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**TECHNICAL EVALUATION
OF THE
MULTI-PURPOSE
NYLON WEBBING CARGO NET** **FC**



BAYONNE, NEW JERSEY

RESEARCH AND DEVELOPMENT DIVISION
BUREAU OF SUPPLIES AND ACCOUNTS
WASHINGTON 25, D. C.

TECHNICAL REPORT REVIEW

TECHNICAL EVALUATION
OF THE
MULTI-PURPOSE NYLON WEBBING CARGO NET
(REPORT NO. 2)

Project NT003-007(c)
Sub-Project SE52-19
Engineering Report No. 5.2071
1 July 1955

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TECHNICAL EVALUATION
OF THE
MULTI-PURPOSE NYLON WEBBING CARGO NET
(REPORT NO. 2)

Project NT003-007(c)
Sub-Project SE52-19
Engineering Report No. 5.2071
1 July 1955

by

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ABSTRACT

In an endeavor to develop a suitable substitute for conventional manila nets, the Naval Supply Research and Development Facility has developed and tested what is now known as the multi-purpose nylon webbing cargo net. This report covers the technical evaluation of this net, indicates some of the variety of its possible uses and, in particular, describes its unique application as flexible staging aboard aircraft carriers. As a result of satisfactory service performance, the USS BENNINGTON (CVA-20) in a letter report, Appendix A, recommended that the nylon nets be included with the manila nets on the Bureau of Ships allowance list.

SUMMARY

PROBLEM

Previous work by the Naval Supply Research and Development Facility concerning development of cargo nets for transfer-at-sea operations resulted in a Military Specification, MIL-N-18313, "Nets, Sling, Cargo, Nylon Webbing". Special operational requirements for nylon webbing nets aboard aircraft carriers have necessitated modifications and changes which resulted in a slightly different design of the same general type net.

FINDINGS

The nets developed by this Facility have shown the following characteristics:

1. A nylon net has one-quarter the cube and one-third the weight of a comparable capacity manila net.
2. Unlike conventional manila nets, the nylon net can be stowed safely while wet and can easily be handled by one man.
3. The unique interslotting construction of the net means that the net does not depend upon stitching for its strength characteristics. The net can easily be repaired aboard ship using a minimum of materials and equipment.
4. The nets, in addition to their primary cargo handling capabilities, have many other possible applications. The chief of these is the nets' potential use as flexible staging now being evaluated. The nets also show interesting possibilities for use as save-all nets, debarkation nets, and lashings for deck cargo.
5. The USS BENNINGTON (CVA-20) reported satisfactory uses as cargo nets and flexible staging (Appendix A).

RECOMMENDATIONS

It is recommended that twelve multi-purpose nylon webbing nets be furnished a carrier in the Pacific Fleet for operational evaluation as cargo nets, flexible staging, save-all nets, debarkation nets, etc. Twelve nets are currently under evaluation by the USS BENNINGTON (CVA-20) in the Atlantic Fleet.

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	iii
SUMMARY	v
LIST OF ILLUSTRATIONS	xi
INTRODUCTION	1
TECHNICAL EVALUATION OF NYLON NETS	1
FINDINGS	20
CONCLUSIONS	20
RECOMMENDATIONS	vii
APPENDIX A	A1

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Construction details and specifications for multi-purpose nylon webbing cargo net.	3
2	Enlarged view of nylon slotted webbing.	4
3	Comparison of weight and stowage factors.	5
4	Comparison of "Flat" characteristics of nylon webbing and manila rope nets.	6
5	Fork truck placement of palletized load on multi-purpose net.	6
6	Arrangement of weights for static load test.	7
7	Static load test with 14,000 pound test load.	8
8	Suspended static load with cut webbing.	8
9	Dynamic load test.	10
10	Electronic shock instrumentation showing accelerometers mounted on test blocks.	11
11	Net's resilience - a measure of shock resistance - Nylon Webbing Net.	12
12	Net's resilience - a measure of shock resistance - Manila Rope Net.	12
13	Static load test for mesh webbing and intersections - Tensile.	13
14	Static load test for mesh webbing and intersections - Shear.	13

<u>Figure</u>		<u>Page</u>
15	Method of locating and securing multiple weights to the net's meshes.	15
16	Method of shackling weights to the net's frame.	15
17	Static load test of the net's frame.	16
18	Handling of a palletized load in the multi-purpose net.	17
19	Bottom view of a palletized load in the multi-purpose net.	18
20	Multi-purpose nylon webbing sling.	19
21	Static load test on married nets.	20
22	Married multi-purpose nylon webbing nets rigged under canted flight deck. Front view. Photo by USS BENNINGTON (CVA-20).	A5
23	Married multi-purpose nets used as flexible staging. Side view.	A6
24	Method of rigging flexible staging using S-hooks. Side view.	A7
25	Multi-purpose net used for cargo handling of five gallon cans.	A8
26	Multi-purpose net used for handling of bagged commodities.	A9
27	Handling of supplies.	A10

TECHNICAL EVALUATION OF THE MULTI-PURPOSE NYLON WEBBING CARGO NET

INTRODUCTION

The need has long existed for a strong, lightweight substitute for conventional manila nets. Manila has many desirable strength characteristics, but it is heavy, difficult to handle, and presents many stowage problems. In an effort to find a suitable substitute for manila nets, the Facility was authorized to develop and test new types and designs of cargo nets. The strong, easily handled nylon net is the result of that investigation.

This report summarizes and presents, in a convenient photographic format, the more important information concerning the military characteristics of the multi-purpose nylon webbing net - particularly as related to cargo handling applications and to proposed applications as flexible staging on aircraft carriers.

TECHNICAL EVALUATION

The military characteristics of the multi-purpose nylon webbing net are based equally on the physical properties of the webbing and the net's design features. These factors essentially govern the fundamental applications and end-uses of the net in military operations. The physical properties of the webbing, enhanced by recent improvements in the technique of weaving and application of abrasion resistant coating, impart to the net the following distinctive characteristics: lightweight, high strength, low stowage cube, flexibility, resiliency, durability and resistance to weathering and extreme temperatures. The design of the net incorporates as its principal function a large margin of safety under all predictable conditions of usage. The ultimate strength of the webbing is fully utilized in the net's interslotted construction. This method of construction ensures strong mesh and frame intersections and junctions, equal to the breaking strength of the webbing. In event of damage to the net, the design

provides for redistribution of stresses to adjacent webbings, and prevents and localizes the extent of damage.

The evaluations of the military characteristics were predicated on the usage of the nets as cargo nets, flexible staging, debarkation nets, save-all safety nets, lash-down and lash-back nets. In all cases, the strength of the frame and security of the intersections determine the functional behavior of the net. Two tests, dynamic and static loading, were devised to reproduce the various types of loading. Instead of separately evaluating the nets, with respect to special applications, the technical evaluations were restricted to these two tests as being sufficiently valid in making realistic determinations.

This report is not intended to be exhaustive or comprehensive in treatment since the scope of laboratory testing is necessarily limited, and the correctness of findings must be verified by actual service performance. To date, actual service evaluation has been highly satisfactory.

Net Construction

Fig. 1 shows the latest design characteristics of the multi-purpose nylon net. This is the type of net which it is proposed to use for flexible staging on aircraft carriers.

Fig. 2 illustrates the distinguishing and basic features of the multi-purpose nylon webbing net, which is the unique utilization of slotted webbings to develop extraordinarily strong mesh and frame intersections without reliance on stitching or stitching patterns. Stitching is used mainly to shape the net and to secure the terminals of the webbing.

Essential description of two distinctive types of slotted webbing, designed and woven especially for the multi-purpose nets, are as follows:

1. Double ply webbing with the slots formed by the separation of the two plies. Typical construction is illustrated by the following photograph.

2. Single ply webbing with slots formed by equally dividing the warp and filler yarns and weaving into two separate plies.



Fig. 2. - Enlarged view of the nylon slotted webbing. NSRDF Neg. No. 59-13.

Weight and Cube Advantages

A nylon webbing net has one-third the weight and occupies one-quarter the cube of a conventional manila rope net of equivalent dimensions (See Fig. 3). The nominal dry weight of a 12 x 12 foot multi-purpose nylon webbing net is 38 pounds as compared with 130 pounds for a 12 x 12 foot manila rope net. A 12 x 12 foot nylon net can be easily carried and stowed by one man.

Under wetting conditions, the nylon net does not noticeably gain weight by water absorption, and normally can be stowed while wet. The manila net, on the other hand, appreciably gains weight by water absorption and is subjected to progressive deterioration if stowed wet.

"Flat" Construction Advantages

During underway replenishments, the effectiveness of transferring cargo from one ship to another can be measured by

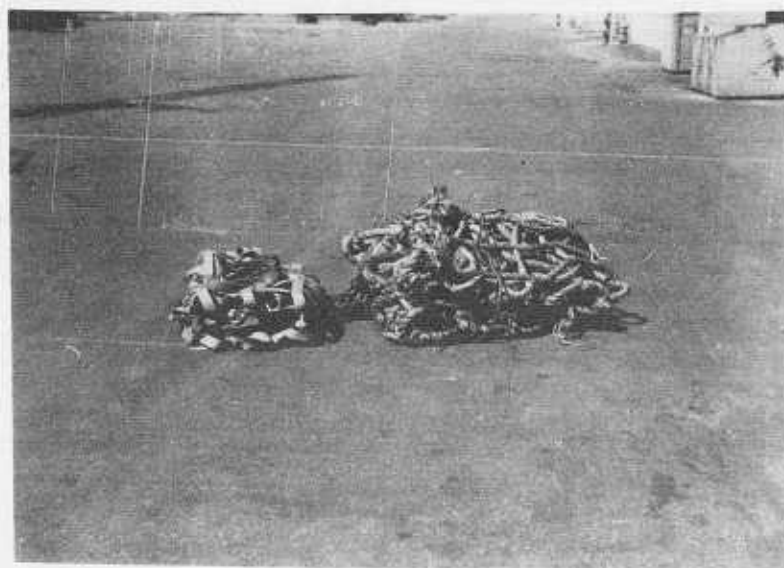


Fig. 3. - Comparison of weight and stowage factors. NSRDF Neg. No. 293-6.

the tonnage delivered per hour per man per transfer rig. Time, effort and the number of men required to handle and properly position the net on deck, prior to loading, affect the tonnage rate. A manila rope net being heavy, stiff and cumbersome, requires excessive energy and manpower to stretch the net into a flat condition. Nylon webbing net is lightweight, soft and flexible and can be positioned readily (See Fig. 4).

One of the minor considerations governing the selection of flat webbing in preference to the rope type net was the ease in which fork trucks and other wheeled equipment can maneuver on webbing nets (See Fig. 5). The use of fork trucks to handle palletized cargo on board cargo vessels is increasing, and it is reasonable to assume that in ship to ship transfer of cargo, especially in rough seas, a certain amount of palletized cargo may be transferred in nets.

Static Load Test

The rated load capacity of the multi-purpose net is 3,500 pounds, conforming to the maximum net draft on replenishment vessels. The factor of safety for the net is four times the rated load, established by the static and dynamic load tests. This is a

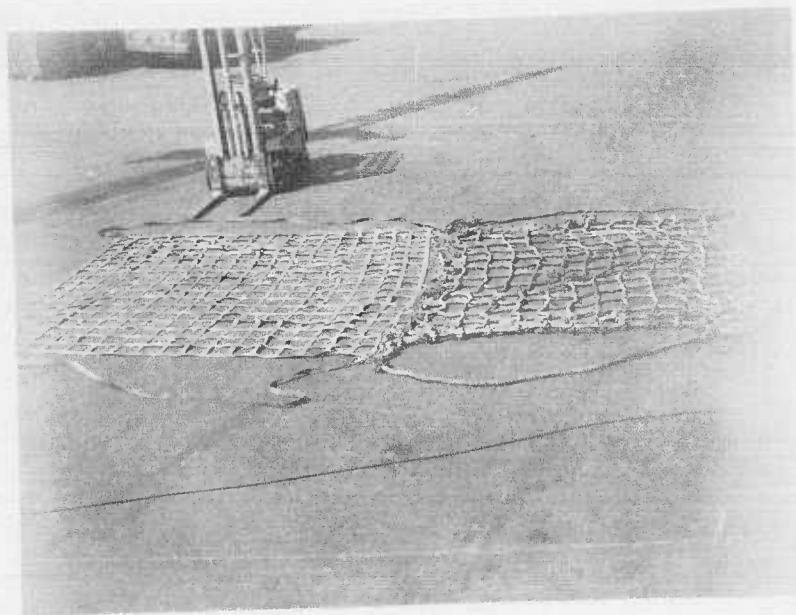


Fig. 4. - Comparison of the "Flat" characteristics of nylon webbing and manila rope nets. NSRDF Neg. No. 293-9.

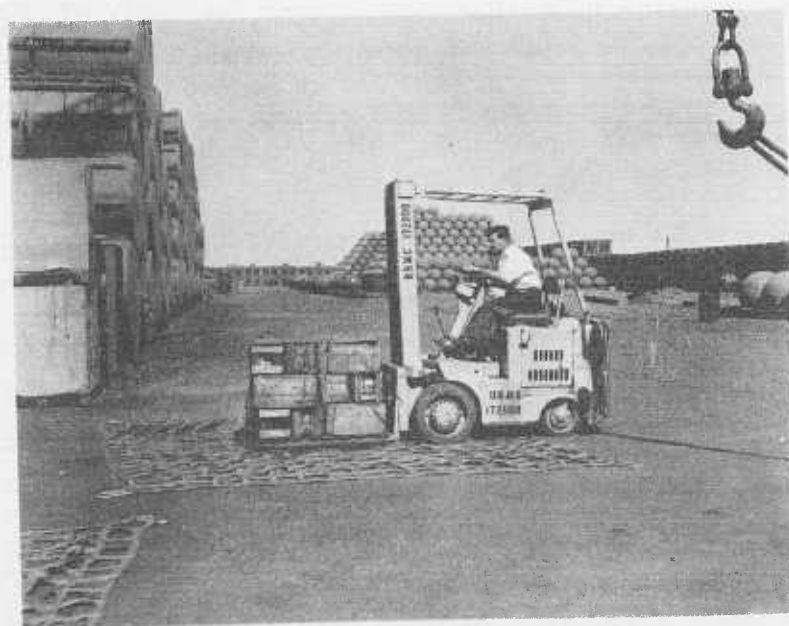


Fig. 5. - Fork truck placement of palletized load on multi-purpose nets. NSRDF Neg. No. 293-15.

conservative estimate which takes into account indeterminate factors of aging and progressive deterioration by rough handling and exposure.

The positioning of a concentrated test load of 14 one thousand pound blocks in the center of the net is illustrated in Fig. 6. The result of the general test procedure for static loads revealed satisfactory performance without visual defects developing in the webbing or construction. General test procedure for static loads involves lifts of massive loads in the prescribed manner of quickly raising and lowering the load from varying heights, ten to fifty feet, for a minimum of twenty lifts.

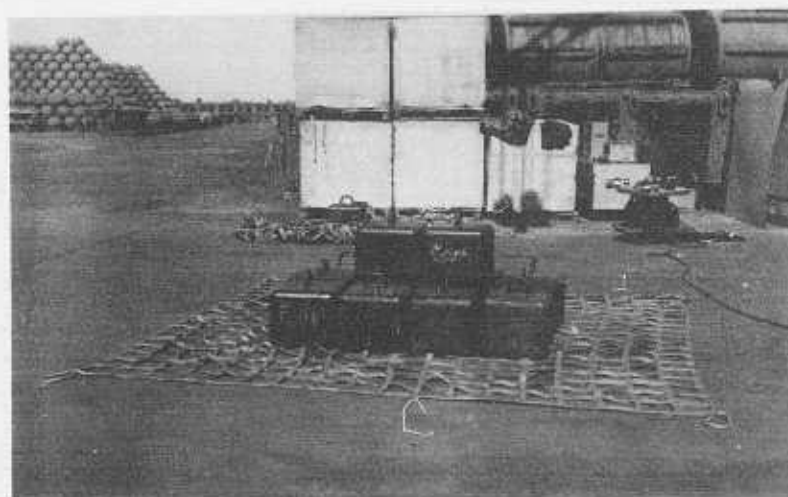


Fig. 6. - Arrangement of weights for static load test. NSRDF Neg. No. 293-20.

Fig. 7 illustrates the conformation of the net under a dead weight of 14,000 pounds. The importance of using the interslotted construction cannot be overlooked in the development of a strong grid pattern. By tracing the course of each webbing in contact with the load in Fig. 7, it can be best seen how the formation of a secured grid pattern divides and distributes the load on the mesh webbing which collectively terminate at the cargo hook.

Of special significance is the view of a broken webbing shown in Fig. 8. During the static load test, the mesh webbing,



Fig. 7. - Static load
test with 14,000 pound
test load. NSRDF Neg.
No. 293-22.

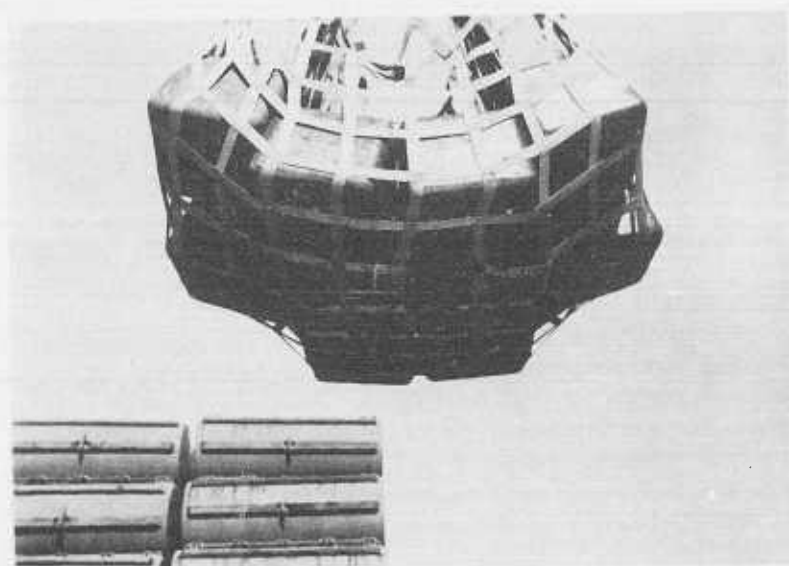


Fig. 8. - Suspended static load with cut webbing. NSRDF Neg.
No. 293-21.

located under the center of the load, was accidentally cut by the iron blocks when the winch man, operating the crane, neglected to apply his brakes in time to prevent full impact of the load on the pavement. This accident occurred during test with 10,000 pound load. Nevertheless, in order to fully assess the effect and possible extension of the damage, the test continued with an additional load of 4,000 pounds added to the net. After about twenty lifts, the net was minutely inspected. Except for slight spreading of the mesh webbing adjacent to the cut web, there were no further evidences of damage, or signs of progressive weakness.

It is worthy of note that the damaged webbing can be easily and readily repaired by sewing a webbing patch to join the two ends.

Dynamic Load Test

The dynamic load test was devised as a means of rapidly and accurately assessing the physical characteristics of nylon webbing net's design, with special reference to the strength of the mesh frame intersections. The value of this test lies in the fact that the worst possible condition encountered in the handling of cargo can be simulated and intensified in a short test period. By subjecting the net to repetitive massive shocks, deficiencies, which will not generally develop in the static load tests, are quickly revealed.

The dynamic load test is conducted in the following manner: the net is loaded with its rated load, and quickly raised to a height of fifty feet. At this height, the crane brake is released permitting the load to fall as freely as possible. Before the load reaches the ground, at a height of three feet, the brake is applied, snubbing the load. The test is rapidly repeated twenty times. At the end of the test, the net is inspected for webbing and stitching failures. To qualify, the net should show no evidences of failure. (See Fig. 9).

Measurement of Shock

To more accurately record and analyze dynamic and shock loading, the Naval Supply Research and Development Facility used electronic instrumentation extensively in the investigations. The theory involved in using this method of investigation is based on the following considerations:



Fig. 9. - Dynamic load test. NSRDF Neg. No. 293-8.

A load in a net which is motionless and then moved, or which is moving at a constant velocity which increases or decreases suddenly, incurs shock. Shock is an impacting force arising from a sudden change in direction or magnitude of a velocity vector. Since this rate of change of velocity can be defined as acceleration, it is possible to ascertain by measurements the value of this unit. The force acting on the net is equal to " ma ", where " m " is the mass of the load and " a " is the acceleration. For each instant of shock, force " F " is directly proportional to the acceleration, the mass remaining constant.

Fig. 10 shows a typical electronic setup for a 4,000 pound test load. One 10 " g " accelerometer is mounted on each 1,000 pound block and is connected by a long electric cable to a recording oscillograph located on the ground. The recording oscillograph records electric quantities which undergo rapid variations corresponding to the signals from the accelerometers attached to the test blocks. These signal recordings are made on photosensitive paper which provides a continuous record of acceleration versus time during the period in which the dynamic load

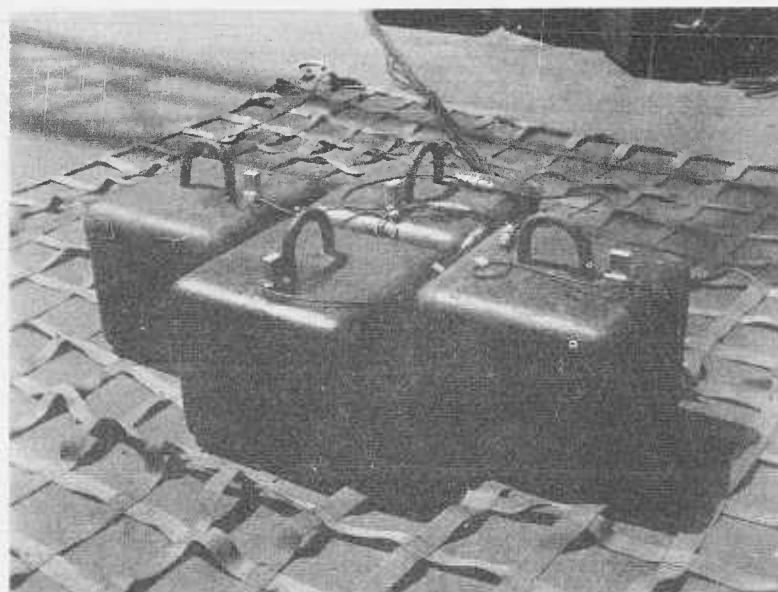


Fig. 10. - Electronic shock instrumentation showing accelerometers mounted on test blocks. NSRDF Neg. No. 293-12.

test in being performed. Analysis of the record indicates the value of the acceleration in terms of "g" at each instant of impact. For example, if the "g" factor records 2 at the point where the net load was snubbed, then the force is calculated at 2 times 4,000 pounds, or 8,000 pounds.

Resilience Test

The degree in which a net can absorb shock within itself by deformation without thereby incurring permanent deformation is indicative of its resiliency. Using a resilient net is an important factor in the reduction of cargo damages, and of stresses and strains on the ship's gear. For instance, when a heavily burdened net is abruptly stopped in its descent, the kinetic energy of the load is spent in one or all of the following ways: By crushing the cargo, by stressing the cargo runner, tackles, topping lift, mast and boom, and by deforming (stretching) the net. Obviously, if the greater portion of this energy could be absorbed

by the net, then there would be correspondingly less stresses on the cargo and ship's gear. In Figs. 11 and 12 the resilience factor for nylon webbing and manila rope nets was investigated under identical conditions of loading, in accordance with the dynamic loading procedure. The following observations were noted:

1. The forward motion of the crane boom was violent and more pronounced when the manila net load was dropped and snubbed. This net did not perceptibly elongate.

2. The nylon webbing net noticeably stretched when snubbed and the effect on the crane was not exceptionally pronounced.

3. In twenty movements conducted on each net, the action of rapidly picking up and dropping the load was smoother and more uniform with the nylon webbing net.

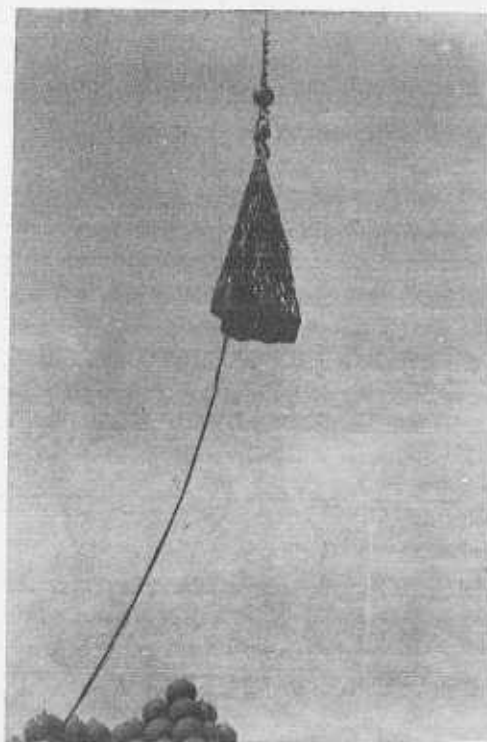


Fig. 11. - Nylon webbing net.
NSRDF Neg. No. 293-1.

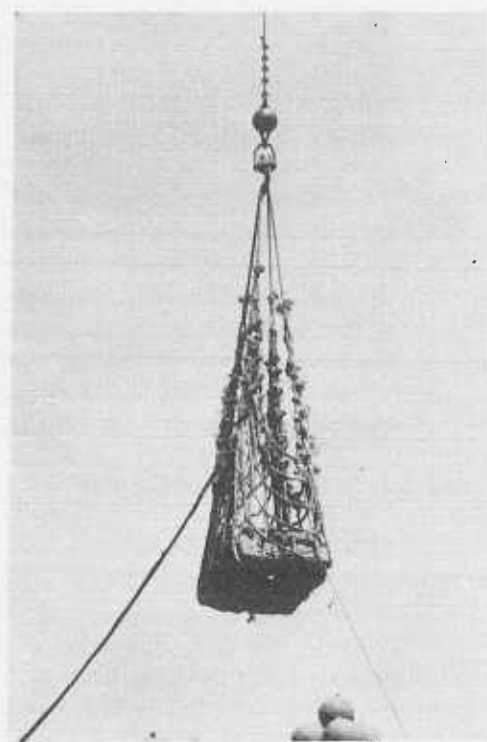


Fig. 12. - Manila rope net.
NSRDF Neg. No. 293-19.

Net's resilience - a measure of shock resistance.

Mesh Webbing and Intersection Tests

Figs. 13 and 14 demonstrate two methods of stressing the webbings and intersections. Technically, in both tests, tensile, torsion and shear stresses are present in different combinations and degrees of intensity. However, for the purpose of identification, the principal stress developed in each type test is taken as denoting the test.

These tests, although they indicate the possible employment of the multi-purpose nets as lashing nets are, in reality, rough approximations and, consequently, cannot be considered as conclusive without further investigation. The acceptability of the nets should be contingent solely on satisfactorily meeting the service requirements.

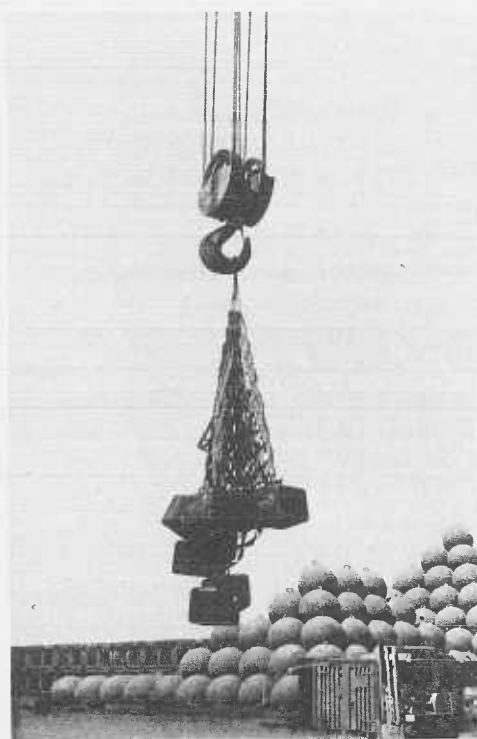


Fig. 13. - Tensile.
NSRDF Neg. No. 293-10.



Fig. 14. - Shear.
NSRDF Neg. No. 293-11.

Static load tests for mesh webbing and intersections.

In a typical installation involving the multi-purpose net for lash-down or lash-back applications, securing the net to pad eyes and stanchions is generally made by manila or wire ropes. These are turned in and around the net's mesh and frame webbing at various locations. Tensioning of the ropes is accomplished either manually or mechanically with turnbuckles. The effectiveness of tensioning depends almost entirely on the ability of the webbing's intersections to resist, without failure, the tensile and shearing forces imparted by the ropes.

To simulate the effect of the tensile and shearing forces, two lift variations were made. In the first case, Fig. 13, the net was suspended by its four net rings so as to permit the weights to hang freely from the webbings, thereby inducing tensile stresses. In the second variation, Fig. 14, the net was suspended by two rings which caused the weights to hang parallel to the body of the net, thus permitting the development of shearing stresses on the intersections.

Fig. 15 illustrates a method of ensuring an unbalanced distribution of weights on the net. This was done by spotting at random, within a 12 foot square, 10 one thousand pound blocks. A net was then thrown over the blocks, and shackles inserted at every point where the webbings touched the blocks' lifting attachment.

There are no recognized standard procedures for testing and evaluating nets. Consequently, tests were devised by the Naval Supply Research and Development Facility to give reliable test data which could be interpreted in terms of expected performance under field usage. Generally speaking, two tests, the static load which consists of lifting massive loads in excess of the rated load, and the dynamic load by which the net is shock tested, are sufficient to qualify a net specifically for cargo operations. However, for applications other than handling cargo, additional tests were devised, namely, static load testing of the meshes and frames. These tests were devised to simulate extreme conditions under which the nets may be subjected. For instance, the nets may be used as lash-down for deck cargo, or lash-backs for hold and 'tween deck cargo, in which case turnbuckles may be applied to tension the nets for containment of cargo.

Fig. 16 illustrates the shackling of the net's frame with 10 one thousand pound blocks.

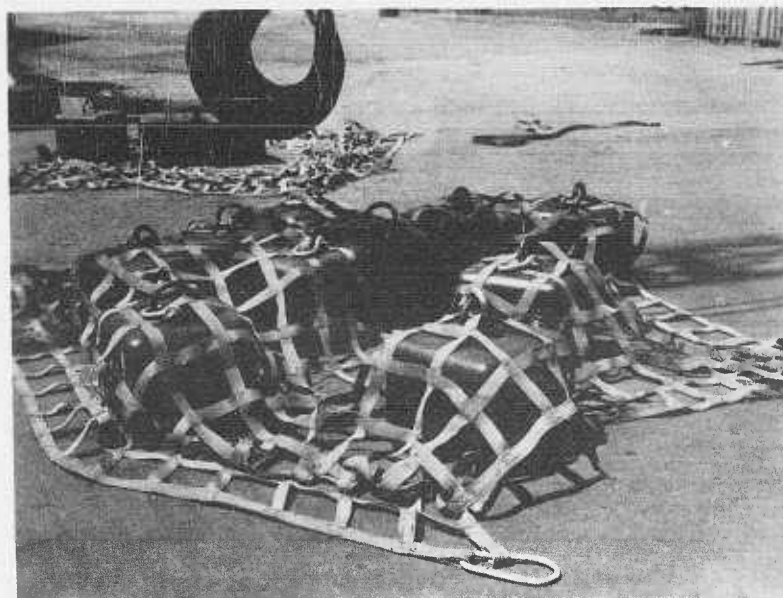


Fig. 15. - Method of locating and securing multiple weights to the net's meshes. NSRDF Neg. No. 293-7.

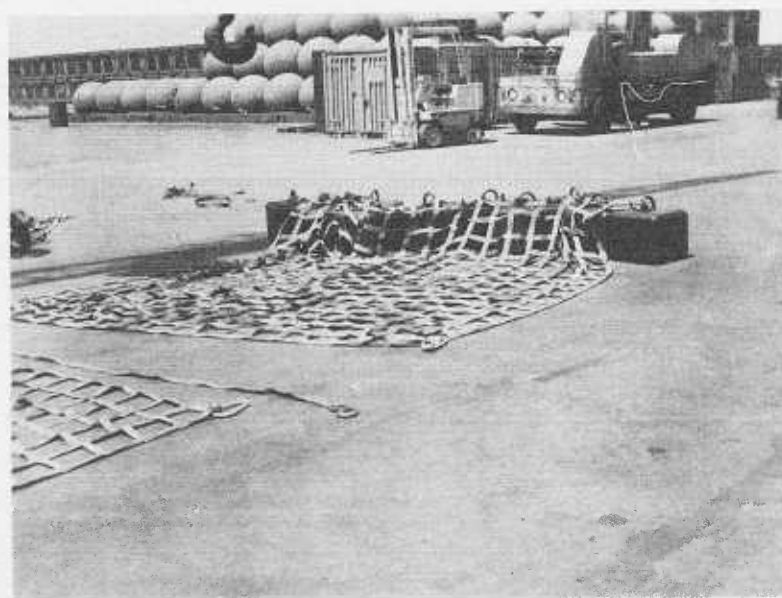


Fig. 16. - Method of shackling weights to the net's frame. NSRDF Neg. No. 293-4.

Frame Webbing Tests

The static load test of the frame consists of shackling a given number of 1,000 pound weights to various sections of the frame webbing, and rapidly raising and lowering the load for about twenty movements. Starting with 4,000 pounds, the load is progressively increased by 2,000 pound increments until a final load of 12,000 pounds is reached. This represents a load of 1,000 pounds per foot of frame length. The objective of the test is to determine whether signs of weakness or over-stressing would develop. None should be visually apparent.

It was concluded from this test that the net could be used satisfactorily, either as lash-down or lash-back, for cargo.

Fig. 17 shows a test load of 10,000 pounds, suspended on two rings, being raised to a height of fifty feet.

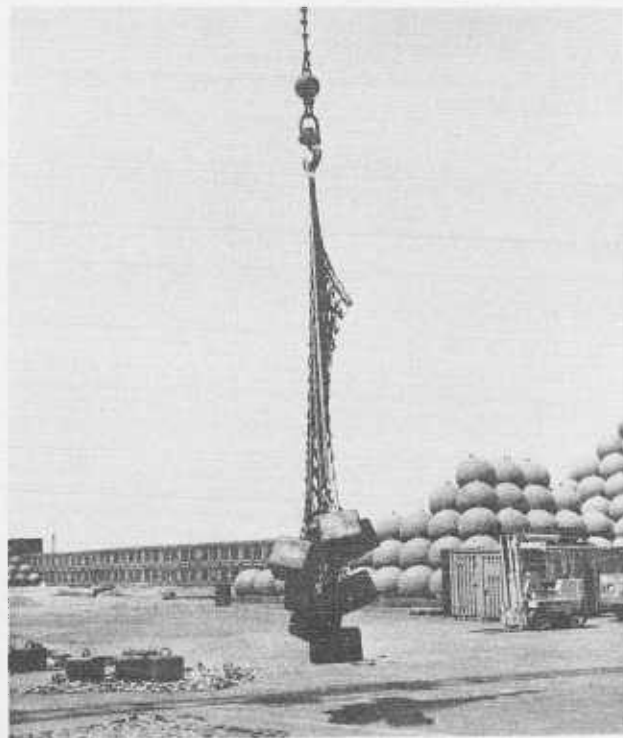


Fig. 17. - Static load test of the net's frame. NSRDF Neg. No. 293-13.

Palletized Load Test

A rectangular "pie-plate", wood pallet or standard size palletized load can be handled satisfactorily in a multi-purpose net. The net's square meshes permit the development of a form-fitting load, securely contained on four sides by the net. The load shown in the net weighs 2,500 pounds, consisting of 21 wood boxes loosely stowed on a standard 40" x 48" pallet. (See Fig. 18).

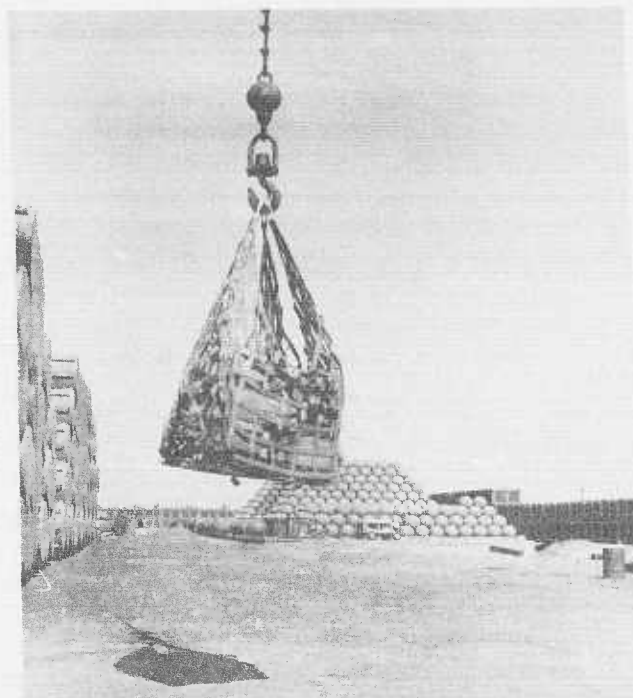


Fig. 18. - Handling of a palletized load in the multi-purpose net.
NSRDF Neg. No. 293-16.

Fig. 19 illustrates how the arrangement of the square meshes of the nets provides uniform bearing for the pallet's bottom deck board. Another pallet load, if necessary, can be superimposed on top of the bottom load, and both can be handled satisfactorily. Loose cargo, especially multi-wall bags, can be carried effectively and efficiently by the multi-purpose nets.

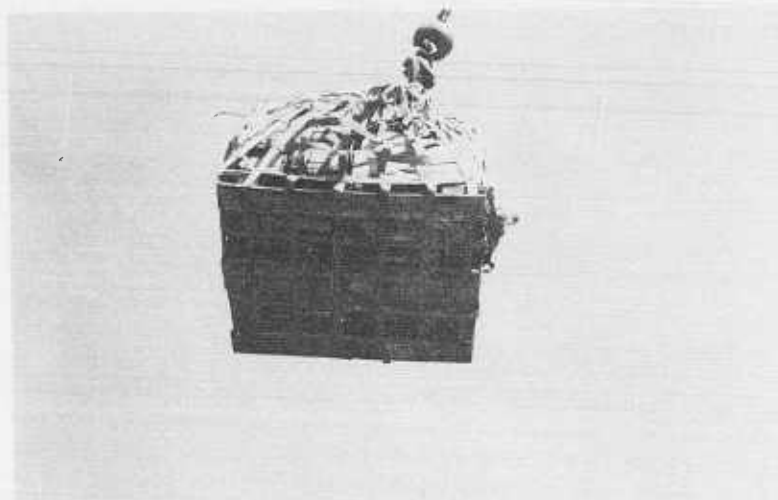


Fig. 19. - Bottom view of a palletized load in the multi-purpose net. NSRDF Neg. No. 293-17.

Nylon Webbing Sling Test

To extend the functional application of the multi-purpose net into other fields of employment, a multi-purpose nylon webbing sling was developed as a supplementary accessory. Its principal functions, when used with the nets, are as (1) attachable beackets to increase the net's cubic capacity, (2) reeving line to couple nets, (3) lashing to close and secure the nets. Other functions which are not directly connected with the nets, are as (1) pallet sling, (2) pipe sling, (3) platform sling, and (4) lashing for air delivery pallet boxes.

The development of the webbing sling embodies a new concept of bonding webbing joints with adhesives. Although experimental work is still continuing, the sling, illustrated in Fig. 20, was developed for demonstration purposes to verify its practicability. Special latex cement was used in the construction of the sling, and tests indicated that the tensile strength of the bonded webbing was at least equal to stitched and riveted joints. This particular sling is 15 feet long, with a 3,000 pound S.W.L. safety hook at each end. The theoretical breaking strength of the sling is about 12,000 pounds, achieved by lapping and cementing a

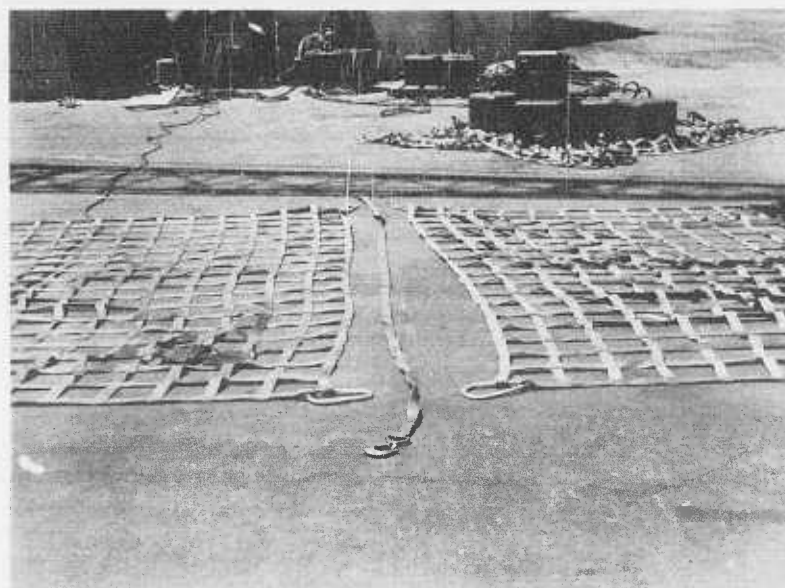


Fig. 20. - Multi-purpose nylon webbing sling. NSRDF Neg. No. 293-3.

30 foot length of 6,000 pound breaking strength webbing. Cemented type slings have only been used experimentally at the Naval Supply Research and Development Facility, and have not yet been sent to the Fleet for evaluation.

The static load test using five 1,000 pound blocks shackled to the net's frame, as shown in Fig. 21, was devised to demonstrate the feasibility of employing the nylon webbing sling as a reeving, or coupling line for nets. This coupling of nets can be used to assemble: save-all, flexible staging, debarkation and safety nets.

As an example of the type of application that can be made with the nylon webbing sling, the USS BENNINGTON (CVA-20) proposes to use 12 multi-purpose nets coupled at the frames, forming a large staging 36 x 48 feet. This would be rigged under the superstructure of the overhang portion of the flight deck. Slender steel rods, 3 feet long with hook bent at each end, engage the superstructure's pad eyes and the nets' meshes at every 6 feet spacing, thus developing a flat working platform for working parties to perform necessary maintenance.

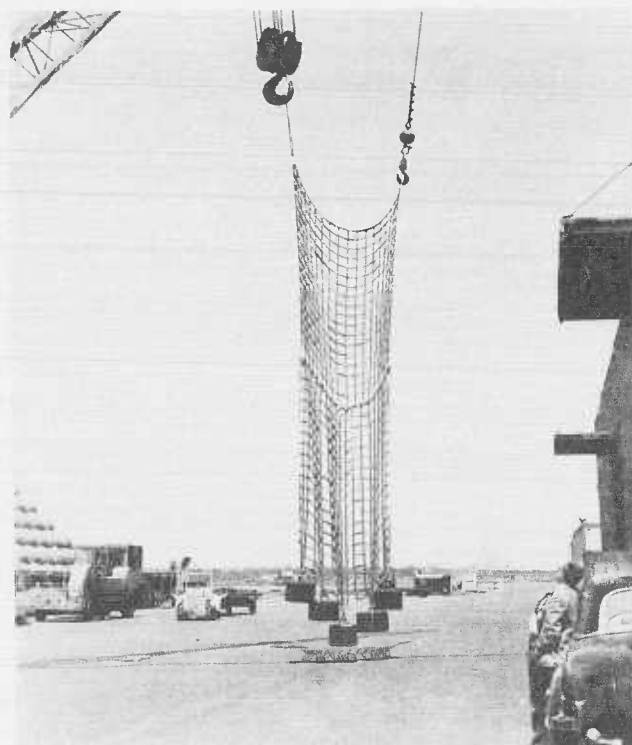


Fig. 21. - Static load test on married nets. NSRDF Neg. No. 293-2.

FINDINGS

As a result of the technical tests conducted, it has been determined that the multi-purpose nylon net has superior strength characteristics, has decided weight and cube advantages over conventional manila nets, and should find many diverse applications for Navy use.

CONCLUSIONS

The following conclusions can be drawn from this technical evaluation:

1. The nylon multi-purpose net has one-quarter the cube and one-third the weight of a comparable manila net, can be stowed while wet, and can easily be handled by one man. All these conclusions have been verified by actual tests.

2. The nylon nets have exceptional strength characteristics, from the qualities of the nylon itself and from the nets' unique construction, which are more than sufficient to enable the nets to safely handle extreme loads under severe operating conditions.

3. Results have indicated that the nylon multi-purpose net can find many applications other than cargo handling, for which it was originally designed. Some of these other applications are:

a. Flexible staging and safety nets - Any width or length of staging required to meet specific conditions can be quickly made by marrying the requisite number of nets. In most cases, the combined nets can be rigged and handled without mechanical aids. The USS BENNINGTON (CVA-20) is currently evaluating 12 multi-purpose nets in this application.

One of the principal advantages of the nylon net, when used as a safety net, is the cushioning effect which absorbs a major portion of the impact developed by a falling body, thereby minimizing bodily injury.

b. Save-all - The strength of coupled nets is sufficient to handle any cargo, handled by ship's gear, that may fall into it. Spacing of the meshes is small enough to prevent cargo from falling through. Because of the light weight of combined nets, it can be rapidly rigged and handled manually, and adjustments to compensate for tide conditions can be made quickly and readily. Furthermore, compact bundles can be made for stowage purposes, and it is easier to break out as compared to the conventional wire and manila save-alls.

c. Debarkation - A number of nets can be quickly and effectively assembled to any required length. The horizontal frame and mesh webbings are more than adequate to support any given number of men with heavy field packs. The soft, flexible webbing permits easy and secure grasps for the hands, and affords good bearing for men's feet in all weather conditions.

APPENDIX A

Twelve multi-purpose nylon webbing cargo nets of the type and construction illustrated in Fig. 1 were fabricated and assigned to the USS BENNINGTON (CVA-20) for service evaluation.

The nets were delivered on 19 April 1955, and the results of the evaluation are summarized in the following letter report received from the Commanding Officer of the USS BENNINGTON (CVA-20).

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U.S.S. BENNINGTON (CVA 20)
FLEET POST OFFICE
NEW YORK, NEW YORK

CVA20/05/RCW/do
All
Ser: 1708

24 JUN 1955

From: Commanding Officer, U.S.S. BENNINGTON (CVA-20)
To: Officer in Charge, U.S. Naval Supply Research and
Development Facility
NSD, Bayonne, New Jersey.

Subj: Nylon Webbing Cargo Nets; information concerning

Ref: (a) Officer in Charge, U.S. Naval Supply Research and
Development Facility speed letter, A11/07 (c), SE10/am,
dtd 2 May 1955

Encl: (1) Photographs showing various applications of Nylon Webbing
Cargo Nets.

1. The subject cargo nets were received on board this ship in April of this year. Since that time they have been employed as cargo nets for hoisting aboard supplies and provisions and as flexible staging for maintenance on overhanging areas of the ships superstructure.

2. Although the nylon cargo nets have been used for a relatively short period of time they have proved their value in many ways.

a. For cargo handling they are considered superior to manila nets for the following reasons:

(1) They are lighter in weight which allows for ease of handling, especially when replenishing from motor launches. More man power is required for handling standard manila nets due to their weight and bulk. The nylon nets, which weigh approximately 40 lbs. each, can be handled by one man with little difficulty.

(2) The nylon nets are more compact and can be stowed much easier.

(3) They repel water and do not become bulky and hard to handle when inadvertently subjected to rain or salt water.

b. The nylon nets have been installed as flexible staging for carrying out routine maintenance and upkeep on overhanging areas of the ship's superstructure. This method is particularly effective when painting large unbroken areas of overhanging structure such as the angled deck overhang.

c. This installation was accomplished by installing two wire pennants on each unbroken section of the canted deck overhang, running fore and aft, one at the outboard side of the overhang and the other inboard where the slant of the overhang meets the vertical side of the ship. The nets are then suspended between the pennants by trolleys and the slack taken up to hold the nets close to the overhang. Personnel involved have access to the nets through trap doors installed along the catwalks on the outboard edge of the canted deck. To take up the slack induced by the weight of the personnel in the net, S-shape hooks are suspended from padeyes installed on the overhang and fastened into the net. These hooks are of sufficient length to hold the net approximately three feet from the overhang. To reposition the nets, the S-hooks are removed and the nets are hauled forward and aft along the pennants. This method of carrying out maintenance and upkeep on large overhang areas is considered superior to standard staging.

3. The following are considered to be the advantages and disadvantages in using nets for painting superstructure:

a. Advantages:

(1) After installation a much greater area can be painted using the nets as compared to using standard staging.

(2) Nets are considered safer than standard staging.

(3) The nylon nets are, due to light weight, easier to rig than manila nets.

b. Disadvantages:

CVA20/05/RCW/do
All

(1) Due to the inaccessibility to the under sides of the angled deck it is difficult to rig the nets on the inboard pennant and to secure steadying lines from the net after it has been suspended between the two pennants.

4. During the evaluation period the multi-purpose nylon nets have been used only for loading and off-loading cargo and as flexible staging. It is anticipated they will be used as: (1) save-all nets, (2) lashdown nets, (3) safety nets, (4) man overboard nets, (5) abandon ship nets, and (6) for stowing relatively light weight materials from the hangar deck overhead. During the limited time the nets have been in operational use the following designed properties have been substantiated:

- a. Resistance to abrasive materials.
- b. Sufficient strength to carry heavy loads.
- c. Excellent water resistance.
- d. Relatively simple to clean and maintain.

5. It is felt the nylon multi-purpose nets have proven to be superior to the manila nets during the initial evaluation period. It is recommended the nylon nets be included with manila nets on the Bureau of Ships allowance list.

/s/ Paul Foley, Jr.
PAUL FOLEY, JR.

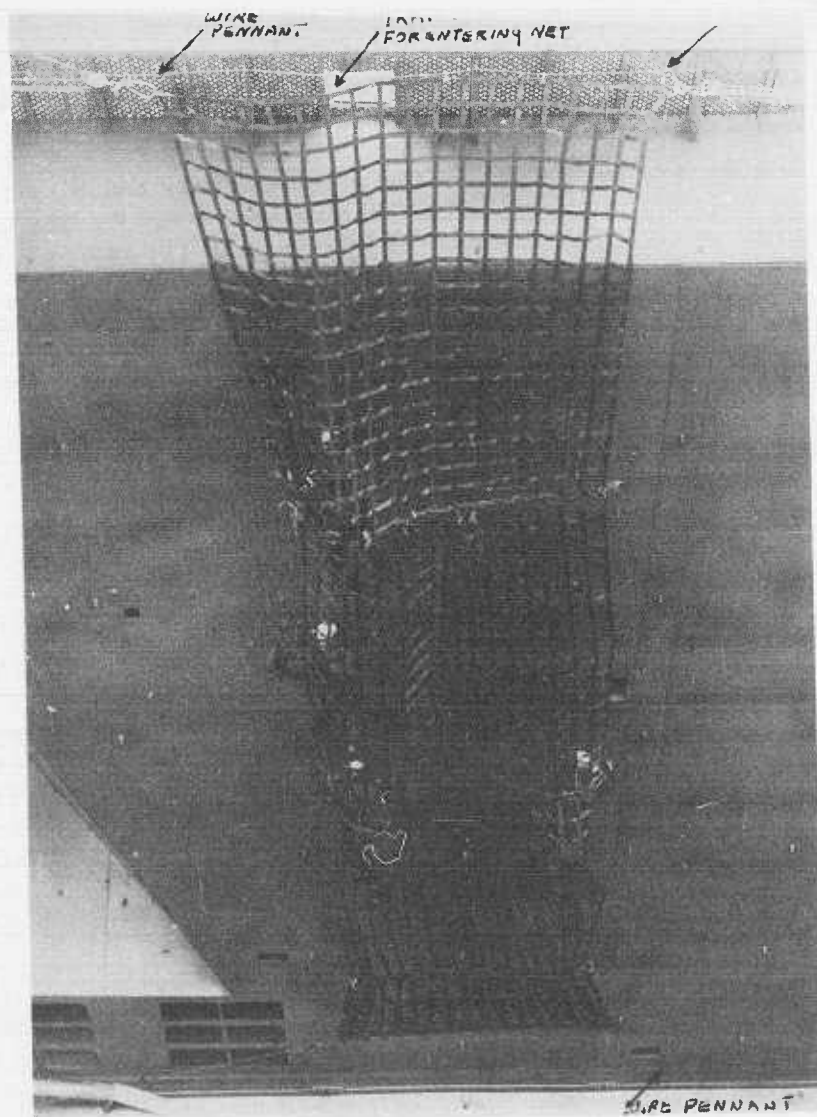


Fig. 22. - Married multi-purpose nylon webbing nets rigged under canted flight deck. Front view. Photo by USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-6.

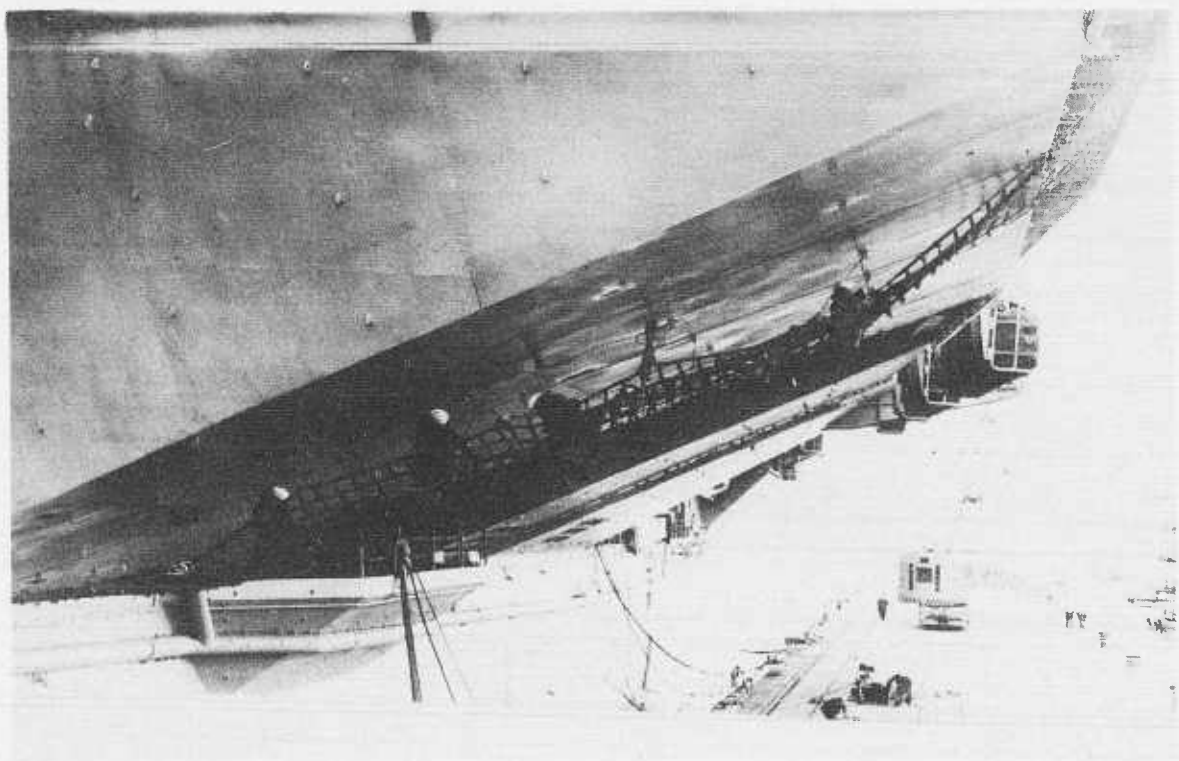


Fig. 23. - Married multi-purpose nets used as flexible staging. Side view. Photo by USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-7.

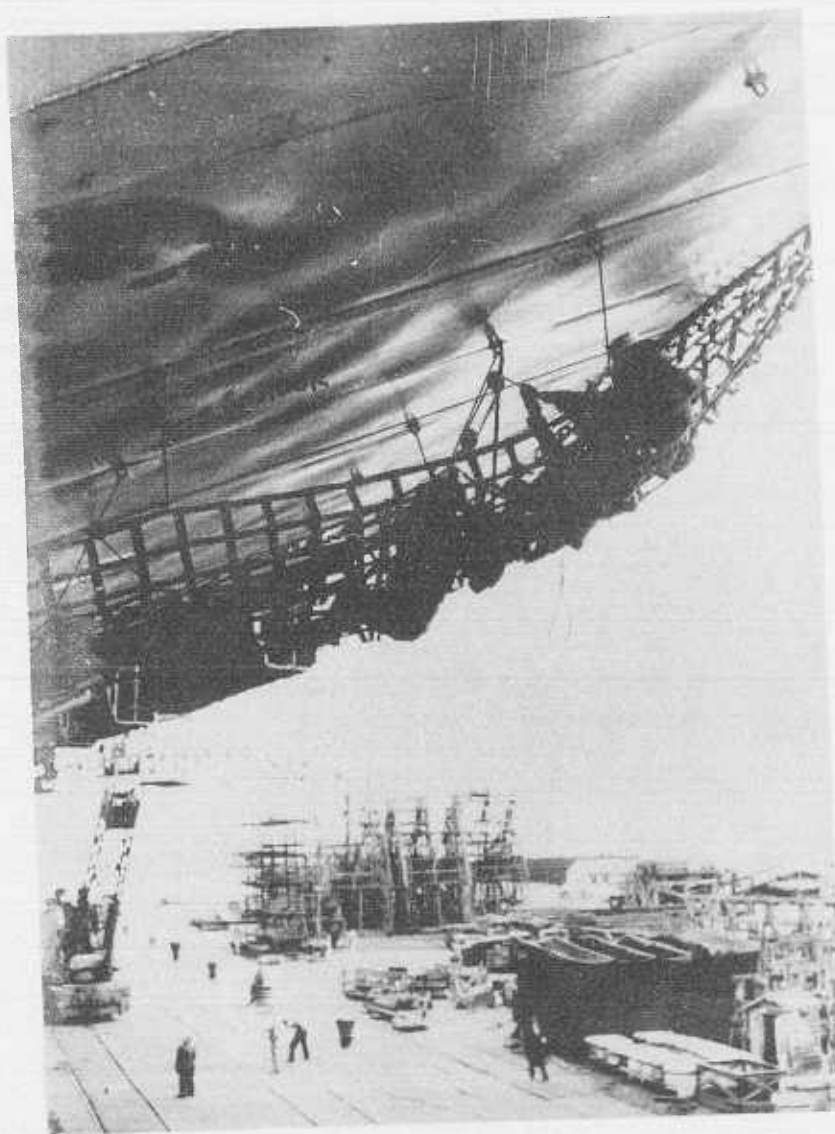


Fig. 24. - Method of rigging flexible staging using S-hooks. Side view. Photo by USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-5.

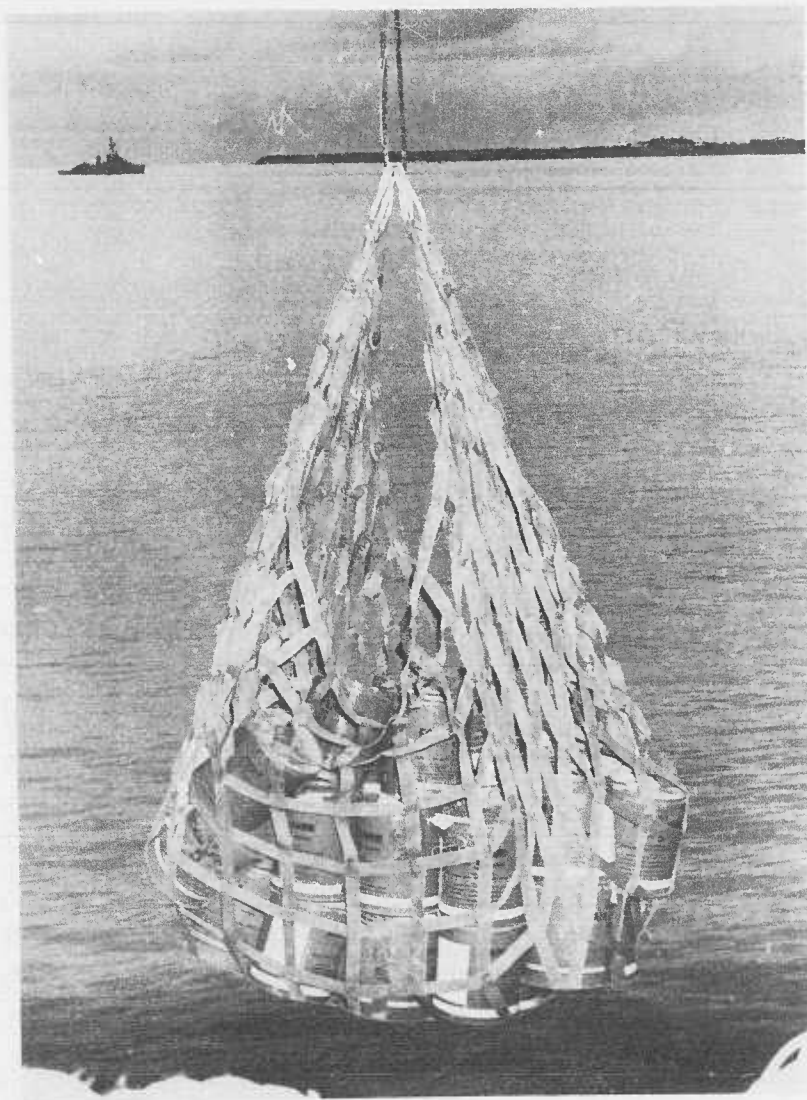


Fig. 25. - Multi-purpose net used for cargo handling of five gallon cans. Photo by USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-1.

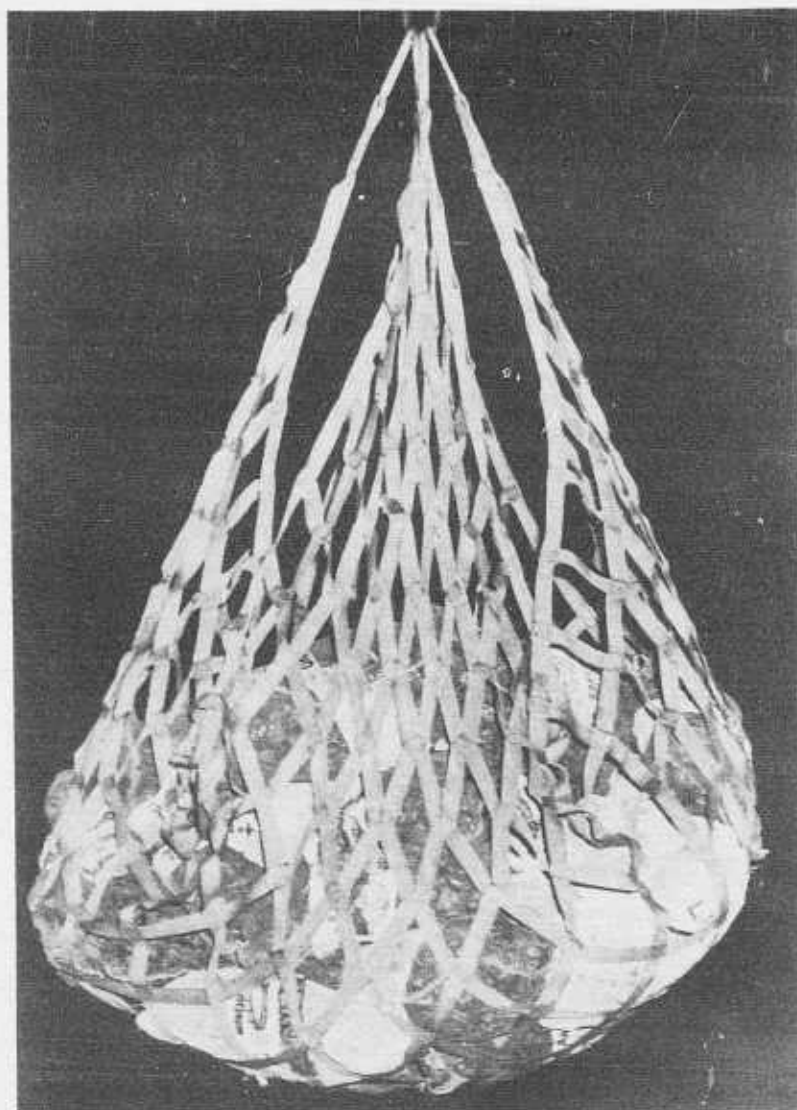


Fig. 26. - Multi-purpose net used for handling of bagged commodities. Photo by USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-4.

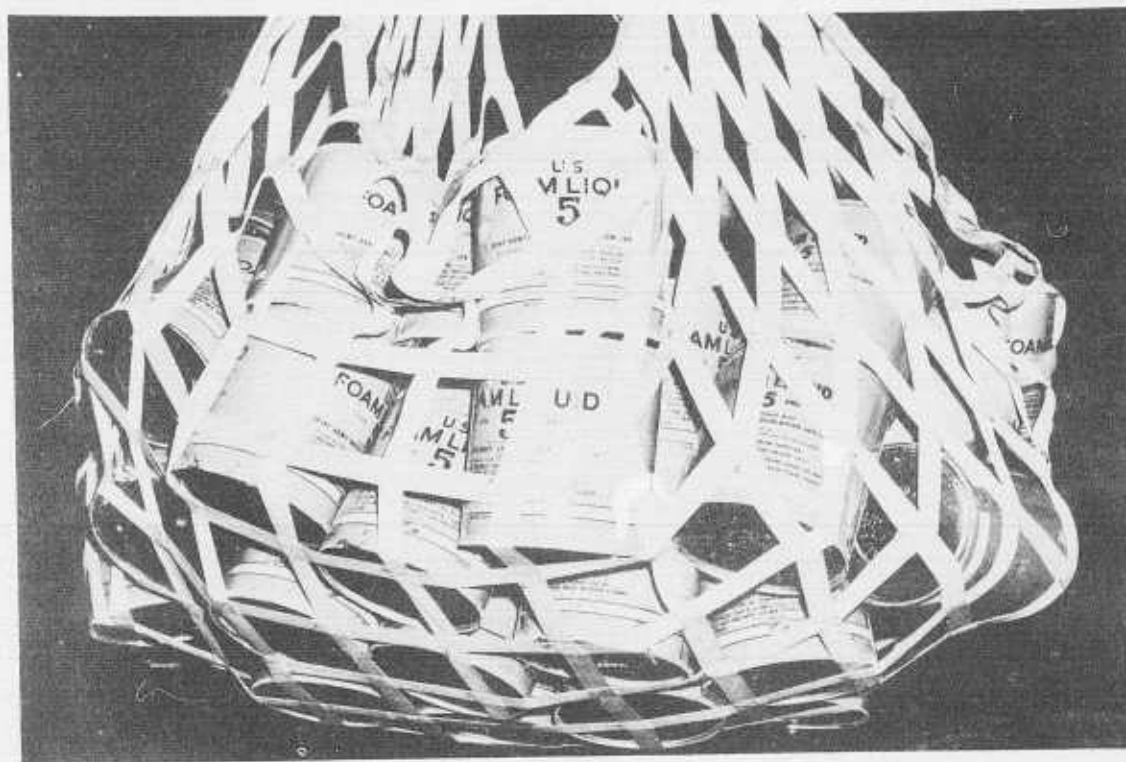


Fig. 27. - Handling of supplies. Side and bottom view. Photo by
USS BENNINGTON (CVA-20). NSRDF Neg. No. 312-3.

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Armed Services Technical Information Agency

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