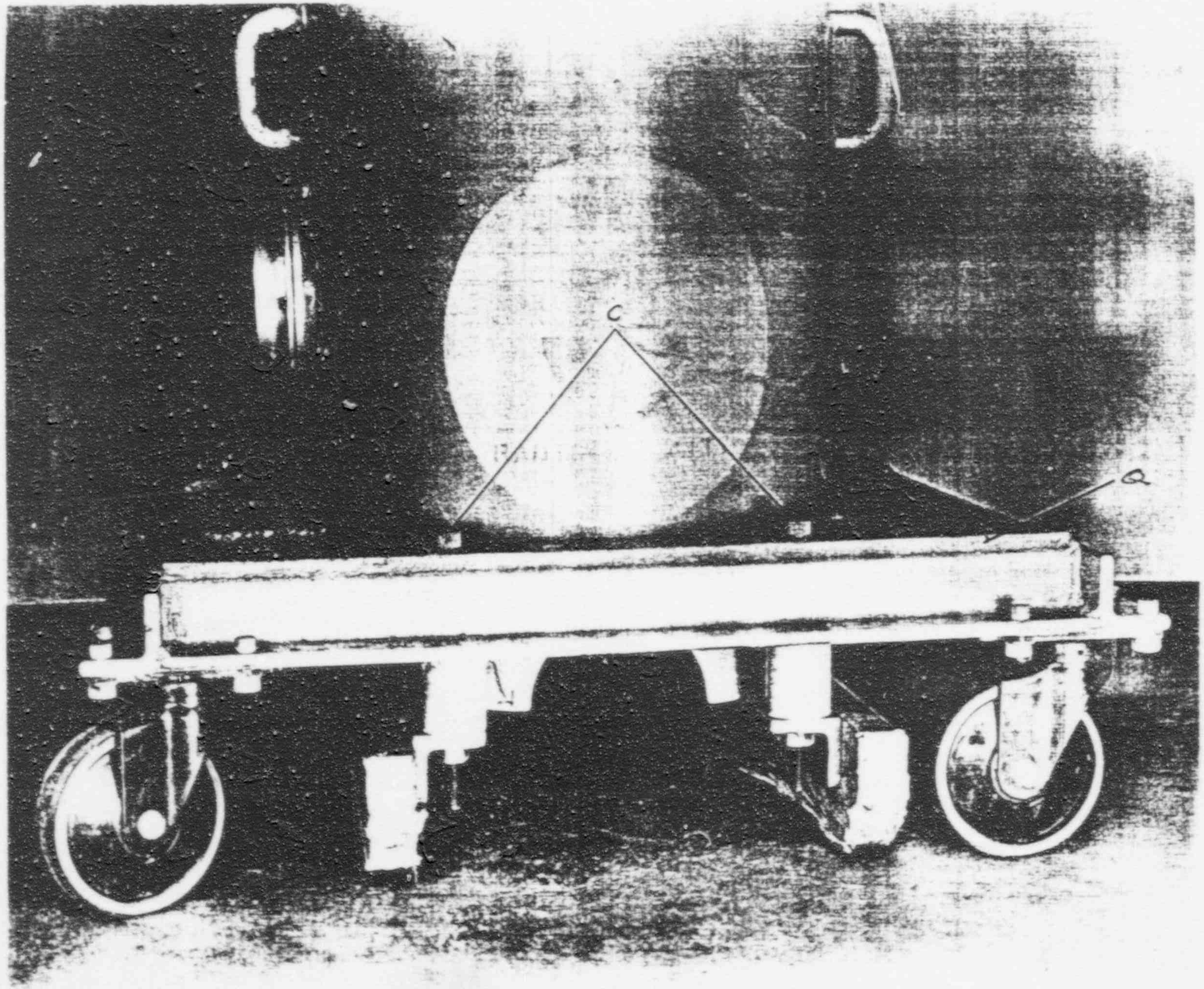
FIG (1)



SHIPPING AND LOADING SHIELD WITH CRATING REMOVED

M'D'L. "A"

FIG ②

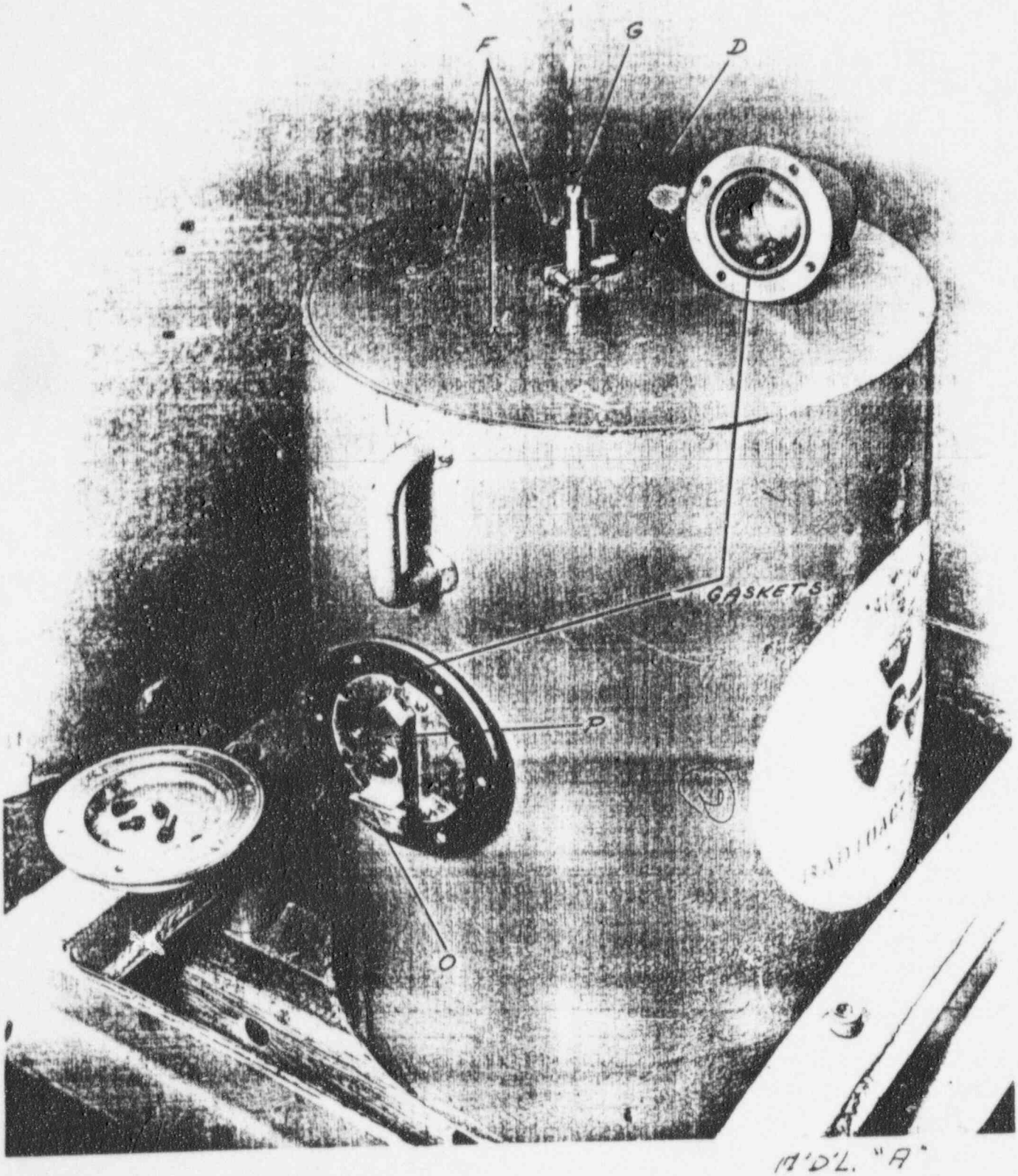


JACK ARRANGEMENT FOR CASTERS

M'D'L. "A"

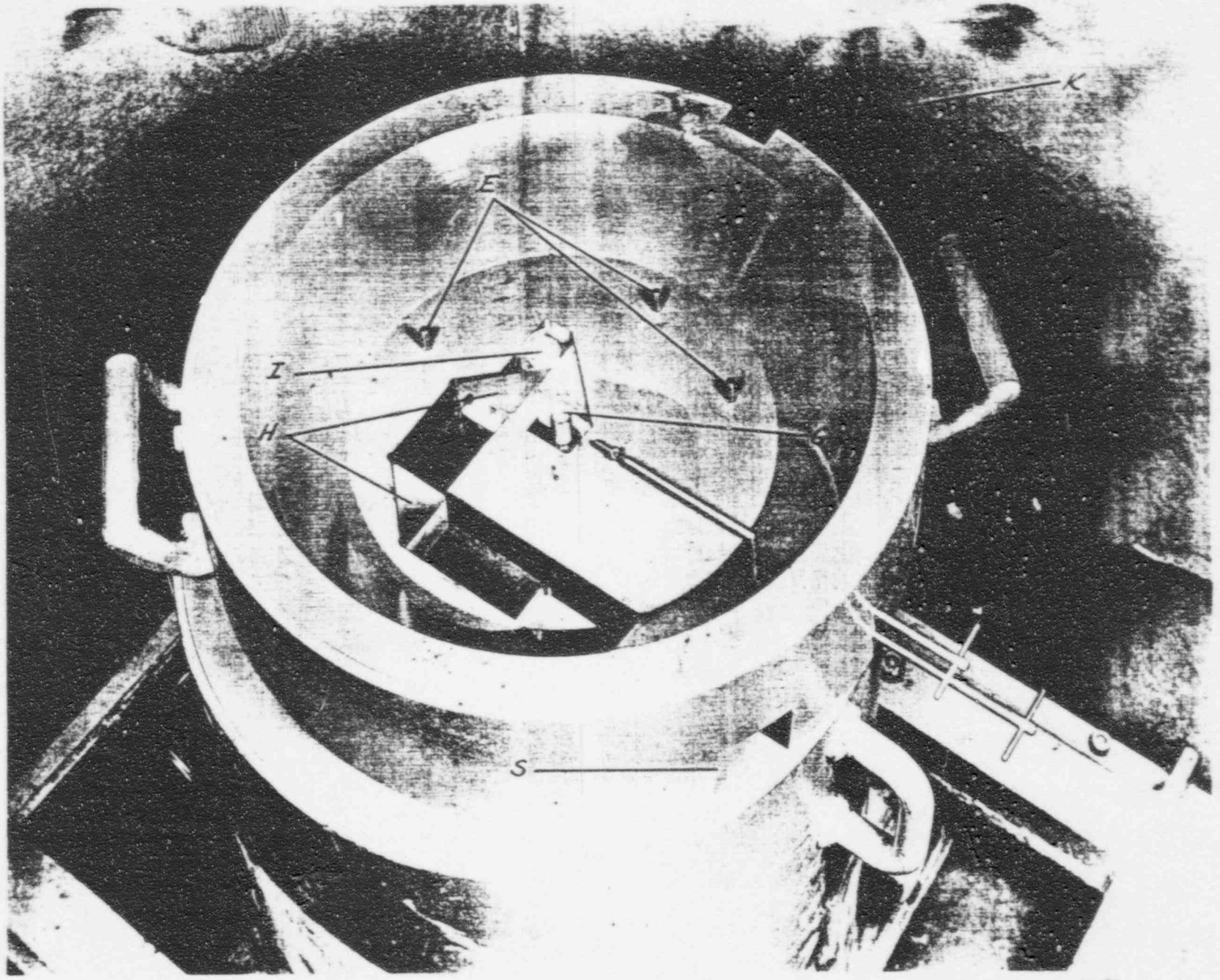
FIG (3)

DETAIL OF PROTECTIVE SHIPPING COVERS



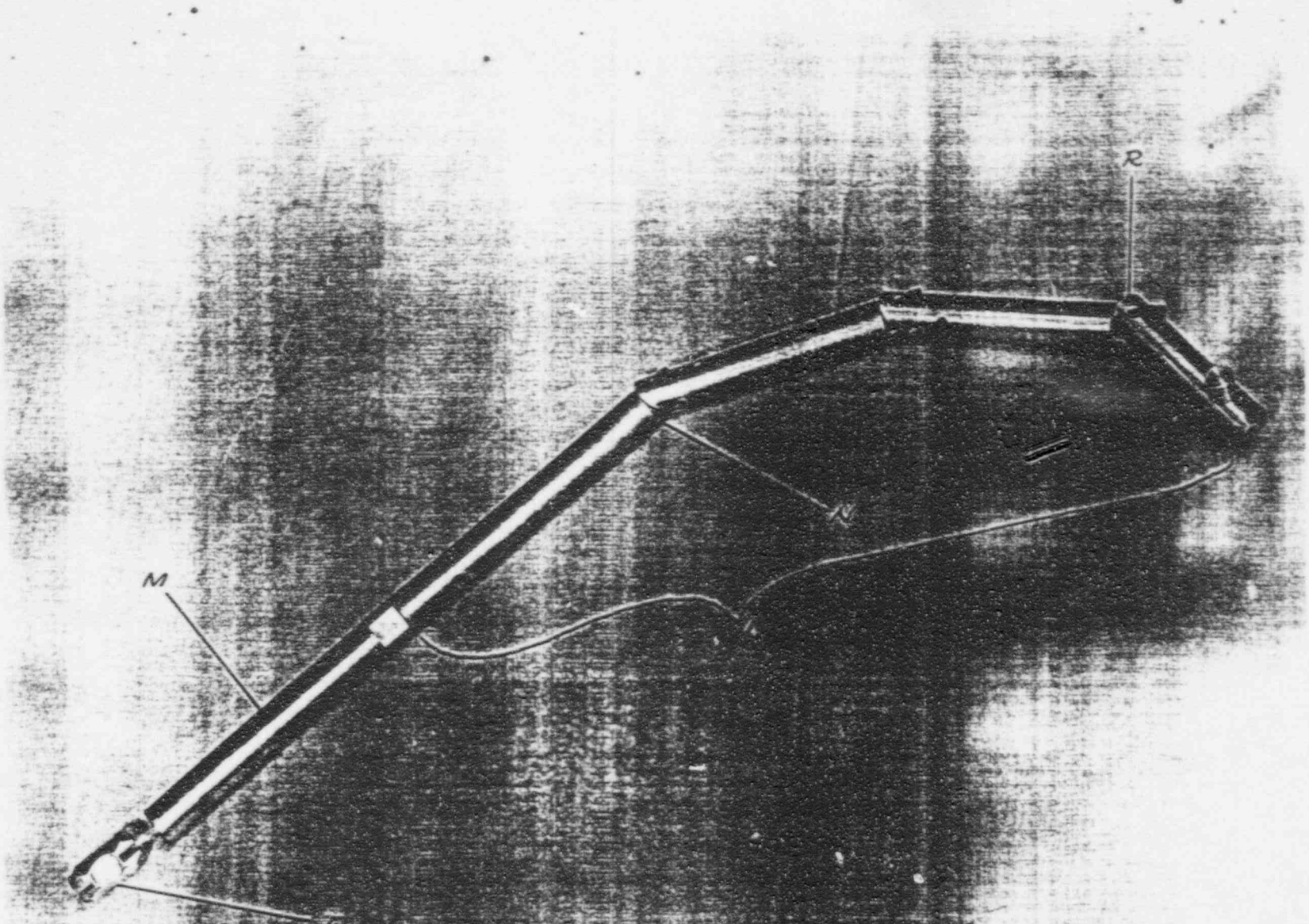
M'D'L. "A"

FIG (4)



M'DL. "A"

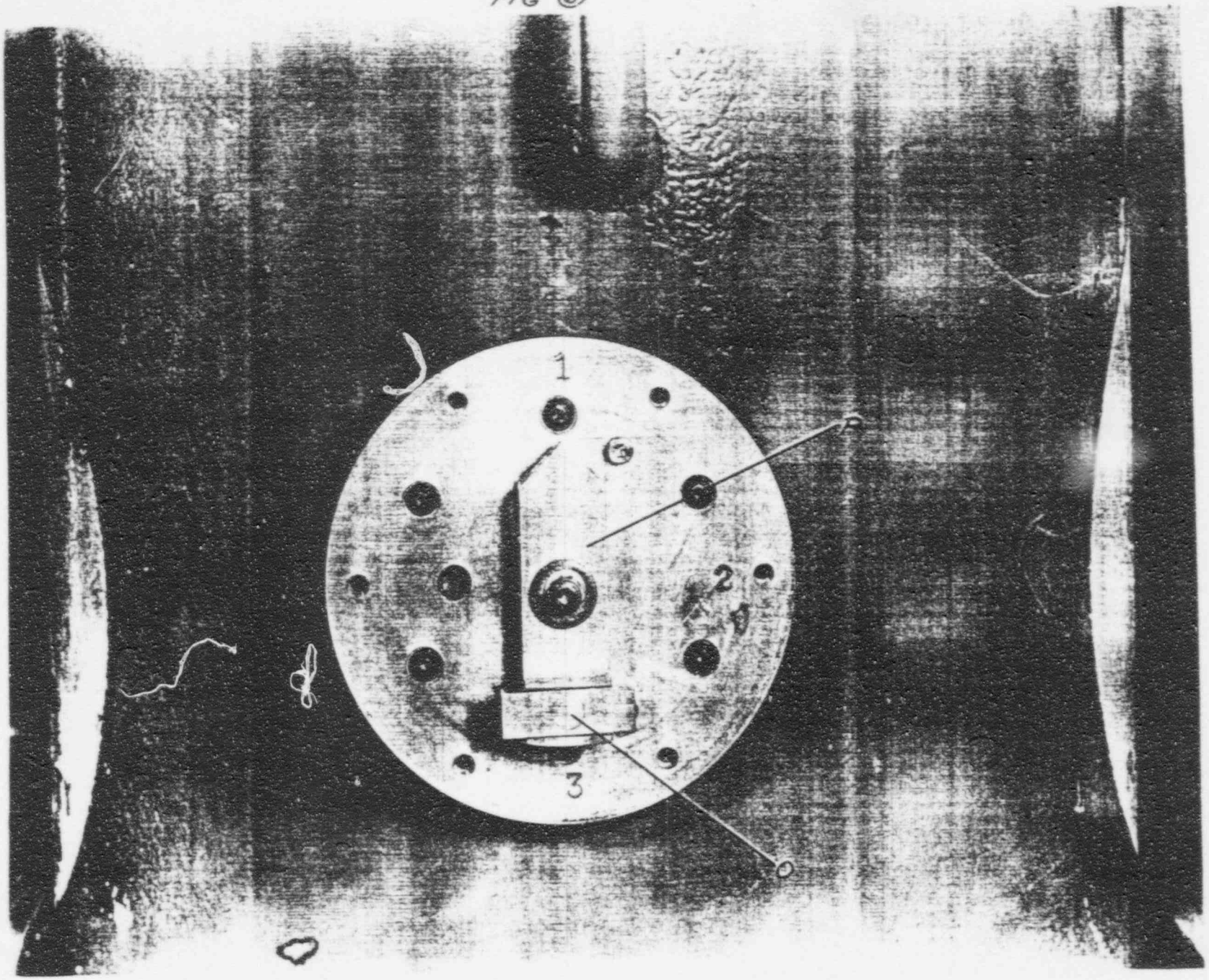
FIG (5)



SHIELD ROD - COMMANDO SHIPPING & LOADING SHIELD.

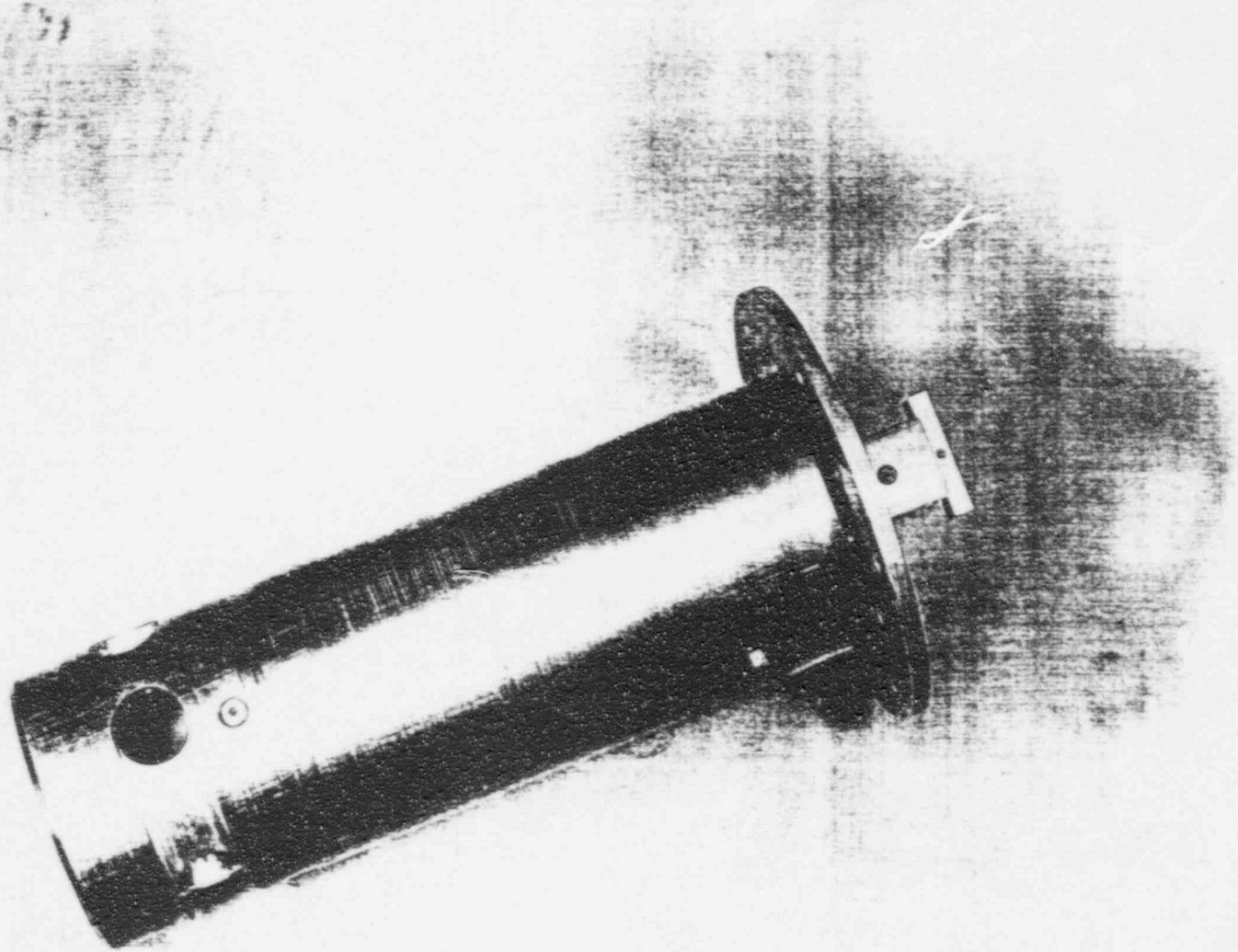
M'D'L. "A"

FIG ⑥



M'DL. "A"

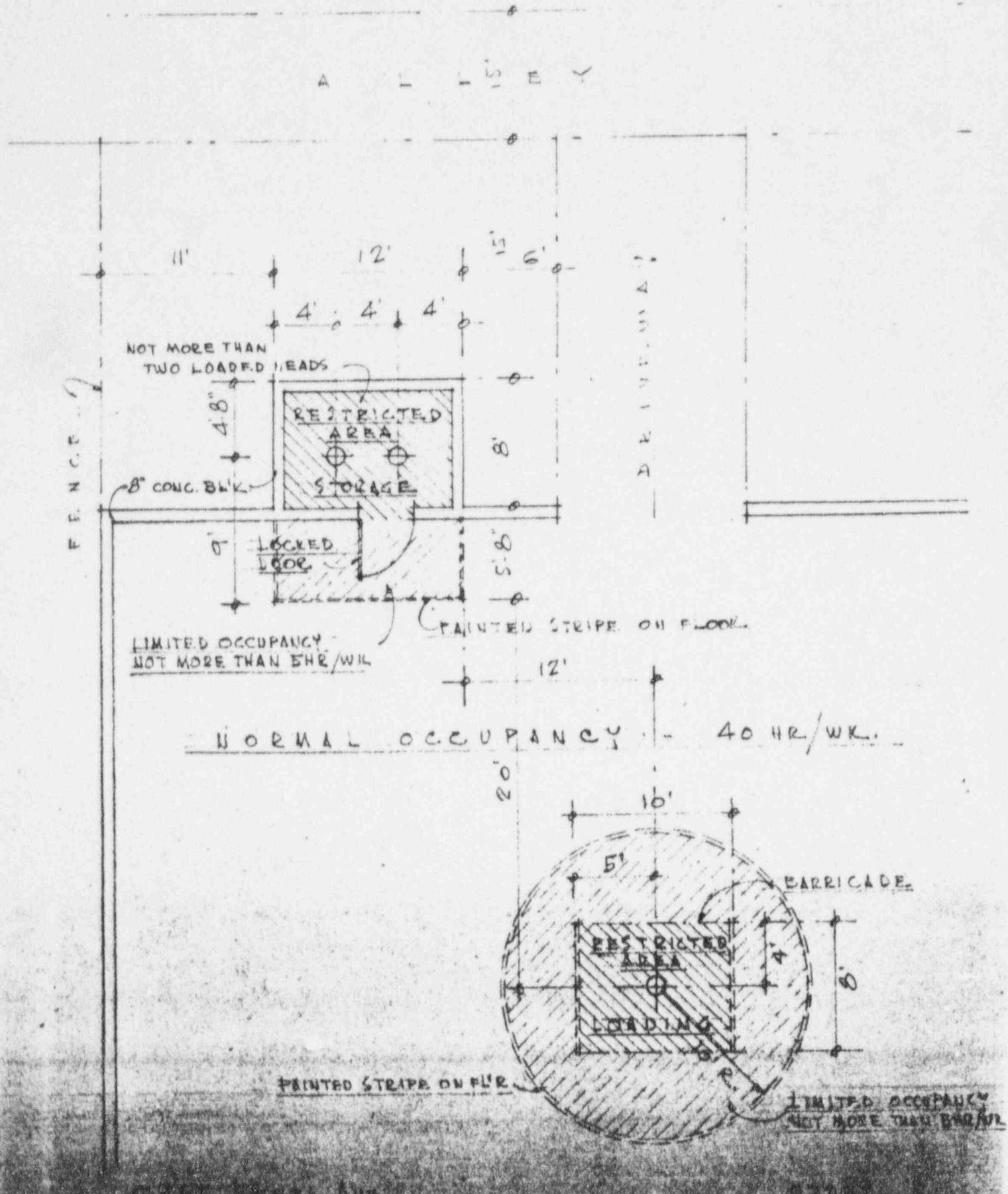
FIG (7)



MDL. "A"

ENC. #3.

ABC 213.
DICK X-RAY CO



A sketch of the loading premises is attached as enclosure #3. On it are shown conditions relevant to the loading and storage areas for Commando teletherapy apparatus.

Areas of restricted occupancy will be suitably marked and where necessary, barricades will be provided. Required signs carrying the prescribed radiation symbol will be posted at all areas of restricted or limited occupancy.

Areas of restricted and limited occupancy shown on enclosure #3 have been established to maintain the maximum level of radiation at any time to or below the following:

1. Restricted area:- 2.MR/hr @ 1 meter
2. Limited Occupancy:- 0.25 MR/hr to 2 MR/hr.
   (not more than 5 hr/wk.)
3. Unrestricted area:- 0.25 MR/hr and less.
   (not more than 40 hr/wk)

Standard operating procedures provide for the transfer of a loaded capsule from the shipping safe to a teletherapy head within 48 hours after its receipt from the encapsulator.

Shipments of sources from the encapsulator are carefully scheduled and loaded teletherapy heads are normally surveyed and shipped to licensed user within one week of loading.

Only most exceptional circumstances will result in the presence of three encapsulated sources on the premises at any one time.

This application is for permission only to transfer sealed teletherapy sources from an approved shipping safe to an approved apparatus, and to possess at any one time not to exceed three such sealed sources with a maximum aggregate activity of not more than 675 curies of Cobalt 60, each source to be contained at all times either in a teletherapy head or shipping safe.

Prior to receipt on the loading premises, sealed sources will have been subjected to prescribed leak tests by the encapsulator. The level of activity in the critical area of the shipping safe is to be measured routinely as part of each source transfer from the safe to a teletherapy head. This measurement is made a matter of record. (step 3, Loading Instructions. Enc. #2)

If, at the time of the next succeeding source transfer, activity is measured in the critical area of the shipping safe which is significantly higher than the first preceding recorded reading, this is presumed to be prima facie evidence of a leaking source capsule. As such, it will constitute an emergency which must be reported to AEC, Division of Licensing and Regulation.

Under these circumstances, Loading Instructions, Enc. #2 provides that the shipping safe is to be immediately resealed. Further necessary steps will be as prescribed by the Division of Licensing and Regulation.