TRANSPORTATION OF TROOPS AND MATERIEL

BY

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MAJOR CHAUNCEY B. BAKER,

QUARTERMASTER'S DEPARTMENT, UNITED STATES ARMY.

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Read before the Naval War College,

Newport, R.I.,

August 16, 1904.

Contents of this included verbatim in "Handling Troops & Material" book by same author

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INTRODUCTORY.

The maintenance of an army in the field in a thorough state of efficiency is in degree of importance little short of winning victories. In fact the winning of victories, whilst immediately the result of discipline and tactics, is vastly influenced by the state of efficiency of the army, which in turn depends for its efficiency largely upon the state of supplies and equipment, its recruitment and the disposition of the sick, and the facilities that provide for its mobility. These are the subjects that will be entered into in this discussion with you.

If it should appear that details have been too largely entered into, let it be borne in mind that it is often much easier to illustrate by concrete examples than to promulgate general principles; and that it is much easier to follow a parallel case than to develop an original line of action from abstract principles.

It is believed that the commander who stands first to win is the one who has the capacity for seeing farthest into the future and who possesses the means of providing most completely against the unexpected in the little things that cause

delay and uncertainty. Viewing conditions along these lines it is believed that you will bear patiently while going over what may seem some very trivial matters. The importance of making full provision for the transport service in all its branches before taking the field has been too fully exemplified within recent years to need further emphasis at this time. After a long period of peace, details along all lines grow dim if they are not constantly in use or kept always in mind in peace training. And when it is remembered how very sudden is the transition from peace to war, it cannot fail to be impressed upon you that the necessity of working over even the minor, and what may seem non-essential details, is very great.

TROOPS, DEPOTS AND SUPPLIES.

TROOPS. - At the beginning of hostilities between this nation and any other the army will be found, as at the outset of the Spanish war, to consist of many small bodies of troops comprising from one to twenty-five companies at each location, scattered at various small posts throughout the country. There will be also this new feature, that a considerable portion of the forces will be in service at distant points beyond the sea, in our insular dependencies.

These organizations will probably be on a basis of from fifty to sixty per centum of war footing, rendering necessary the supply of recruits to bring them up to authorized strength,

possibly after the declaration of hostilities, as was the case in 1898.

The regular army thus increased will be supplemented by enlisting volunteers, or by calling out the militia, and all of these troops must be gathered from every quarter, and placed in conveniently situated camps of concentration, for equipment, instruction and discipline, before it will be possible to use them in the field.

From the concentration camps transportation must be furnished to the vicinity of active service, and further provision must then be made for bringing up recruits and reinforcements, properly transferring the sick and wounded, and for maintaining the ceaseless movement, back and forth, of the tide of human life that puts the healthy and vigorous to the front and withdraws the wasted and worn to the rear.

The policy pursued in providing troops for the national defense is one that does not interest us here, but the question that does concern us is the means employed to bring together and transport the detachments and organizations which will finally make up the body of the army.

SUPPLY. - In treating of the subject of the transport of troops and materiel it is altogether impossible to separate it entirely from the question of supply. The two, together with the movement of armies, constitute that portion of the

art of war known as Logistics. No effort will be made in this paper to treat particularly, or even generally, of the subject of supply, further than is necessary to show the methods of distribution, and the principles upon which are established general depots, sub-depots and field depots.

In the military service, stores, supplies and munitions of war of whatever sort, are, as a rule, collected in large depots, and thence distributed to lesser depots for issue to the troops.

DEPOTS. - In an active campaign central depots will be located in a safe position in the interior of the home country. Sub-depots will be established, and advanced as the line of contact is pushed forward. This will result in time, perhaps, in the establishment of a chain of depots, some of which will be abandoned as the army proceeds or changes position, and others will be located in new positions, regulated by the character of the line of communications and the positions of the corps or other units of the army.

If the army proceeds to over-sea service, a depot will be established at the port of embarkation, and another at the point of disembarkation. The magnitude of these depots and the quantities and the character of supplies handled will depend upon the strength of the army, and the character of the campaign.

It is customary to accumulate in the central depots large

quantities of stores and supplies either manufactured by the government or purchased under contract. As rapidly as required for use at the front, these stores and supplies are forwarded to the distributing depots, usually located at the base of operations, and thence on to advance depots, temporary depots, or flying depots in the immediate vicinity of the troops; or possibly, directly into the hands of troops; due care always being taken to avoid accumulating a surplus of the class of stores that deteriorate in storage, and yet always maintaining a sufficient quantity so that no form of disaster will leave the army destitute of supplies.

During the recent war with Spain, the central depots of the various supply departments of the army remained practically as in times of peace - usually near great centers of industry, where large quantities of all kinds of supplies could be readily procured to advantage, or where extensive manufacturing plants existed for providing arms, ammunition, clothing, etc. Immediately upon the encampment of a large body of troops in any locality, a secondary depot was established at that point for their supply. As troops were embarked from Port Tampa for Santiago, general supplies for the corps were loaded with them. On landing in Cuba a sea base was immediately established, the principal adjuncts of which were the depots of the supply departments from which necessary issues were made,

and temporary depots established and supplied, as the troops moved forward. The same method was pursued as to our troops in China, as well as with the forces operating against the insurgents in the Philippines.

In making the preliminary arrangements for the supply of an army, it is of the utmost importance that the supplies, stores and materiel to be furnished, bear a correct relation to the number of troops and the character of the service. It is simply a double burden to transport cumbersome machinery and appliances of doubtful utility, and leave behind necessaries that could well take their place. It has sometimes happened that the burden of useless plunder taken with an army has been more detrimental to its movements than the lack of other essential supplies necessarily left behind.

It is of the first importance that the commanding general shall be able to calculate upon having certain supplies in the hands of his troops at a given time, and failure to accomplish this will inevitably result in great hardship, if not in positive disaster, and the usual result of such failure is to tie the forces to the ground until the supplies can be brought up.

In order to accomplish this end, such methods should be adopted as will result in transmitting the supplies from the central or base depots, and placing them in the hands of the

troops with the greatest certainty, the least degree of confusion, and with the most directness.

Remote from the front, the question of transportation and supply is comparatively a simple one. The magnitude of the quantities of supplies and the usually limited time are the only serious considerations. Difficulties, however, increase with progress towards the point of contact, and finally to get the supplies upon the firing line, both of ammunition and subsistence, with absolute sureness and without confusion, is the most difficult of all the problems of transportation.

TRANSPORT. - To effect this chain of communication, from the central depots to the final point of contact with the enemy, is the duty of the transportation service of the Quartermaster's Department, and in the prosecution of this work, as well as in the ordinary service of the army in times of peace, every known device for transport is made use of, the various classes of which may be grouped as follows:

A. WATER TRANSPORTATION:
   1. River steamers and other vessels,
   2. Tugs, launches, lighters, barges, cascoes, lorchas, etc., for harbor service,
   3. Wharf facilities,
   4. Ocean going vessels.

B. LAND TRANSPORTATION:
   1. Rail,
   2. Wheel,
   3. Pack (either animal or by coolie bearers),
   4. And in the Alaskan service, by means of dogs and sledges.

5. Traction engines and automobiles.

According to the manner in which the transportation is provided and the extent to which it is controlled by military authority, it may properly be styled as:

1. Military transportation: That which is the property of, or chartered by, the government, and wholly under military control.

2. Auxiliary Transportation: That which is hired or chartered for the special service required.

Any or all classes of transportation may be provided from that owned by the government, or from auxiliary transportation procured by engagement under formal or informal contract or charter, by requisition when the country in which the army is operating will be called upon to furnish it, by seizure or force, or by capture from the enemy.

The methods of procuring transportation under formal or informal contract will vary according to the exigencies under which its provision becomes necessary. In peace, when ample time is available, proposals may be advertised for, and full competition may thus be had, or the service may be immediately required, in which event it may be had by prompt offer and acceptance as is common amongst business men.

Ocean transportation may either be owned by the government, or chartered for military purposes, under a great variety of conditions, according to the most practicable method at the

time. Vessels may be engaged to carry troops and supplies without recourse to charter or formal contract. The same is true of railroads and other classes of transportation lines, the officer acting for the government making use of the tariffs in effect with the general public. In some cases where the government has owned its railway or equipment, it has engaged in passenger and freight transportation as would any private corporation. Similar means are used for providing wheel and pack transportation.

All of these methods are provided for under the regulations of the army.

The officer engaging service by contract will, as a rule, be the officer responsible for the disbursement of the funds paying the transportation accounts, and the methods he pursues should be wise and economical for the government, but at the same time such as to produce the best results to the service, with the required degree of promptness. The character of his contracts will be subject to the careful scrutiny and approval of his commanding officer and the accounting officers of the Treasury, and the necessity of exercising wise business judgment is a matter as personal to him as it is important to his government.

BASE AND LINES OF COMMUNICATION.

In order to have a full comprehension of the subjects of supply and transportation it is necessary to consider them in connection with the base and the lines of communications and in their relation to the other staff functions under control of the commanding general.

For each army in the field or expeditionary force a general officer will be placed in command of the base and the lines of communication. His staff will consist of the following subordinate chiefs or so many as may be required:

A. A commander at the base - line officer.

B. A chief of transportation - an officer of the Quartermaster's Department.

C. A chief of the railway service - an officer of the Quartermaster's Department.

D. A chief of transport by water - an officer of the Quartermaster's Department.

E. A chief commissary of base and line of communications - an officer of the Subsistence Department.

F. A chief ordnance officer - an officer of the Ordnance Department.

G. A chief paymaster - an officer of the Pay Department.

H. A chief medical officer - an officer of the Medical Department.

I. A chief of telegraph and telephone service - an officer of the Signal Corps.

K. A provost marshal of base and lines of communication - usually a line officer.

In many cases it will no doubt be found practicable to combine to advantage two or more functions in the same staff officer, who on his part will be provided with the necessary assistants to properly attend to details, e. g. as in San Francisco at this time the Depot Quartermaster performs the duties of Chief of Transportation, Chief of Railway Service, and Chief of Transport by Water.

The matters pertaining to administration and protection of the base and lines of communication devolve upon the commander of the base and incidentally upon the various staff officers attached thereto.

When the line of communication crosses the seas the protection of the line of communication devolves wholly upon the Navy and the manner in which that shall be accomplished is a question that is left altogether to that Department. The completeness with which that function has lately been performed has been the subject of congratulation and caused an outburst of popular national pride, the like of which has not been known for more than a generation.

RIVER TRANSPORT.

Formerly, the rivers which traverse our country were quite generally used as a means of communication, and for the

transportation of troops and military supplies. This was particularly the case during the Civil War, when the Potomac, Tennessee, Ohio, Cumberland, Missouri and Mississippi were especially made use of as great arteries by means of which troops, stores and supplies were sent to the front, and the sick and wounded, broken munitions of war, and crippled animals were carried to the rear. These means of transportation were particularly advantageous inasmuch as they could be wholly controlled by military authority, whereas railroads, owned by private corporations and operated by civil officials, did not always lend themselves so readily to orders emanating from the military establishment. In addition, the vessels on these waterways were far less subject to annoyance and damage by the enemy than were railroads connecting important points, which were constantly the object of raids. River steamers were as a rule, when in dangerous territory, convoyed by river gunboats, mostly improvised vessels that served very well as a defense against ordinary attacks by land forces.

The question of embarkation, disembarkation and shipping troops and supplies by river steamers and other craft is greatly simplified as compared with similar traffic on ocean going vessels. The means employed for loading and unloading at wharves are less varied and the cargo is always taken through ports instead of through hatchways, which greatly facilitates

the loading and discharging.

In addition the certainty of encountering fair weather on the trip and the frequent opportunity to land, removes the necessity to provide many of the features required in ocean going vessels.

The greatest of the expeditions by water during the Civil War was that of General McClellan which resulted in transferring an army of 120,000 men, with all of its materiel of war, artillery, cavalry, munitions, baggage, trains, and equipage, from the lines in front of Washington to the lower Chesapeake; and after the reverses before Richmond, were again withdrawn and reestablished in front of Washington by the means gotten together by the Quartermaster's Department, which purchased and chartered every available vessel on the Atlantic Coast and took into its service all vessels as rapidly as they could be completed.

JUNKS. - The particular kind of river craft used will, of course, depend upon the character of the waters, and, as in all other classes of transportation, that native to the waters will be used whenever available.

As an illustration of the adaptability of our service to new conditions, I will quote from the report of General Humphrey, chief quartermaster of the expeditionary force to Pekin:

"Our forces at Pekin received their supplies from Taku,

thence to Tientsin by junk, 40 miles, thence 105 miles to Tungchow by junks, for the remaining 15 miles they were sent to Pekin by wagon. The single line railroad was little used by our troops as it was kept busy serving the other nations.

"It was necessary for the junks to reach the head of navigation before the ice covered the river. The river too was very shallow and constantly falling.

"The junks were very light draft, about two feet,and were poled in both directions. It took about ten days to make the round trip from Tientsin to Tungchow.

"The United States was the only one of the allied forces (and this contrast was marked) that seemed to have no difficulty in securing all the junks required for the transportation of supplies. The reason for this is to be found in the uniform good treatment that the men received, the honest dealing afforded the people, and the fact that all creditors were paid promptly in cash."

HARBOR SERVICE BOATS.

The harbor service boats provided for prior to and during the Spanish-American war were of almost every pattern of tug, lighter and barge afloat. This Department has now developed a series of boats for harbor service, which it is believed will be found wholly suitable for the service required,

and equally so in time of peace as in war. These boats are intended to serve the military stations and batteries in and about our harbors. They are divided into three classes according to their capacity, and are called first, second, and third class harbor boats. They are arranged for both passenger and freight service, and will stand a reasonable amount of rough weather.

In case of an expeditionary force along the coast or to the nearby islands, it is believed that the harbor boats of the first and second class would answer exceptionally well as lighters for troops and stores, and being wholly under the control of the Department would possess many advantages over hired service of this character.

TUGS, LIGHTERS, BARGES, CASCOES, ETC.

For the prompt and safe embarkation of an expeditionary force in this country it will not be difficult to procure by hire the necessary means in wharfage facilities, tugs, lighters, waterboats, etc.

When the force, however, arrives at its destination, on hostile shores, another condition of affairs is presented.

For harbor service and to assist in expeditiously unloading such a force from transports, both passengers and freight, it will be necessary to call into requisition all classes of harbor

boats available, including tugs, launches, lighters, barges, cascoes, lorchas, etc.

It will never, however, be reasonable to expect to find such auxiliary means ready at hand and available for the use of an expeditionary force, no matter how friendly the shores may be. The only case when reliance should be placed in such means is when conditions have been so favorable that an officer can have been sent in advance to a friendly port to canvas the means obtainable to assist in discharging vessels of the passengers and cargo. In all other cases full and sufficient means for setting the troops and cargo ashore should accompany the expedition. Tugs, lighters and barges should travel under their own steam, and of course such selections should be made as will give vessels with sufficient speed not to unduly retard the movement. Our experience has shown that there should be no attempt to tow lighters, unless the conditions of distance, season, state of the enemy, the necessities of the case, etc., should render that course unavoidable. Full use should be made of the launches and ships' boats if necessary.

Great advantage will be found in using the owned harbor boats of the government on such an expedition, rather than hired or chartered boats. The masters of the latter class will be far more interested in the safety of their owners' property than in rendering efficient service. For that and other reasons all available owned harbor boats should be withdrawn to accompany the

expedition, and their service temporarily replaced by hired or chartered boats.

Both the British and Germans have undertaken to provide for such service in a measure by the use of sectional vessels.

Our government has built one experimental vessel of this character with a displacement of about 72 tons. This experiment has been sufficiently satisfactory to warrant the belief that it is without question a valuable adjunct under conditions favorable to putting it together.

WHARVES, LANDING AND LOADING FACILITIES.

With an expeditionary force by sea, when uncertainty exists as to the condition or existence of wharves, or as to the point of disembarkation, to take along such means of constructing or repairing temporary landing places, as the means at hand or available will permit, including piles and the means of sinking them, planking, bolts, spikes, rope, etc., for repairs to wharves, and also for building ramps and floats and other facilities for disembarkation. At Porto Rico the pontoon bridge train was used to make a floating wharf, and over it were landed something more than a thousand animals and most of the heavy materiel of the army.

As a rule, however, once a harbor is gained, landing facilities will be found to be available.

The earliest reliance, however, is to be placed in the

means carried with the expedition, and these are to be supplemented with every facility the waters afford, and ultimately the local means will in most cases become the chief dependence. e. g. On the China relief expedition full provision was made by carrying the necessary timbers and material for the construction of the barges, and flat lighters required for landing our stores and supplies at Taku, and sending them up the river by our own means, but before these barges and lighters were completed native junks and other means in abundance were available for the service.

Platforms on pontoons, or casks, or stages resting on boats, can be used as an improvised means of landing troops and stores in protected harbors. The connection with the shore may be made, if need be, by means of a trestle bridge.

Separate landing places should be set aside as far as practicable for the troops of the various arms, and for stores and supplies. The supplies on being landed should at once be separated and sent to their proper storage places.

Liberal use should be made of placards so that all necessary information can be had concerning landing and storage places without the necessity of asking questions; and if facilities can be provided separate wharves should be set aside for receiving each class of stores. As for example, at Alexandria, Virginia, during the Civil War, there were separate wharves for forage,

clothing, horses, mules, camp equipage, hospital equipment, ordnance and ammunition, railroad and bridge material, etc.

TRANSPORT OF TROOPS AND IMPEDIMENTA ON OCEAN GOING VESSELS.

Troops, animals and supplies are carried over sea (1) on commercial vessels under special contract or under ordinary public tariff, and (2) on the owned and chartered vessels of the government.

The transportation furnished by commercial vessels, either under special contract or ordinary commercial tariff, will, of course, vary in importance from the carriage of one man or a single package to the full capacity of the vessel.

The method adopted for obtaining this transportation is by use of transportation request and bill of lading furnished the carrier by an agent or officer of the department. Such request or bill of lading will be issued upon invoices and receipts in the case of property, or proper travel order in the case of men, due authority being cited in each instance.

Such carriage will not differ in any essential respects from that afforded the public, but as the bulk of water travel of true military aspect will always be by owned or chartered vessels, the particular measures to be adopted have been given attention under that head.

Under ordinary conditions, even in cases where established

commercial lines exist connecting points between which much traffic is to move in times of peace, commercial lines fail to furnish the measure of comfort, care of the sick, and convenience afforded for the soldier upon owned transports, nor would the military requirements be adequately met, if the schedule of the vessel and facilities provided were made subservient to commercial interest.

Furthermore, carefully kept statistics on this question disclose the fact that the ordinary operations of the present transport service show a very material saving to the Government as compared with service of equal merit furnished by commercial lines. Under the urgency of war conditions where economy cannot always be considered, and military requirements of dispatch and certainty become of the first importance, not only does the cost of the transport service materially increase, but under like conditions a like result would accrue in any other class of undertaking.

THE ARMY TRANSPORT SERVICE.

The Army Transport Service, comprising both the owned and chartered vessels of the Government, is engaged in transferring troops and supplies between home ports and over sea points. It is assimilated in its methods of administration to those of commercial steamship lines as far as practicable,

such modifications being made as are necessary to adapt it to military requirements.

The Army Transport Service is conducted by its own officers under the supervision of the Quartermaster General. It is a branch of the transportation of the army practically independent of the other branches of the department; such matters, however, as relate to the medical and subsistence departments are under the control of those bureaus.

There are two home ports for the service, one at San Francisco and the other in New York. Each of these ports is provided with suitable terminal facilities, including wharfage for ships and storage for freight and with a suitable force of employees to conduct the business of the service. The equipment of both these offices has been materially reduced with the decreased requirements of the transport service. That at the port of New York is now practically on paper.

The general organization, personnel and duties of the army transport service under the regulations are as follows:

1. General Superintendent.
2. Assistant to General Superintendent.
3. Subsistence Superintendent.
4. Medical Superintendent.
5. Transport Quartermasters and transport Commissaries.
6. Transport Surgeons.
7. Marine Superintendent.

8. Assistant to Marine Superintendent.
9. Superintending Engineer.
10. Assistant to Superintending Engineer.
11. Port Steward.
12. Quartermaster's Purveyor.
13. Chief Stevedore.
14. Army transport agents at over-sea ports

The transport regulations provide for the regulation of the duties of each of these officials, as well as the duties of all the ship's officers and the conduct of troops on shipboard in such a manner that there can be no conflict of authority and no interferance of duties and no divided responsibilities.

MOVEMENTS BY SEA.

EMBARKATION. - The transport regulations provide for the embarkation, disembarkation, and conduct of troops on board transports.

For conveyance by ship, whether of men or stores, application will be made to the General Superintendent of Transport Service, except under certain circumstances, when the authority of the Quartermaster General will be required.

The statement of the commanding officer accompanying the application should show fully all persons for whom transportation is required. Any changes in numbers after report has

been made should be reported by telegraph. The quantity and character of baggage will also be reported to the General Superintendent. The commanding officer of the troops to be embarked should send a staff officer to precede the command to the port of embarkation, to arrange with the General Superintendent or other officer in charge of transport service for proper assignment of quarters on board the transport. The staff officer should at the same time consult with the transport quartermaster as to the number and stations of the sentinels during embarkation.

Commanding officers whose regiments receive orders to prepare for over-sea service will take proper precaution to see that all concerned are familiar with the essential points in the transport regulations covering the transportation of troops.

The arrival of the troops at the point of embarkation should be so timed when organizations are being dispatched singly that they can be directly embarked aboard the transport without the necessity of making a temporary camp or bivouac.

All fatigue details necessary to carry out the provisions of transport regulations should be made previous to embarkation, and all members of such fatigue details should be fully instructed as to their responsibilities and duties in advance, so as to avoid confusion at a time when it is difficult to promulgate orders to a command in process of embarkation. These fatigue details should be amply large to handle the baggage, etc.,

in the most expeditious manner possible. They should be well officered and should not be permitted to loaf at their duties. The work of the fatigue details should be performed under the supervision of an officer.

The ammunition will be loaded first and put into the magazine, which will be locked.

If the heavy baggage is accompanying the command it should be sent on board in advance of and kept separate from the field equipage, if the latter is to be used immediately upon landing. If the movement is a mere change of station, however, it is not necessary to separate the two classes of baggage, except so far as to make the light wagons first available.

The property and baggage of each company will be stored separately and should be so stored as to be conveniently reached immediately on disembarkation.

The baggage of troops should be securely packed and carefully marked with the name of the organization and the destination if known. No package should weigh more than 150 pounds.

Such baggage as will be allowed in staterooms, as well as all other freight and baggage, should be sent on board in advance of the troops.

The commanding officer should take pains to come to a full understanding with the transport quartermaster regarding arrangements for loading and embarkation. Failure to have a

complete understanding in the beginning will surely result in a play at cross purposes with the result that annoying delays will occur.

He should have a reconnoissance made of roads and streets leading to the wharf in order that troops can be marched to the proper point without interfering with other traffic.

All sentinels should be posted aboard the vessel before the troops are embarked, and should be thoroughly instructed by the new officer of the day, assisted if necessary by the transport quartermaster. Troops should be embarked by companies, packs and equipments properly stowed and rifles placed in racks. Troops once located in quarters should not be permitted to leave them until all are embarked.

The manner in which this is performed is as follows:

The berths on the transports are numbered consecutively from one up. The number will be found tied to each bunk. Prior to embarkation the commanding officer of the troops will be furnished with a diagram of the troop compartments showing the numbers of the berths, and he will make his assignments by companies accordingly. The troops will not be given individual numbers before they are marched aboard and located, but will take the number found on the berth at which they are placed when marched aboard. The knapsack containing the necessary articles of equipment to be used on the voyage and immediately upon disembarkation is hung on a hook at the head of the bunk

provided for that purpose.

After all the troops are aboard and knapsacks are stowed the arms are placed in the arm racks.

Early opportunity should be taken to furnish necessary instructions as to messing, bathing, latrines, washrooms, etc., and it is considered desirable that these instructions be given the men before they leave their stations at bunks. The duty of instruction upon these points falls upon company commanders.

The embarkation should be so timed that it shall be accomplished if possible between regular meals. The command should be on board at the next regular meal hour. The meal will be served from the ship's galley.

Commanding officers are held responsible that nothing but authorized baggage and persons of their commands are taken on board.

Proper returns of the troops will be made by the commanding officer before sailing. Commanding officers will be held responsible for the discipline and movements of the men of their commands. They will not be permitted to leave the ship without due authority.

CONDUCT ON BOARD. - A bulletin board will display extracts from the transport regulations relative to the discipline and conduct of the troops on board.

Officers and noncommissioned officers are charged with proper police and cleanliness of the parts of the ship occupied

by their men and with the enforcement of the regulations relating to the conduct of enlisted men.

A noncommissioned officer will be in charge and at all times present and alert in the quarters of each company.

Officers and enlisted men will not make complaints to officers of the ship or direct to the crew, and will not enter into controversies with them concerning deficiencies of service, equipment or supplies. If there is sufficient reason for such complaints they will be made by officers to the police officer, the mess officer, or the officer of the day according to circumstances. In exceptional cases the commanding officer may be addressed. Casuals, recruits and convalescents on board will be organized into temporary companies. Officers and noncommissioned officers will be detailed for their control.

THE COMMANDING OFFICER. - The commanding officer of the troops embarked will be responsible for the discipline and conduct of all the troops on board the transport, including such casual, discharged and furloughed soldiers as may be given transportation aboard the ship; he will also be responsible that the transport regulations concerning such passengers are understood and obeyed. He will also be responsible for the proper cleansing of quarters occupied by troops including mess decks.

The commanding officer of troops is bound to pay attention to any representation for the good of the service made by the

master, and to remember that the master is responsible in all matters connected with the safety of the ship and the passengers.

In all matters of navigation and in emergencies in the control of the ship, the authority of the master of the ship is absolute.

The commanding officer is charged under no circumstances to interfere with the duties and prerogatives of the transport quartermaster and master, and under no circumstances to interfere with the control of the ship. The routine of the troops on board, and the uniform to be worn on deck, is to be prescribed by the officer commanding the troops. The commanding officer, accompanied by the transport quartermaster, the officer of the day, the police officer, the surgeon and the master, will inspect the berth and mess decks, latrines, bathrooms, hospital galleys, etc., each day at a fixed hour.

Prior to disembarkation, return will be furnished to the transport quartermaster showing the number of persons, all ranks, carried to destination.

THE POLICE OFFICER. - A suitable officer of the command will be detailed by the commanding officer as police officer who will have general charge of those parts of the ship occupied by the troops especially the berths, latrines and mess decks.

He will see that the troop and mess decks are swept clean each morning and after each meal. He will accompany the commanding officer daily on his inspection.

Suitable noncommissioned officers and privates will be detailed as his assistants. Minor matters relating to troops, or discipline, will be reported by police officers to the immediate commanders of those affected.

Such commanders will report any minor defects regarding ventilating, washroom, or other apparatus to the police officer who will report the matter to the transport quartermaster. Such reports will not be made direct to any of the ship's officers or crew.

OFFICER IN CHARGE OF MESS. - A suitable officer will be placed in charge of the enlisted men's mess; he will be detailed by the commanding officer before embarkation. All orders affecting the messing of the men will be given to the transport commissary by the officer commanding the troops direct, or through the officer in charge of the mess. The mess officer in consultation with the transport commissary will draw up a scheme for the service of messes in accordance with the facilities of the ship; after approval by the commanding officer this plan will be published in orders.

Such noncommissioned officers and men as assistants to the cooks, bakers and waiters, as may be necessary, will be detailed on special duty.

ROUTINE ON BOARD. - The commanding officer will cause to be published the list of calls affecting the troops on board. At reveille the men will stand at attention at their bunks, and immediately afterward their bedding will be cared for under regulations to be prescribed by the police officer, and not in violation of the transport regulations. The berth decks of the men will be cleared each morning of all persons, save those detailed to clean them, between hours provided in transport regulations. The commanding officer of the troops will prescribe the hours for daily exercise or drill. The command will be exercised in such manner as to best utilize the space available. Bathing facilities will be fully utilized under regulations prescribed by the commanding officer of the troops. Inspection of troops will be held by company. Inspection in underwear should be held weekly or oftener if necessary, at which inspection the surgeon should be present.

THE GUARD. - The detail for the guard will consist of an officer of the day, one or more officers of the guard, and such number of noncommissioned officers, trumpeters and privates as necessary.

A separate place will be assigned for the guard. Guard duty on ship board will follow the principles laid down in the manual of guard duty with such modifications as are rendered necessary by environment.

In general the duties of the guard will be to preserve

order, protect property, deny access to certain portions of the ship, and to assist in enforcing the regulations governing the troops.

OFFICER OF THE DAY. - The officer of the day is responsible that the troops preserve good order and comply with the regulations governing troops on shipboard. He will post sentries to effect this end, and be responsible that sentries are properly posted and instructed; give particular attention that the troops wear the prescribed uniform, that there is no disorder at the serving of the meals, airing of bedding, bathing, etc., and that they are excluded at all times from forbidden parts of the ship. Will see that meals are served to troops at proper times, attend when bedding is aired, take means to prevent introduction or use of intoxicating liquor, will inspect between decks after taps when necessary.

THE OFFICER OF THE GUARD. - If there are two officers of the guard, one will always be present with it and on the alert. If there is but one he will leave the senior noncommissioned officer in charge during absolutely necessary absences. The senior officer of the guard will command the guard, and assist the officer of the day in the execution of duties required of him, and will be responsible for the posting and instruction of sentinels. He will make frequent inspections both day and night.

SENTINELS. - The special orders for sentinels will be prescribed by the officer of the day under orders of the commanding officer.

It will be the duties of sentinels to be constantly on the alert whilst on post and see that the transport regulations are observed by the men of the command. They will arrest soldiers failing to obey their orders, or showing disrespect to sentinels.

FIRE. - In case of discovery of fire the report is made quietly to the officer of the guard.

The commanding officer will at once offer such assistance to the master and quartermaster as may be needed.

Immediately on embarking, stations will be designated where each company will form in case the alarm of fire is given. On the alarm of fire, company commanders will form their commands and remain with them quietly awaiting instructions.

All details for assisting at the pumps or hose or rendering any other assistance in case of fire or accident will have been made directly after embarkation. These details will have been carefully instructed in their duties and the use of appliances and will be practiced daily in taking their posts. On the alarm of fire they will take their places without waiting for command.

DISEMBARKATION. - On nearing port preliminary arrangements

will be made for facilitating the prompt discharge of the baggage and impedimenta.

A guard will be detailed and formed previous to the arrival at the wharf, to furnish the necessary sentinels to guard the baggage and control the men of the command. The commanding officer of the guard should consult with the officer in charge of the wharf as to the location of sentinels and posts of the guard.

If the landing place is already occupied by troops a staff officer will meet the command at the wharf.

The troops will leave the ship by company in the inverse order of embarkation, and they will form on the wharf or in its vicinity under their officers.

The necessary details for wharf guard, handling baggage, police, ammunition, etc., will have been made and formed under officers or noncommissioned officers, before the troops leave the ship in order to be at once available. They will leave the ship with the command, stack arms and at once report back on shipboard to the officer who will be in charge. The fatigue details, each under an officer, will be the following:

One to report to the police officer to clean up those parts of the ship vacated by the troops.

One detail to report to the quartermaster of the transport to assist in discharging the baggage.

One to report to the quartermaster of the troops to

assist in unloading the ammunition.

The regimental and battalion quartermasters and the regimental and company quartermaster-sergeants will, in conjunction with the ship's officers, have charge of the unloading and sorting of the baggage, ammunition and impedimenta and of its transfer to camp.

As the baggage and impedimenta will not be listed on the manifest it will be the duty of the regimental and company quartermaster-sergeants to keep a close supervision over the loading and discharge of the property to guard against miscarriage and losses. Each wagon load should be provided with a guard en route to camp.

No men except the authorized details will be allowed to return to the ship, and the guard on shipboard will not leave until all the men and baggage are ashore, and the police of the mess and berth decks is completed.

When the ship is unable to come to the wharf, the landing will be made by lighters, barges, and small boats.

The details of unloading will be similar except that the fatigue details will remain on board. Great care will be taken to avoid over-crowding and the commanding officer will observe in this respect the advice of the official in immediate charge of the discharge of the ship.

When there is no wharf, each ship's boat will be manned by

men of the crew to row and beach the boat after its release by the launch.

When the command consists of a force carried in several transports the disembarkation should be under the supervision of an officer detailed by the commanding general. It is believed that the best results will follow if he is made an assistant to the chief quartermaster or the quartermaster in charge of the wharf.

If no other detail is made the quartermaster in charge of the wharf will assume charge of the disembarkation. He should be assisted by such officers as may be necessary and the details of the plan of disembarkation will be communicated by him to the several transports as early as practicable, each being assigned a strip of the beach, or being notified as to its turn for coming to the wharf.

The officer superintending the disembarkation, if not at a wharf or regular landing place, will have a temporary headquarters on the beach, marked by the quartermaster's guidon, and he should have at his disposal the means of communication with the transports and the various landing places.

He should have ample assistance in order that his orders may be promptly and intelligently communicated and that proper records of the program of the disembarkation may be kept and communicated to the commanding general.

It is essential that in this, as well as in all other matters concerning the movement of troops, quiet and orderly method must prevail in order to procure the best results.

If the troops are the first to land on a hostile shore it will be necessary to effect the landing by way of surprise, and it will invariably be covered by naval vessels, and in most cases be preceded or accompanied by a landing of marine forces.

Once the landing place is decided upon it is essential that it be carried forward with the utmost dispatch. It is not intended here to discuss what shall be the stratigical or tactical features in selecting such a landing place, but it is desirable that it be so selected as to afford ready means of effecting a safe and expeditious landing with the means at hand, and if circumstances permit it should be so selected as to insure the early possession of a well protected portion of the coast and if possible a bay or harbor.

Once the landing place is decided upon and the landing is commenced it becomes the first duty of the commanding general to organize the administration of his base and lines of communication.

In most foreign services, especially the British, in which all battles are fought on foreign shores, a carefully planned scheme is provided for this service which includes all the staff departments, as well as all arms of the combatant troops. With us, however, it is usually held in hand by the commanding general,

who not only commands the base and line of communications and the advancing army as well, but performs oftentimes these dual functions with the same staff.

This paper, however, is only concerned with the transport feature of the service which still is so important a part of the administration of the base and lines of communications that it seems necessary to say this much.

It seems to be conceded that it will scarcely be possible for any country with a long line of seacoast to prevent the landing of a determined and enterprising enemy that holds the command of the sea.

As to whether such a landing once made can be defended and developed into a base of operations is a question that will be left to the debate of the battlefield, but it will be very unwisely undertaken unless the means for keeping up a flow of men and supplies are such as must ultimately give to the invaders the superiority.

Transports engaged in carrying an expeditionary force will be numbered, carrying the numbers in large figures on both sides of the ship, bow and stern.

A special system of signals will be provided to enable the troops aboard any vessel to identify themselves. We have no published regulations on this subject, but the provision would be made upon the organization of an expeditionary force,

and they should be of such character as to insure a full understanding with no chance for mistakes.

Troops which are to land ahead of the supplies should be required to carry in their haversacks a sufficient amount of rations to provide against shortage until the supplies can be unloaded.

In disembarkation the men and animals naturally take precedence, and even if the facilities are fully adequate it is obvious that everything cannot be unloaded at once; consequently this is one of the times to be recognized as an emergency and the soldier must therefore carry his rations for a necessary period along with his ammunition and shelter tent.

The English overcome this difficulty in a measure by sending along with the expedition a special subsistence ship, which becomes a floating commissary depot and furnishes the subsistence supplies immediately required on landing. I very much doubt, however, if this method will so entirely remove the evil as our method of having each man carry the rations immediately required. With us subsistence supplies are carried with the company and regimental property, and if the facilities for unloading are good they can be had almost immediately; otherwise some waiting is likely to be entailed, when the remedy is a resort to the haversack.

TRANSPORTATION OF ANIMALS.

ARRANGEMENT AND CONSTRUCTION OF STALLS. - The stalls will be so arranged that animals will stand athwart ships and provision will be made so that the heads can be reached for purposes of feeding and watering and the rear for cleaning the stalls.

The animals will be fed from the floor and there is no better or more economical way for watering them than from buckets carried by hand.

The size of stalls will be 7 feet 6 inches by 2 feet 6 inches between centers. The animal should fit comparatively snug into his stall as to width, but it is desirable that he have free play fore and aft as this freedom enables him to get his sea legs and keep his position.

The regulation stanchions forming the corner posts of the stall are of 3 inch wrought iron pipes. Malleable iron cleats are secured to the stanchion to support the side boards. The rear stanchions are provided with fittings admitting of the rear stringers to run in continuous lengths which are made of 2 inch by 12 inch pine; side boards are 2 inch by 10 inch pine. A space of 14 inches will be left below the stall boards at sides and back.

No breast bars will be provided but halter chains with end and center snaps will be provided, so that they may be used

long or short. They will be well secured, two for each stall, to the front stanchion.

The deck after being coated with tar or properly painted will be sheathed except at drainage ways, with 2 inch plank laid on 2 inch by 4 inch stringers running athwartship. Six fore and aft cleats 1-1/4 inches by 3 inches will be put down in each stall, with a thwartship cleat of oak 2 inches by 3 inches between stalls.

A portion of the passageway at the heads of animals will be arranged for feeding hay and grain on the floor.

Eye bolts will be placed overhead for securing with breast and body slings. Back of stalls will be padded and sides left smooth.

Special attention must be given to providing ventilation. This should be accomplished by means of electric blowers. The amount required by regulations is 125 cubic feet per minute per animal.

EMBARKATION. - The process of embarkation should be carried on as all other work in connection with animals, very quietly and without excitement. When it is possible to use ramps they should be made use of as the work can proceed by their use much more rapidly, quietly and without getting on the nerves of the animals.

If ramps are impossible, then flying stalls or slings will

be made use of, in which case the floor of the flying stall will be well covered with hay or sawdust to prevent injury to the animals in case they are thrown on their knees. Similar protection should be afforded in using the sling.

If ramps are used the animals should be started by putting the gentlest ones in the lead when they should kept going in a continuous string and upon reaching the deck should be led at once to the most remote unoccupied stalls, or on leaving the ship to the temporary picket line. If a stubborn animal refuses the ramp he should be led aside so as not to excite his neighbors, and if need be he can be easily forced up the ramp by means of drawing forward on ropes attached to the forward end of the ramp and passed back of his haunches.

A method frequently resorted to in discharging animals in the stream or roadstead is to rig a plank through a port and to lead the animal out on this plank, then force him out until he overbalances and is plunged into the sea. This method when pursued is effective, and without danger to the animal if properly carried out. A few of the first animals unloaded may have a line attached to the halter and shown the way to the shore by means of leading from a boat. The others will follow.

In lowering horses into lighters the utmost care is necessary if there is a swell on to prevent injury, and the tackle must be instantly slackened as the animals' feet touch

the lighter.

CARE OF ANIMALS. - Horses before being embarked should be shod before and behind, they should not be in high condition, and steady work with low diet will put them in good condition for a sea voyage.

They should be neither watered nor fed before being put on board. The stable orderlies will remove the manure as fast as it collects and render such assistance to horses in trouble as they may require. In case of accident to any of the animals they will at once notify the proper noncommissioned officer or other person in charge.

There should be not less than one caretaker to every ten animals, with proper noncommissioned officers for their supervision, and veterinaries for care of the sick. For the first day hay only should be fed. The oats ration will then be reduced to five pounds and five pounds of bran will be fed daily. The hay ration may be fed complete. Mules will be fed five pounds of oats and four pounds of bran.

Slings should be provided so that in smooth weather they can be adjusted so as to give the animal a chance to rest himself by throwing his weight into them.

WATERING. - The animals should be watered three times a day, in the morning before feeding, at noon, and before afternoon stables.

GROOMING. - Horses should be groomed daily, particular attention being paid to hand rubbing the legs and joints and sponging the eyes, nostrils and dock.

Care must be taken to keep the deck clean. It is better to remove manure as fast as it accumulates rather than to wait for a regular hour for stable police.

SICK ANIMALS. - A few large stalls should be available for sick animals. In fair weather it would be well to supply litter for the sick animals to lie down, rather than to use the sling.

In rough weather the animal should be given as free opportunity to use his legs as possible, and he will soon accommodate himself to the motion of the ship. He is a much better sailor than the average of his keepers.

Unless absolutely necessary animals should not be used for several days after landing, but they should be given gentle exercise, careful grooming and good care.

The officer of our service who had the largest and most successful experience in the transportation of animals by sea is Major J. C. Byron, and he offers these suggestions:

"The salient points which ought to be considered in the order of their importance are, fresh air, plenty of cool, fresh water, facilities for cleanliness, exercise space, stalls, slings and appliances, feeding and organization of force.

"No padded stalls should ever be placed on this ship but smooth boards, boarded to within 16 inches from the floor; if more space is left the animals kick each other, if less they get their legs under when they fall or lie down and can not get them out. Ventilation, flow of urine, and ease of cleaning require that they should not be boarded way down. The stalls should be narrow, about 2 feet 4 inches wide, to keep them from pitching about in rough weather, and as long as the ships beam will permit. I have measured the sway of animals on the upper decks in heavy weather and found that from the point of the shoulder to the buttock they would pass over 7 feet 6 inches, while the ordinary length of the animal is not above five feet; stalls say 6 feet 9 inches are all right, if it is necessary to make them that short, but a wide canvas strap must then be used in place of a breast bar. I found that the breast bars bruised the breast, so that many of them had to be lanced; then I threw the bars overboard and used a canvas strap; this should be made 8 inches wide, of hemp canvas (cotton chafes too much) with a spreading stick at each end to keep it from getting wrinkled up. By adjusting this band the horse can come as far forward as one pleases, and a stall not over five feet may be made to do. The cleats should be well nailed down, made of hard wood, and should be placed one in front of the stall in the alley and five in the stall, equal distances apart; they should be made of 2 inch by 2 inch stuff.

HANDLING AND CARRIAGE OF FREIGHT.

The baggage, equipage, stores, rations, animals, etc., in the hands of the troops are handled by the troops under supervision of their officers. All ropes, lines and slings and gear are, however, manipulated by the ship's crew or stevedores.

All other classes of freight, stores, supplies, and baggage are handled and accounted for in the transport service much as the same is done in the merchant marine.

The ship's manifest shows all freight, stores, supplies, and baggage carried except such as is in the hands of the troops and such company and regimental impedimenta as has been stored under the immediate supervision of regimental and company officers and such mess kits, etc., as will be in daily use.

The manifests are made up from the check lists or loading tickets, verified as the freight is sent aboard. To insure a correct tally each load sent to the ship for loading should be accompanied by a loading ticket, giving the list of the property; this is receipted by the proper official on the wharf and insures the property being placed on the manifest.

The freight, etc., on being discharged from the ship is again checked against the manifest. Formerly there was great difficulty in securing a proper check of the manifest, both in loading and discharging, which was largely due to the fact that many invoices of stores were necessarily split up in being sent to the wharf for loading, and in some cases an in-

voice would go in parts on several different transports. As the invoice goes direct to the consignee there was no way for the transport officials to know whether the complete invoice was shipped or not. As a result when but a portion of the invoice arrived at destination the property was checked short, and when the remainder arrived an apparent overage would be created, and for a time much confusion resulted. These defects are now remedied and I believe that the present losses are vastly less than those of the average commercial lines.

The stevedores and lorcha men in foreign ports are expert thieves and it is exceedingly difficult to prevent petty thieving. This can be remedied in a measure by furnishing a guard, but a far better method has been found to furnish each lorcha with a transfer bill of the property and charge any loss or damage pro rata against the crew. Major Aleshire, who for a long period had charge of the water service in the harbor of Manila, informs me that this method produced the best possible results.

The method of stevedoring, checking, and accounting does not differ from that in vogue in the commercial world. It has been found far more satisfactory to hire our own stevedores rather than to contract for the work at a certain rate per ton.

The necessity for providing storage for freight, stores and supplies, in the immediate vicinity of the landing should be one of the first things attended to. As in our service the same

branch that provides the transportation also provides the shelter, no reason exists for delay or neglect in this matter. If the landing is to be made on the open beach paulins and storage tents will be the substitutes.

The elementary principle involved in loading and discharging freight and impedimenta from the transport is the sequence in which it is necessary to land the troops and stores on arrival at the point of disembarkation. If the transports are not under convoy the fastest will naturally convey the troops and stores that should be first landed. If under convoy, then those offering the best facilities for disembarkation and discharge of cargo should carry the troops and stores to be first landed. The disembarkation is so dependent for successful results upon the proper embarkation that it is essential that the former proceed upon rational lines and entirely with a view of facilitating and expediting the latter. It is impossible to lay down general rules that will fit special cases further than to say that the articles first required will go in last and the others in the order in which they are required; yet the greatest necessity exists that such rules be made so as to remove all questions of doubt and to afford all concerned with the necessary information to work in full accord.

The duties connected with the disembarkation and embarkation will devolve upon an officer of the Quartermaster's Depart-

ment and will involve the following matters:

1. The supervision of all arrangements for transferring the troops, animals, provisions, stores and war materiel from the ship and receiving it on shore.

2. The removal from the wharves of all such stores, supplies, and materiel not in the hands of troops and providing storage therefor.

3. Providing for embarkation of sick and discharged men, return of surplus supplies, and stores, and troops returning for any reason.

4. As a rule the same officer will have under his charge the provision of the land transportation required to forward the stores thus received as the troops advance, whether by rail or overland.

The local office of the officer in charge will be marked so as to be readily distinguished.

SIZE OF PACKAGES. - One great defect of handling our stores until recently was in the size and strength of the packages. It was not unusual to find packages in not very strong boxes weighing as much as five and six hundred pounds and even more, and a four hundred pound box was an ordinary thing. Recently, however, the packages of our supply departments have been reduced in weight, and the maximum now allowed is 150 pounds. Several sizes are afforded, all of which meet conditions

carefully figured to fit into an escort wagon box and at the same time of proper size to pack conveniently on mule back. A package of this size can always be easily handled by two men, and if need be one man can master it. The great saving, however, is in the matter of breakage. The large packages before mentioned scarcely ever reached the storehouse with a whole skin, whereas the lighter boxes are rarely broken.

On the march to Pekin the packing of the British troops from India and the Japanese was greatly commended. The latter only under extreme circumstances permitted their packages to exceed 100 pounds; they were as a rule reinforced with rice straw matting which gives a very light packing material.

The British package is covered with a jute casing and the packages seldom exceed 80 pounds - one-half load for their pack mules.

The Russian, French and German packages were all of mixed sizes. Many of them, however, showed from their marks that they had been procured in the Eastern markets and were not the normal packages for military stores.

MARKING PACKAGES. - Original packages of stores and supplies in our service are always marked for indentification. The commissary stores with the crescent in black; the ordnance with the shell and flame in black; the engineer stores with the castle in black; medical stores with the caduceus in red;

signal corps device in black; the quartermaster's Department, its device of wheel and eagle in black. Company, regimental and other property is marked with the letter of the company, the number of the regiment, etc.

EVOLUTION OF THE TRANSPORT SERVICE.

From the time of the Civil War up to 1898 the United States had experienced no need for the movement of troops by ocean routes and at the outbreak of the war with Spain in April of that year the War Department was without a single ocean going vessel suitable for the transportation of troops and supplies for service over sea.

It becoming at once evident that armies of occupation would have to be dispatched to the Spanish possessions in the West Indies, the Quartermaster's Department was called upon to immediately take steps to furnish and equip the necessary vessels for that purpose. There were available for the transport service only the smaller and inferior types of ships; some of them provided with limited passenger accommodations, but consisting principally of vessels engaged in coastwise freighting.

In providing the transport fleet for the movement to Cuba and Porto Rico the charter of every available steamship of American Registry on the Gulf and Atlantic coasts was considered, and the majority of them were inspected to ascertain their fitness.

Those found most suitable were selected and hurriedly fitted up for the service required. The faults of the transports thus provided were that they were small, over-crowded, poorly ventilated, unsanitary, and unsatisfactory, especially for the warm climate of the West Indies.

The naval victory of May 1st at Manila created a similar emergency on the Pacific for the transportation of troops to the Philippines. Fortunately, numerous trans-Pacific steamers of sufficient capacity were available, which furnished a better basis for the transport fleet in those waters. Temporary provision was made as on the Atlantic to meet the changed requirements from commercial purposes to the necessities of the military service.

The work of refitting the vessels of both these fleets was necessarily performed under pressure for time and conditions of particular disadvantage. It was not found practicable to establish in the beginning more than a general policy in refitting, and the fitting up of temporary transport vessels had to be left in a great degree to the judgment of those charged with the work. This resulted in the use of more or less diverse means for the accomplishment of the ends in view.

It was clearly developed, however, that the use of chartered vessels, fitted as might be found possible at the immediate time of use, was at best an unsatisfactory method of handling troops,

animals and government stores. Therefore it was soon decided to purchase the most suitable vessels obtainable on both Coasts and reconstruct them into transports. In doing this it was found that the steamship companies were of course unwilling, except at very high prices, to dispose of their best vessels, and those offered were principally second-rate ships. Hence, in order to avoid exorbitant prices, the Government was forced to make selection from a rather varied assortment of the older type of foreign built ships with the exception of the fleet of one of the large New York and London Lines, the Atlantic Transport Company. This Company through its American president tendered practically its entire fleet for sale to the Department and eight of its best and fairly modern steamships were purchased. These ships were engaged principally in the transportation of general freight, cattle and dressed meats; the largest vessels were fitted to carry a few first class passengers.

In all, twenty-three ocean going ships, five coastwise ships, and numerous tugs, lighters, barges, dispatch boats, etc., became the property of the Government. Under emergency resort was still had to charter to fill temporary additional needs. At the height of the development the owned and chartered vessels of the transport service, including all classes of craft, numbered a total of one hundred and twenty-five. In addition to these, upwards of two hundred small craft were employed in the inter-island service of the Philippines.

The work performed by this transport fleet from the outbreak of the war to June 30, 1903, exclusive of inter-island traffic, consisted briefly as follows:

Armies were transported consisting of--

17,460 men to Porto Rico,
65,612 " " Cuba,
75,723 " " the Philippine Islands,
3,000 " " China,

with animals, impedimenta, attaches, camp followers, and stores.

The total service furnished comprised the following:

626,737 persons,
73,438 animals,
772,709 tons of materials,
6,000,000 miscellaneous packages,
5,000,000 lbs. of mail matter,

and between $30,000,000 and $40,000,000 in currency and coin. This entire work was performed without the loss of a single life chargeable to any act or neglect of the service.

Following their requirement, the owned ships, as rapidly as possible, were completely reconstructed to meet the special requirements of the military service as evidenced by the experience gained. This process of reconstruction consisted of stripping the vessels to the bare hulls leaving in position only the lower decks, watertight bulkheads and parts of the machinery. The matter of refitting was made the subject of careful study, and the necessary provision was made for the sleeping, messing, and exercising of the men; hospital and isolation wards; lavatory, latrine and bathing facilities; troop galleys and

bakeries, storerooms, ice houses and cold storage chambers; troop laundries and mess kit washing facilities; electric plants, ventilating plants, distilling plants, sanitary, five fresh water and heating systems and a multitude of other necessary fittings for the successful transportation and maintenance of from 1500 to 2400 human lives for a period of from 30 to 60 days at sea.

In refitting these ships the 'tween and orlop decks were used as berthing spaces for the troops, and on the best type of transport 116 cubic feet of air space is allowed for each berth, making available space for about 1800 berths.

These berths are of the metal standee pattern placed in double and single rows, and in tiers of three high, rigidly fitted in position, yet so arranged as to be portable if required to clear the space for other purposes. The bottoms are of canvas laced in position and can be removed and laundered after each trip. Aisles are provided between tiers, along ship's sides, at ends of compartments and at convenient spaces every eighteen to twenty-four feet across the ship. Easy access from these aisles is arranged to companion ladderways in each hatchway.

Over the berths are placed racks for life preservers, and along the sides and ends of each compartment are arranged the gun racks for storage in place of the troops' arms. At the head

of each bunk suitable hooks are fixed upon which knapsacks and other accoutrements are hung.

The main deck is principally set aside for messing and lavatory accommodations, the extreme forward end being cut off for use of ship's crew. On this deck washrooms and lavatories are provided, one forward and another aft. These lavatories extend the full width of the ship, and comprise a total length of eighty feet. Accommodations of this character have been found desirable in the following proportions:

Washbasins, 8% of total persons carried.

Bathing facilities (showers) 1%.

Watercloset accommodations, 5%.

Clothes washing tubs, about 1-1/2%.

Entirely separate toilet provision is made for the crew.

Water, salt and fresh, is provided, hot or cold, as desired, in all toilet rooms throughout the vessel.

The troops' mess-rooms occupy three central compartments of the main deck, with a total length of 250 feet by 50 feet in width. Folding mess tables and benches are provided for 600 men at a sitting. When not in use these are folded and slid into racks or swing from overhead. The space thus cleared is available for drill, exercise and recreation. Sinks, or long troughs, with running water and heating coils are provided along the sides of mess deck for washing mess kits and utensils.

The galley is equipped with modern devices for economical service of food and is located between the mess rooms.

This galley is arranged with a serving window its entire length, from which the troops are served as they file past to mess rooms. The experience of the department has been that this is the most expeditious method of messing and accomplishes the distribution of the food with greatest precision and least confusion.

The hospital is placed at the after end of the main deck and is calculated to furnish accommodations for 3-1/2% of the total persons carried. The berths are of the usual type, white enameled, in rows, two tiers high. Diet kitchen, dispensary, operating room, surgeon's office, attendants' quarters, separate toilet and lavatory and linen room adjoin and connect with the hospital ward. Two decks above the main hospital, and connected with it by stairs, are the isolation ward for contagious cases, and the refractory ward for insane patients. Separate toilets and lavatories are provided connecting with each of these wards.

The midship section of the spar deck is reserved for cabin accommodations, dining saloon and other similar purposes for officers and families.

The greater portion of the spar deck is separately cut off, and arranged with reading and writing room, and for exercise,

lounging and recreation and lounging space for enlisted men.

The promenade deck is arranged for first class cabin accommodations for officers and families, and on this deck is placed the office of the transport quartermaster.

The freight holds, baggage and mail rooms, storage room for ship's,commissary and hospital stores, and refrigerating chambers are variously arranged below the lower troop berthing decks.

Owing to the fact that the service furnished by these vessels is largely in the tropics and on runs averaging sixty days or more, especial attention has been given the subject of refrigeration. It has been found advantageous to provide a number of chambers capable of being simultaneously run at differing temperatures. The plant consists of two eight ton refrigerating machines.

Mechanical ventilation is provided capable of furnishing one hundred thousand cubic feet of air per minute throughout the living quarters of the ship below the promenade deck, and this fresh air is supplied cold or heated as the season may require.

Fresh water is provided in the customary manner by storage in double bottom compartments supplemented by distillation.

AUXILIARY TRANSPORTS.

It is not to be supposed that our existing transport system taxed to its full capacity will be able to meet the requirements for transporting an expeditionary force of any magnitude without the supplementary aid of additional vessels procured by charter. Commercial vessels of the class usually available for short term charter are unsuited without considerable refitting and alteration for the carriage of troops and military supplies and stores; or for the successful transport of animals.

Inasmuch as the temporary refitting of vessels chartered for ocean transport service is an operation requiring great dispatch, the alterations and additions will be made as a rule at the port from which the movement is scheduled to take place.

In order to effect this without delay it is necessary to have at hand certain information gathered in advance, and regularly kept up to date through a system of reports so arranged as to give accurate data at any time desired. By this means it will be an easy matter to meet the requirements of practically any condition that may arise with a degree of exactness, and avoidance of confusion not otherwise obtainable, so far as the fleet available for charter will make it possible.

1. Maintain on file deck plans and an accurate description of every vessel available for charter for transport service, showing also name of owner and rate at which charter would be made and the alterations required to temporarily

fit her for military transport service - showing briefly the requirements for infantry and freight, cavalry or artillery and freight, freight exclusively, and animals exclusively.

2. In each instance indicate the number of each class of mechanics required to do the temporary refitting in say, two days' time, counting twenty-four hours, with three daily shifts of eight hours each.

3. In indicating the changes to be made, a precise description should be given not only of the interior structural modifications within the vessel, but the mechanical or other appliances to be installed should be plainly described and illustrated. These should be simple and of readily obtainable character, and mention should be made of methods by which appliances may be improvised from means at hand in case necessity should arise for makeshift means. There should also be shown such means as should be provided for loading unloading, additional boats, launches, etc.

4. A list should be made of the various ports from which expeditions would be likely to set forth, also a full description of the facilities to be found available for dispatching an expedition without unduly interfering with the current traffic, and the names of firms and individuals at each from whom required material and labor could be quickly obtained in case of emergency, and showing the ruling prices for the different classes of material and labor likely to be required.

By the advance provision and maintenance of this information it would be possible to charter ships at available points, place them in the hands of a suitable official of good judgment, in such matters, afford all the information relating to the existing status and necessary changes in a certain ship for whatever class of service required, put aboard of her wherever found the mechanics and materials in specific number and quantity as previously calculated by a competent expert, immediately begin the work of refitting while enroute to designated port of embarkation, and complete the required changes with a degree of accuracy, economy and rapidity by no other means obtainable; all in conformity to a general planof action shown by experience to be the best.

As an illustration of the possibilities in this connection in a small way it may be stated that in April, 1902, just previous to the evacuation of Cuba by the American forces, it became necessary to remove within a limited time, owing to quarantine conditions, a large number of animals and attendants from the Island.

Not a single ship was immediately available in Cuban waters for the service. Those offered in response to informal invitation for proposals were not fitted for the special service required, and most of them were,furthermore, at ports in Mexico, South America, Central America, and the Gulf States, or they were

on the high seas to or from such ports.

A definite plan of refitting was established and the necessary orders were given that resulted in the inauguration of the alterations along this general plan while the vessels were still at the various ports where engaged. The work was prosecuted while at sea en route to point of embarkation and between points of embarkation. As a result, without confusion, and without the loss or injury of a single animal or man, three thousand animals and 800 attendants were collected from eleven different points in Cuba, and distributed to twelve different points in the United States during the 27 days period from April 4th to April 30th. Every vessel was provided with required accommodations for attendants and with facilities for feeding and watering, with necessary stalls and ample ventilation for the animals carried. These were furnished almost entirely by improvising the means from the material found at hand in foreign ports. The average cost of this shipment was the lowest ever made by the Department between the points concerned.

PRELIMINARY KNOWLEDGE.

When a state of war exists all that is said in this paper on the subject of transport presupposes that naval action has anticipated the movement of troops by water, and that the navy has gained control of the sea, and is in a position to protect

the transport fleets from the hostile demonstrations of the enemy.

Whilst for short distances over sea consecutive voyages may be relied upon, it is to be regarded as a principle only to be departed from under special circumstances that the first outward expedition should be complete, both in number of troops and munitions of war sufficient to establish and defend a base if not to undertake vigorous aggressive action, otherwise the landing of an insufficient force on an enemy's coast may subject it to being overwhelmed before reinforcements can arrive.

In contemplating the plan to be pursued in prosecuting a movement across the seas the army should be possessed of knowledge upon the following points through the Division of Military Information, viz:

1. As full a knowledge as possible of the theatre of operations, including its topography, its communications and facilities for transport.

2. An estimate of the strength and composition of the force it will be possible for the enemy to oppose to the disembarkation or which he can place across the prospective line of advance.

3. The resources of the district whose invasion is contemplated and all local information, including information as to camp sites, climate, facilities for landing troops, defensive positions, etc.

The Navy should be able to furnish necessary information upon the following points:

1. The force necessary to protect the convoy, and whether the connection with the home ports can be maintained.

2. The proper point to be selected for disembarkation; the difficulties to be encountered and the advantages possessed; the character of the anchorage, tides, currents, etc.

3. The ports on the coast, their resources, facilities for entrance, their dimensions, depth of water, and availability for protection.

4. The defenses of the enemy's coasts and the practicability of cooperation with the army in attacking them.

CONVOYS.

Whether or not the transports will be placed under convoy of warships will be for the War Department to decide after consultation with the Navy Department. It will be for the latter Department to render an opinion as to whether the seas are safe from the depredations of the enemy and whether or not war vessels are available for convoy service.

Once the question of convoy has been decided, absolute compliance with the orders and signals given by the officer in command of the convoy will be enforced.

Should the transport become separated from the convoy every effort will be made to regain it or reach the destination

or rendezvous and to avoid capture by the enemy.

Should the officer in command of the convoy have given orders covering the case of a vessel becoming separated from the convoy, those orders will be rigidly complied with.

Written orders giving the general instructions for and sailing formation of the ships under convoy and any signals that may be prescribed or agreed upon will be given by the officer in command of the convoy to the commanding officer of the troops on board the transport, or to the transport quartermaster when troops are not on board, who will see that the master is furnished with a copy thereof.

CONCLUSION.

Our present transport system counting active and inactive vessels is capable of carrying 150000 men, baggage and camp equipage with supplies for Two months, not counting, however, on carrying any animals either for cavalry or transport, or for artillery. For the carriage of an army corps consisting of 36,570 men, together with the necessary animals, guns and all classes of impedimenta, would require not less than 320,000 tons of shipping, and this would not include any supplies other than what will be required for immediate use.

For the transport of an army of a hundred thousand men, fully equipped for field service, with a proper proportion of cavalry, artillery, field transport, engineers, signal

corps, hospital equipment, siege guns, etc., and with supplies sufficient to last for a period of thirty days, a fleet of something more than one million tons would be required. In other words were the combined fleets of the International Mercantile Marine, including as it does nearly all the great trans-Atlantic shipping companies, offered to the Government for the purpose of carrying to foreign shores an army of one hundred thousand men, it would fall short by some thousands of tons of accomplishing the purpose.

The total American tonnage on the Pacific coast, exclusive of our transports is 303,739.

The total American tonnage on the Atlantic Coast is 498,132.

It can be figured that on the Pacific we can put to sea with an army of about 40,000 men provided we can make use of all the American bottoms there afloat.

On the Atlantic coast we could put to sea with an army of about 60,000 men.

It is not intended to present here a plea for increasing our mercantile marine. Nor is it thought necessary to recount the advantages such an increase would be in enlarging our commerce, strengthening our navy, and giving value to our army. But it is thought proper to point out the limitation to our arms under present conditions.

This limits our aggressive war making power on land across the sea to the following cases, assuming that we first obtain control of the sea:

1. To those nations against which we can form an alliance and thereby procure a landing on friendly territory within striking distance.

2. To those nations that have weak colonies which may be overcome by the forces we can carry in a single expedition and augment more rapidly than can the enemy.

3. Those nations that are so weak that no force can be concentrated greater than that carried by the first expedition before it is augmented.

The astounding developments of 1898 at once projected this country into the arena of world politics through the operation of forces, the origin of which no one foresaw, and the outcome of which no one can now foretell.

Questions of the national defense have assumed an aspect hitherto undreamed of. The protection of our own coasts has hitherto been our most vital concern, involving as it would, provision against attacks by powers whose forces would likely be brought from points beyond the sea, with practically every question of transport for them to solve, and with our position peculiarly happy from every standpoint of defense.

Today we have Porto Rico, a measure of interest in Cuba, the Panama Canal Zone, Hawaii, Guam, and other small islands

of the Pacific, and in addition to these the complex problem of the Philippines; and finally that national policy we call The Monroe Doctrine which is alike the despair of the commercial interests and a thorn to the national pride of the great powers of the world.

With interests so remote, and so widely scattered the question has become one involving extensive operations of an offensive character in case of attack by any foreign power. Troops, supplies and munitions of war must now be conveyed by us to distant points of conflict, and the vast extent of the provision to be made is a point upon which we well may ponder. No effort has been made in this paper to indicate any method of enlarging the means we now possess but merely how to make good use of what will come to our hand. Added means would increase our power and broaden our possibilities.

In the regulation and government of nations certain functions are natural and primary. The first of these is the war power, and without it no nation can have an independent existence. Once the war power of the nation is limited the influence upon the civilization of the world is correspondingly reduced.

The ceaseless efforts of nations to attain supremacy in commerce, wealth and power, bend every energy to develop and strengthen the resources from which those elements are derived. Only the fullest development of those resources can be defended

our common interests against the commercial aggressions of the nations of the world. When or under what circumstances friendly commercial rivalry will be converted into armed hostility who shall say?

Where or with what power our next conflict is likely to arise is not for us to guess. May we not venture the hope that careful foresight and a constant state of increasing preparedness may be the price of peace.