

65TH CONGRESS : : : 2D SESSION

DECEMBER 3, 1917 - NOVEMBER 21, 1918

SENATE DOCUMENTS

VOL. 6



WASHINGTON : : GOVERNMENT PRINTING OFFICE : : 1918

701-24 42

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STANLEY DOUGHERTY

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VOL 6



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FIRST ANNUAL REPORT
OF THE
COUNCIL OF
NATIONAL DEFENSE

MESSAGE FROM
THE PRESIDENT OF THE UNITED STATES
TRANSMITTING
THE FIRST ANNUAL REPORT OF THE COUNCIL OF
NATIONAL DEFENSE FOR THE FISCAL
YEAR ENDED JUNE 30, 1917



JANUARY 4, 1918.—Read; referred to the Committee on Military Affairs
and ordered to be printed

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LETTER OF TRANSMITTAL

To the Senate and House of Representatives:

In accordance with the provisions of the Act of Congress approved August 29, 1916, establishing the Council of National Defense and providing for the appointment of an Advisory Commission to the Council, I transmit herewith the first annual report of the Council, the Advisory Commission, and the subordinate agencies of both bodies for the fiscal year ended June 30, 1917.

WOODROW WILSON.

THE WHITE HOUSE,
4 January, 1918.

LETTER OF SUBMITTAL.

COUNCIL OF NATIONAL DEFENSE,
Washington, November 21, 1917.

MY DEAR MR. PRESIDENT: I have the honor to transmit to you herewith for submission to the Congress in accordance with the provisions of the act establishing the Council of National Defense that "An annual report to the Congress shall be submitted through the President" the first annual report of the Council of National Defense, covering the activities of the council and the agencies subordinate to it up to the end of the fiscal year ending June 30, 1917.

Respectfully,

NEWTON D. BAKER,
*Secretary of War and
Chairman of the Council of National Defense.*

TO THE PRESIDENT,
The White House, Washington, D. C.

FIRST ANNUAL REPORT
OF THE
COUNCIL OF NATIONAL DEFENSE.

COUNCIL OF NATIONAL DEFENSE,
Washington, November 20, 1917.

The Hon. NEWTON D. BAKER,
*Secretary of War and
Chairman of the Council of National Defense.*

SIR: Herein I have the honor to hand you the first annual report of the Council of National Defense, its Advisory Commission, and the various boards, sections, and committees under both the Council and the commission, from the date of their organization to the close of the fiscal year ending June 30, 1917. It should be stated that the permanent organization of the Council was not effected until early in March, 1917.

MOBILIZING AMERICAN INDUSTRY FOR DEFENSE.

The several fields in which the Council has undertaken its work of mobilizing the national resources are presented in detail in the later sections of the report. The Council has endeavored intelligently to coordinate diverse industrial factors and to direct their activities to the definite needs of the Government. The results may be enumerated as follows:

1. New sources of supply for both raw material and finished products have been developed, and purchases of supplies for the executive departments of the Government have been supervised and coordinated to the advantage of all requirements.
2. Standardized specifications for tools and implements used in the manufacture of munitions have been introduced.
3. The cooperative organization of transportation and electric communication for war service has been enlisted.
4. An aircraft program has been inaugurated with the Government departments and assistance rendered in making the program an industrial possibility.
5. The medical profession has been organized for war.
6. A campaign has been conducted to assist commercial business in meeting the demands made upon it by war and to aid in making

available for the needs of the Government men, supplies, and equipment, without impairing the essential service of trade and without unnecessary hardship to the people at large.

7. Motor transportation facilities for Government use have been developed and stimulated.

8. The leaders of the American labor movement have been organized conjointly with representative employers and civic and industrial leaders for the effective enlistment of the labor forces of the country for the conduct of the war.

9. Scientific research has been promoted and the engineering and educational professions have been brought together and concentrated for the work of the national defense.

10. The efforts of American women have been centralized and given effective direction for assistance in the conduct of the war.

11. The coal industry has been organized for more effective production and distribution of fuel.

12. The activities of the several States in their efforts to aid in the war have been mobilized and centralized direction given.

THE CONGRESSIONAL ACT.

The Council of National Defense, although created under the act of Congress approved August 29, 1916, was not fully organized until March 3, 1917. Under the terms of the act the Council was, among other things, charged with the "coordination of industries and resources for the national security and welfare" and with the "creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the Nation." In pursuance of this purpose, especially since the existence of a state of war between the United States and the Imperial German Government, the Council and Advisory Commission, with their supplemental organizations, have been engaged in the duty of assisting the Government to mobilize the country's resources for the conduct of the war. The history of the Council's organization since its inception has been one of steady growth and expansion as a result of the vastly increasing responsibilities thrust upon it by the international situation.

The duties and functions of the Council, as defined by section 2 of the Army appropriation act, known as H. R. 17498, approved August 29, 1916, are as follows:

- ① SEC. 2. That a Council of National Defense is hereby established for the coordination of industries and resources for the national security and welfare, to consist of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor.

That the Council of National Defense shall nominate to the President, and the President shall appoint, an Advisory Commission, consisting of not more than seven persons, each of whom shall have special knowledge of some industry, public utility, or the development of some natural resource, or be otherwise specially qualified, in the opinion of the Council, for the performance of the duties hereinafter provided. The members of the Advisory Commission shall serve without compensation, but shall be allowed actual expenses of travel and subsistence when attending meetings of the commission or engaged in investigations pertaining to its activities. The Advisory Commission shall hold such meetings as shall be called by the Council or be provided by the rules and regulations adopted by the Council for the conduct of its work.

That it shall be the duty of the Council of National Defense to supervise and direct investigations and make recommendations to the President and the heads of executive departments as to the location of railroads with reference to the frontier of the United States, so as to render possible expeditious concentration of troops and supplies to points of defense; the coordination of military, industrial, and commercial purposes in the location of extensive highways and branch lines of railroad; the utilization of waterways; the mobilization of military and naval resources for defense; the increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce; the development of seagoing transportation; data as to amounts, location, method and means of production, and availability of military supplies; the giving of information to producers and manufacturers as to the class of supplies needed by the military and other services of the Government, the requirements relating thereto, and the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the Nation.

That the Council of National Defense shall adopt rules and regulations for the conduct of its work, which rules and regulations shall be subject to the approval of the President, and shall provide for the work of the Advisory Commission, to the end that the special knowledge of such commission may be developed by suitable investigation, research, and inquiry and made available in conference and report for the use of the Council; and the Council may organize subordinate bodies for its assistance in special investigations, either by the employment of experts or by the creation of committees of specially qualified persons to serve without compensation, but to direct the investigations of experts so employed.

That the sum of \$200,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to be immediately available for experimental work and investigations undertaken by the Council, by the Advisory Commission, or subordinate bodies for the employment of a director, expert and clerical expenses and supplies, and for the necessary expenses of members of the Advisory Commission or subordinate bodies going to and attending meetings of the commission or subordinate bodies. Reports shall be submitted by all subordinate bodies and by the Advisory Commission to the Council, and from time to time the Council shall report to the President or to the heads of executive departments upon special inquiries or subjects appropriate thereto, and an annual report to the Congress shall be submitted through the President, including as full a statement of the activities of the Council and the agencies subordinate to it as is consistent with the public interest, including an itemized account of the expenditures made by the Council or authorized by it, in as full detail as the public interest will permit: *Provided, however,* That when deemed proper the

President may authorize, in amounts stipulated by him, unvouchered expenditures and report the gross sum so authorized not itemized.

THE METHOD OF ADMINISTRATION.

Ensuing sections of this report will recount in detail the activities of the several divisions of the Council. Yet no report of an organism of the character of the Council would be complete without a statement of the manner in which the organization has interpreted and sought to carry out the provisions of the enabling act.

In a broad sense the Council has endeavored to make available to the United States the best thought and effort of American industrial and professional life for the successful prosecution of the war. It has become a truism that no past war has been so essentially a war of the mechanic and the machine, and it is the realization of this truth that has been throughout the inspiration of the policy pursued by the Council, the commission, and their subordinate bodies.

The direction of the machinery of American industry for the national defense necessarily involves the creation of an organization of great flexibility. The swift changes in strategy and rapid improvement in war machinery, attended by the equal speed with which implements of warfare are scrapped and replaced at the front, has been reflected by corresponding rapid transformation and stimulation of the industrial organization within the nations at war. These ever-changing developments have necessitated almost unprecedented flexibility in governmental organizations. The history of the first three months of the war in the United States has proved no exception. Constantly recurring demands for increases in personnel and for new efforts in unexpected directions have had to be met as the war progressed. It has been the effort of the organization of the Council of National Defense to hold itself in constant readiness to meet such new demands and to shift its ground and expand its facilities in the interest of the national service. It has been in no sense a fixed institution. Its organization has been and of necessity must continue in process of evolution rapid enough to keep abreast with the changing current of the times, and yet conservative enough to prevent confusion or lack of proper coordination and control. In a peculiar sense it has felt itself called upon to be constantly ready to "fill in the gaps" and assist the regular departments of the Government in their successful effort to expand and carry the new and huge burdens put upon them by the country's need. Flexibility must remain the essence of the spirit with which the Council carries on its work.

It is somewhat difficult to place on paper an adequate statement of the work of an organization like the Council, because so much of its most important work is accomplished through its function of adjustment. The Council and its agencies have sought to serve as a

channel through which the best professional and industrial intelligence of the country could make itself most effectively available to the Government departments. Necessarily much of the accomplishment implied in such a function must be carried through by personal contact, and where the personal equation is involved it is manifestly difficult to picture results in black and white. It is easy to point out a specific saving of money or concrete results obtained by such an organization as the Aircraft Production Board, for example, at certain stages of its program for expediting the production of the new air fleet. It is not so easy to tell of the achievement of a conference which may result in smoothing out serious obstacles in the war machinery, the effect of which may reach eventually through the whole Government and industrial systems alike.

Throughout the work of the Council the director has been the designated central administrative unit of the organization. Whenever a particular activity is directed in special instances by a member of the Advisory Commission or by some one selected for a particular task by the Advisory Commission or the Council, it is essential for proper administration, and especially for the proper coordination of activities, that the various agencies which are set in motion shall work immediately in touch with and under the supervision of a central directing agency. It is this function which the director has attempted to perform.

Both the Council and the Advisory Commission have met several times a week for discussion of war problems, and the two bodies have also met in frequent joint sessions. The Council in its meetings has listened to reports from the director, made recommendations to the heads of the executive departments, discussed suggestions, and referred specific problems to different sections of the Advisory Commission or to branches of the Council's organization. The Advisory Commission in turn has submitted recommendations to the Council for its action. The director has served as the connecting link between the two bodies.

Among the general activities relating to the national defense in which the Council has interested itself, in addition to those to be specifically enumerated under the several sections to follow, may be mentioned the settlement of the threatened railway controversy early in March. At a special meeting of the Council of National Defense on March 16 it was voted, with the approval of the President, that the Secretary of the Interior, the Secretary of Labor, Mr. Daniel Willard, and Mr. Samuel Gompers—the first two being members of the Council and the last two members of its Advisory Commission—should be named a committee of four to deal with the

general railroad strike then apparently imminent. The letter empowering them to act read as follows:

MARCH 16, 1917.

GENTLEMEN: At a meeting of the Council of National Defense it was resolved that you be requested at once to seek an interview with the representatives of the railroad brotherhoods and the railroad executives with reference to the differences now existing between them and apparently threatening to produce a general railroad strike in this country; that you present to the representatives of both sides the grave peril involved in such a situation at this time; and that you request them so to adjust their differences as in any event to lead to a postponement of any acute difficulties during the present national emergency.

Respectfully, yours,

NEWTON D. BAKER,

Secretary of War, Chairman Council of National Defense.

As a result of the action of this committee an accommodation was reached and the strike averted.

On June 30, 1917, there were 408 persons engaged on the work of the Council. Of this number 168 were receiving compensation.

The activities of the subordinate bodies of the Council will herein first be reported.

AIRCRAFT PRODUCTION BOARD.

The Aircraft Production Board was authorized by resolution of the Council of National Defense on May 16. The following pages cover in broad measure the activities of the board up to the 1st of July, 1917, at which date it had been in existence for a month and a half. The resolution of the Council is set forth herewith:

Whereas on April 12, 1917, a resolution was passed by the Council of National Defense:

Resolved, That Commissioner Coffin be asked to take the chairmanship of an Aircraft Production Board as outlined in letter of April 10, 1917, of Dr. C. D. Walcott, chairman executive committee National Advisory Committee for Aeronautics (quoted below), the personnel of which he shall select:

"The National Advisory Committee for Aeronautics have the honor to recommend to the Council of National Defense that a board be appointed by the Council of National Defense to be known as the Aircraft Production Board.

"The function of this board shall be to consider the situation in relation to the quantity production of aircraft in the United States and to cooperate with the officers of the Army and Navy and of other departments interested in the production and delivery to these departments of the needed aircraft in accordance with the requirements of each department"; and

Whereas in accordance with that resolution the situation has now been thoroughly investigated and a plan for the execution of the work developed: Be it therefore

Resolved, That the Council authorize this board as organized by Commissioner Coffin to proceed with this program in accordance with the plan hereinafter set forth:

Organization.—It shall organize its assistance in advising the departments along the following lines:

1. *Engineering.*—To cooperate with the plane and engine design department of the Army and Navy, with all manufacturers, engineering laboratories, private, individual, etc., to advance the science of aviation and aerostation, and to stimulate the production of a better type of aircraft.

2. *Specifications and standardization.*—To advise and assist in such standardization of material and parts and, as far as is practicable, of types of aircraft as will aid in increasing the productive capacity of the industry in the most efficient forms of aircraft.

3. *Production.*—To investigate the source of supply of aircraft of all kinds and the materials entering into them and to assist in the formulation and execution of such plans as may be necessary to enable the Government to purchase all kinds of aircraft of the types and in the quantities desired. This will cover advice in connection with—

(a) Coordination of designs of all aircraft matters through the officers of the allied countries stationed here for that purpose.

(b) Arrangements with existing American factories as to kinds of aircraft best suited to their organizations and facilities and quantities to be built by them.

(c) Suitable arrangements when necessary to advance Government funds where larger contracts are considered than can be privately financed or to make arrangements on a cost-plus basis.

(d) Utilization of such idle facilities and creation of such new sources of supply as in the judgment of the board are necessary to meet the needs of the Government.

4. *Inspection.*—To cooperate with the inspection organizations of the Army and Navy and to assist in coordinating their present systems of inspection to the end that, if possible, there be one system, one standard, and one organization for the inspection of aircraft in this country.

5. *Aviation schools.*—Following the selection of sites by the military departments, to advise in regard to buying or leasing the land, preparing it for use, and erecting all buildings.

6. *Supply depots.*—Following the approval of sites, to advise in regard to leasing the land, erecting the necessary buildings.

7. *Priority.*—To advise regarding priority of deliveries of aircraft material as between the departments in accordance with a general policy as determined by the Council of National Defense.

It will be noticed that the word "advise" is repeatedly used in this authorization. The board has never assumed to act in any other capacity, and has confined its work to the nonmilitary and industrial phases of the situation. The membership on May 16 was as follows: Howard E. Coffin, chairman; Brig. Gen. George O. Squier, Chief Signal Officer, United States Army; Rear Admiral David W. Taylor, Chief Bureau of Construction and Repair, United States Navy; S. D. Waldon, E. A. Deeds, R. L. Montgomery, A. G. Cable, secretary.

COORDINATION OF ARMY AND NAVY EFFORTS.

One of the desirable features of the board is that it represents a coordination of both Army and Navy effort in the production of aircraft. Although the Navy's undertaking in aircraft work prom-

ised to be smaller than that of the other branch of the service, the board has devoted much of its thought to the proper handling of the naval program and at the request of the Secretary of the Navy reserved several plant units exclusively for Navy work.

It was evident at the outset that the problem which lay before the board was to create an industry where none had existed before. The members of the board at once realized that close study should be given to conditions in the airplane industry with a view to considering possibilities of production as they existed at the time. The history of the industry in this country, while full of brilliant accomplishments in many ways, had been on the whole admittedly a slender one from the standpoint of successful manufacturing enterprises. The only considerable market for the products of the industry was the Government, and with small appropriations for this work and a very proper desire on the part of the Government to encourage all the different factories, the business was piecemeal, and no opportunity was possible for putting production on anything like a commercial basis, as it is known in other businesses. No evidence was obtainable that any appreciable amount of profit had been made, and there was plenty of evidence that a great deal of money had been lost in too venturesome undertakings.

BASIS FOR PRODUCTION PROGRAM.

The basis for the entire program of production was a report made to the Secretary of War and the Secretary of the Navy by the joint Army and Navy technical board on design and specifications. This board, composed of three officers from each service, skilled in matters of aircraft and answerable directly to the two Secretaries, represents one of the increasing number of instances of coordination between the two services which are so desirable.

The schedule decided on and incorporated in the board's report was determined with careful consideration of allied experience and needs in relation to those of the United States.

The cause of aviation was urged strongly by members of the missions that visited this country in the early summer, and great pressure was brought to bear to turn as much of our resources into this channel as possible. There was at the same time a frank uncertainty about our being able to accomplish any considerable part of what had been outlined.

The magnitude of the program was at once appreciated and the approval of the War College division of the General Staff was immediately sought.

On June 15, 1917, the War College division addressed a memorandum to Howard E. Coffin, chairman of the Aircraft Production Board—

(1) Inquiring as to the extent to which the board's proposed production of airplanes and engines would interfere with the production of (a) artillery material, (b) machine guns, (c) motor trucks, as planned by other departments of the Government.

(2) Whether the personnel required for the production of airplanes could be obtained without interference with the production of the above-mentioned war material.

(3) Asking that the board obtain a statement of clearance from the General Munitions Board and the Priorities Board of the Council of National Defense with respect to both such personnel and material.

This matter was immediately taken up by the Aircraft Production Board, and on June 16 the chairman received a letter from the General Munitions Board, stating that the aircraft program would not interfere with the forging or machine capacity of the country or the motor-truck program.

It was further suggested by the General Munitions Board, with reference to the production of machine guns, that additional facilities would have to be provided for the requirements of the aviation program, and that the matter should be considered by the machine-gun committee of the General Munitions Board. The latter further stated that there would be no interference in the matter of personnel with the operations of other industries essential to the war.

THE ENABLING ACT.

It was necessary to consider at once both the personnel involved in handling what promised to be such a large arm of the service, and also the funds necessary for its accomplishment. On June 30 a bill was under preparation by the airplane division of the Signal Corps, assisted by various members of the board, providing for an adequate service and calling for an appropriation of \$640,000,000 for the 12 months ending June 30, 1918. The various members of the board were called upon to appear before the Military Committees of both House and Senate; the foreign officers attached to Gen. Squier's staff also submitted evidence, and every effort was being made by Members of both Houses of Congress to give ungrudging support in launching the undertaking.

Considering for the present merely the problems of production, the work of the board resolved itself into two main divisions—(1) equipment for training purposes in this country, and (2) equipment for combat work at the front in France.

First consideration was given to the problem of securing training plans for the elementary training in this country of the pilots provided for by the joint technical board. It was found that a very

satisfactory training plane and motor had been developed by an American company, which machine had been used in quantity both by England and Canada, and through the instrumentality of the board this training machine was adopted as the standard training machine for the three services. The fact developed, however, that while it was possible to secure the desired number of planes of this make from other plants, it would not be possible to secure enough motors of the type designed to fit this plane. The board was accordingly obliged to arrange for an additional type of training machine, which it did reluctantly, as the fundamental policy which it has adhered to wherever possible is the elimination of as many extra types as possible and the concentration on the fewest possible number of types of planes and engines.

When consideration was given to the program of combat, reconnaissance, and bombing planes, the major difficulties were encountered. Although America had been the first to develop the art of aviation, and much of the conspicuous work in the development of that art had been carried on in this country, almost three years of warfare in Europe under the stress of fierce military pressure had produced a development so rapid that the designs and ideas of motors and planes constructed in this country were of comparatively little use, and it was seen at once that so far as plane design was concerned we must rely to a large extent for the present on designs developed in the allied countries.

MOTOR-PRODUCTION PROBLEMS.

The same can be said of the motor situation, with this difference: Whereas the construction of the airplane itself and the translation of designs and specifications of these types from France and England presented comparatively fewer manufacturing difficulties for shops in the country, the attempts to produce foreign motors and translate them into the methods of our shop practice presented almost insurmountable difficulties. This fact is not at once understood until it is realized that the whole method of shop practice in the factories of France and Italy is different from that employed in the United States, and it has been the experience almost without exception that the attempt to manufacture in the United States a fine, delicately adjusted product on the plans and specifications used abroad has been almost invariably unsatisfactory. It is substantially a question of shop practice, rather than the individual skill of the workers, there being little doubt that many of the factories in this country to-day are competent to do machine work the equal of any to be found.

Fully aware of the difficulties involved, the board felt called upon to bring to this country at once as complete data as possible of many of the best types of English and French engines. The experience

encountered with the designs for one of the finest French engines well exhibits the task. When the complete blue prints, including the material specifications, were received in this country, it was found impossible to put these engines into production in a plant here equipped to do the finest type of work because in the hurry and confusion of work under war conditions it appeared that the plans were not complete and the factory could not guarantee satisfactory results.

The board was soon in communication with so many brokers representing various factories in France and England whose products were being offered to the Government for manufacture in this country, with large royalty considerations, that the policy was established of refusing to deal with any individual factory or their brokers. From then on it was decided that negotiations would be conducted exclusively between the United States Government and the French, English, or Italian Governments. The allied Governments acquiesced willingly in this method of procedure and in certain ways it tended to strengthen their position with their own factories. The board took the position regarding the royalty matter that there should be free interchange of rights between governments of all matters pertaining to aircraft at this time, and that the advantage to the allied cause of being able to convert the enormous industrial resources of the United States into the production of aircraft might fairly offset such patent rights as might accrue to individual factories abroad.

MANUFACTURING FACILITIES.

As indicated before, one of the immediate and in many ways most difficult problems to be faced from the standpoint of production was the lack of facilities in the industry from which could be expected any adequate results on a program as large as had been decided upon. To undertake an expenditure in excess of \$400,000,000 within 12 months' time in an industry with a total investment of perhaps \$10,000,000 meant that new facilities must be procured at once. Contrary to general opinion, all types of woodworking or machine-shop facilities are not readily adaptable to the manufacture of airplanes and airplane engines, and the board immediately realized that great care must be exercised in encouraging only such establishments to enter this new and rapidly changing business as were equipped from the standpoint of organization and capacity to be of real benefit. As was the case in all the foreign countries, the board looked to the automobile industry, with its vast organizations, for assistance in the production of motors, but for the plane production the task was not so easy.

As a broad general policy it was felt wise to avoid, as far as possible, the scattering of orders for planes and spare parts of planes among a great number of small shops.

The inspection difficulties involved where a great number of shops are working on jobs of this kind are so enormous and results generally so unsatisfactory that, wherever possible, efforts were made to encourage established institutions accustomed to handle things on a broad scale rather than encourage the conversion of small wood-working establishments of various kinds all over the country. Consideration had to be given to geographical location, as it was obviously unwise to encourage a greater production in any section of the country than could be used at the flying fields to be established there.

SEEKING DESIRABLE PLANTS.

Great pains were taken in ascertaining the desirability of manufacturing plants for this work, and when an offer of a manufacturing plant was received an inventory was at once obtained from that plant, supplementing in even greater detail the inventory already on file with the industrial inventory section of the Council of National Defense. Financial statements, personnel of organization, etc., were all noted, and if the prospect appeared good an industrial engineer was at once sent to the plant to make an exhaustive report of the production possibilities from the standpoint of aircraft.

Soon after it became apparent that America was prepared to take an aggressive part in the war in the air the problem of policy was presented to the board in varying ways—whether the manufacturing should be done entirely in this country and planes and engines shipped abroad complete or whether parts should be made in rough in this country and shipped abroad for finish and mounting in France, or finished parts shipped abroad for assembling in either French factories or large American assembling plants in France. Experiments were made by the board with shipments of planes in unassembled form, and serious consideration was given to this method.

The difficulties referred to in providing for production in this country of foreign motors made it imperative that something be done toward producing a motor here which, while fulfilling the requirements of service at the front, should at the same time be designed for quantity production in this country. Two courses were open—one to encourage our manufacturers to develop their own types; the other to bring the best of all types together and develop a standard motor.

THE LIBERTY MOTOR.

The necessity for speed and quantity of production resulted in a choice of the latter course, and the designing of a standard motor

became the board's engineering objective. Two of the best engineers in the country, both experts in aviation-motor design, were brought together at Washington and the problem of producing an all-American engine at the earliest possible moment was presented to them. Their first conference was held on June 3, and in consultation with engineers and draftsmen from the various sections of the country they worked continuously, and on June 30, which was 24 days after the drawings were started, the new engine, known as the "Liberty motor," was practically completed.

In connection with this work consulting engineers and motor manufacturers gave up their trade secrets as a patriotic measure under the emergency of war needs, and these latter industries also contributed the services of approximately 200 of their best draftsmen. The new engine embodied the best thought of engineering experience, and contributions to the final result came not only through celebrated consulting engineers of this country, but the representatives in the United States of England, France, and Italy cooperated in its development.

It was so designed that all parts of the motor were standardized and might be produced rapidly and economically by many factories operating under Government contracts. In short, the engine amounted practically to an international model, embodying the best thought of American engineering and foreign experience, so far as the latter could be adapted to American manufacturing methods.

A glance at the problems involved in negotiating with the allied countries showed the imperativeness of immediate representation by the board over sea, and accordingly a commission, under the authority of the United States Signal Corps, was dispatched on June 17 to represent the United States in negotiations with the foreign air authorities, and to learn at first hand of the latest developments in plane and engine manufacture abroad. With this commission was sent a group of 103 mechanics, chosen from the best automobile factories in the United States. These men were assigned to a half dozen of the leading French factories to learn from the bench the intricacies and minute details of the manufacture of the most conspicuously successful motors. The work of this foreign mission was only beginning by July 1, and the comprehensive results of their efforts can consequently be no part of this report.

MATERIALS FOR AIRPLANES.

In considering the materials used in the manufacture of airplanes, the board discovered at once that the two major difficulties likely to be encountered were in the procurement of spruce and linen. Because of its lightness and at the same time great strength spruce has

been almost exclusively used in the past in the manufacture of the struts, beams, etc., of the airplanes. Propellers are made of different woods, chiefly mahogany and black walnut, and while it was not easy to secure adequate importations of mahogany, due to lack of bottoms, the situation was clearly well in hand as long as black walnut, and even birch, could be used with success for propeller construction. Spruce, on the other hand, was used almost universally, and three of the allied Governments have been looking to America for their supply of this lumber. This has resulted in thoroughly unsatisfactory conditions in the market, as different specifications were being used by the three principal buyers, each buyer being represented at various times by several brokers who were bidding against each other and exacting exorbitant commissions for supplying the products to their clients.

The matter was taken in hand by the board and a man of experience in woodworking operations was secured to represent the board in this connection. A delegation was sent to the Pacific coast, including a member of the lumber committee of the Council of National Defense, and changes made in the cutting specifications at the sawmills, so that a much larger percentage of the log would be available for airplane stock than heretofore and also to the end of making it possible to purchase much less per airplane manufactured than heretofore. This had the further advantage of relieving the transportation situation. In some instances this revision of specifications resulted in reducing the amount of lumber required for one machine from 2,400 to 800 feet, the amount now found adequate for the average type of plane.

The production of spruce in the United States in 1916 was, roughly, 30,000,000 feet, and the board faced a probable demand for 1918 far in excess of this amount. There is practically an unlimited supply of spruce in the forests, but as it runs fairly uniform throughout a given tract in the ratio of not more than 15 per cent on the entire cut, unless special effort were made to bring out the spruce the supply would be far short.

LINEN SUPPLY.

In manufacturing airplane wings linen has been the fabric used by all factories where obtainable. Its lightness and great tensile strength, the fact that it will not rip when pierced by machine-gun fire or shell fragments, the way in which it absorbs the so-called "dope" applied to its surface, makes it the ideal fabric for this work. There is no production of a fabric of this nature in the United States, the entire supply being obtained from Ireland. The loss of the Belgian textile towns made it necessary for France to look to Ireland for its linen, and with the enormously enlarged program contemplated

it was seen that the supply would undoubtedly be short. After considerable negotiations with the importers in this country representing different mills in England and Ireland an agreement was reached whereby one of their number was authorized to represent the entire group and he was in turn made the official representative of the United States to negotiate all matters pertaining to linen with the British air board there. Arrangements were made for a reasonably adequate supply of linen for the year 1918.

It was soon recognized by the board that steps should be taken at once to fortify our situation in regard to both spruce and linen, if possible, by the development of substitutes. The problem was presented to the Bureau of Standards, which had already conducted numerous experiments along this line.

Other equipment for aviation work, such as motor trucks, machine guns, etc., has required the board's attention, as well as many general policies of the Signal Corps, such as the providing of supply depots in this country, construction work here and abroad, aviators' clothing, etc.

With the program fairly well established, one of the knotty problems confronting the board was the proper contracting for this material in such a manner that the Government would be fairly protected in the expenditure of such large sums of money. It must be remembered that there was practically nothing to be used as a basis in the way of former prices for any of this material, the orders of previous years having been placed in such small quantities that the concerns were unable to accomplish much in the way of lowering costs, and what seemed to be large prices were reputed by the manufacturers and borne out in many cases by the yearly profit statements of the manufacturers as being not excessive.

However, new conditions in the form of quantity orders were now to be placed and adequate safeguarding of the Government's interests required that every possible effort be made to ascertain proper costs on the articles to be produced. Consideration was essential, however, of the position of the contractor, where in almost every case a large investment was necessary to enable a company to undertake a part of the program. Investment had to be encouraged in an industry which had proven hazardous in years gone by and with the consideration that the termination of the war might see almost a complete stop to future business in anything like the quantities dealt in for the moment.

At the outset of the negotiations with the contractors, the board arranged for its own auditors to go into the plants of the various contractors, and a reliable firm of chartered accountants was retained accurately to ascertain the costs of the various planes and motors. However, many of the articles to be contracted for have never been

produced before in this country, and in such cases the board had recourse to independent experts in shop practice and received from them estimates as to what these various articles should cost.

A standard form of cost plus fixed profit contract was in process of development by the board on July 1.

AVIATION TRAINING FIELDS.

The development of flying fields in this country prior to July 1 received the thoughtful consideration of the board. The original program embraced the construction of 24 fields. It was also planned to advise the acceptance of offers from abroad to train there certain numbers of American aviators. A greater development of the flying field program, however, was under consideration on July 1.

The general principle underlying the establishment of aviation training stations was:

1. That such stations should be in the vicinity of centers of material and personnel supply, thus reducing transportation problems.
2. Locations should be sought with favorable topographical and climatic conditions.
3. Consideration should be given to the military use of such fields and their civil use after the war.

In this phase of its work, as in others, the board was brought into close contact with the aviation authorities of the allied Governments, both through its commission abroad and through visits to this country of many of their members.

In the case of Canada a reciprocal arrangement was entered into providing for the training at once of a number of our cadets at Camp Borden, in return for which the United States was to build a double unit school at some point in the South, where Canada may continue her training during the winter months when that work is impossible at Borden.

GENERAL MUNITIONS BOARD.

The General Munitions Board began work on April 9, under the chairmanship of Frank A. Scott. It was composed on June 30 of 17 qualified representatives of the War and Navy Departments and 6 civilians exclusive of the chairman. The efforts of the General Munitions Board were directed toward coordinating the making of purchases by the Army and Navy, and assisting in the acquisition of raw materials, and establishing precedence of orders between the Departments of War and of the Navy, and between the military and industrial needs of the country. The board has assisted in developing sources of supply for rifles and other small arms, machine guns, ordnance of many types, ammunition, gun forgings, carriages, limbers,

caissons, forge wagons, military vehicles, steel helmets, armor-piercing shells, surgical supplies, optical glass and gauges, tools, and dies of many kinds. It has further served as an advisor to the military department in the building of cantonments, the determination of prices, and the establishment of storage facilities.

To meet the various contingencies constantly arising, committees were appointed from time to time to deal with these matters, the personnel of which were men familiar with the subjects assigned to them.

COORDINATION OF DEPARTMENTAL BUYING.

The work under the board of coordinating the departmental buying has tended to eliminate competitive bidding between the War and Navy Departments and between subdepartments. The board further has acted as a clearing house for orders that involve material in which a national shortage exists or is anticipated, and where manufacturing facilities were insufficient, the board has directed its efforts to developing new facilities.

One of the first of the board's activities had to do with materials required by the various departments of the Army and Navy and the development of a policy or method for procuring these requirements. In the early days of the board, the requirements of the various departments, as pertaining to raw materials, were referred to the raw materials committee of the Advisory Commission, with a view to ascertaining whether or not the requirements as reported could be obtained, and if not, how new sources might best be developed. Similarly, the requirements of supplies, such as cotton, woolen goods, and shoes, were reported to the committee on supplies, which arranged for the procurement of these items.

GUN FORGINGS.

A matter to which the board turned its attention shortly after its appointment was the production of gun forgings. This work was first assigned to the Munitions Standards Board of the Council. A survey of the situation showed that the facilities of the country were not sufficient to meet the demands. Conferences were held with numbers of manufacturers in April to ascertain what could be expected in both production and delivery. Various changes were suggested in the specifications by manufacturers and by representatives of the Ordnance Department, and the cooperation of manufacturers was enlisted in developing additional facilities. From time to time recommendations as to plants were made to the Ordnance Department. Throughout these negotiations the matter of precedence, as between the Army and Navy, was constantly considered and recommendations made so that both branches of the Government would be served as

effectively as possible. At the same time as the increase of forging capacity was under way, facilities for machining capacity were being developed on much the same basis. About the middle of June the committee in charge reported that facilities had been planned for a sufficient amount of gun forgings and for machining the material as fast as turned out to cover the estimated requirements for the Army and Navy.

In the matter of small arms, the Munitions Standards Board's committee promptly presented a report, which the board submitted to the Ordnance Department, outlining a plan whereby sufficient rifles might be produced to meet the requirements of an enlarged Army.

At the same time the General Munitions Board made recommendations on the procuring of ammunition for rifles. Similarly, negotiations were carried on with reference to the manufacture of pistol and revolver ammunition, and recommendations were made to the Ordnance Department.

Machine guns was another subject that the board took up, inasmuch as the machine-gun capacity of the country was not sufficient to meet the demands. Investigations were carried on by a committee appointed for the purpose, and plants and their facilities were thoroughly studied and recommendations made as to how the requirements could best be met.

Another committee of the board made a very complete survey of the facilities of the country for producing shells and, during April, held several conferences with the shell manufacturers, the object of these meetings being to arrive at an idea as to fair and just prices. The question of flat prices, of prices based on cost plus percentage basis, was discussed and considered.

RECOMMENDATIONS ON GAUGES.

The board gave its attention also to the matter of gauges, and under advisement of the Munitions Standards Board a committee on this subject went into the question of gauges, held conferences with the interested departments, reviewed the situation, and sent a committee to Ottawa, Canada, to confer with the Canadian officials and learn their experience. The result was a recommendation to the War Department on this subject.

In the matter of powder, a committee took up this problem, held conferences with the leading manufacturers, saw that a possible shortage might exist, and made recommendations for arrangements to overcome this shortage.

In addition to these activities, the board concerned itself with the question of car shortage, having meetings with the Railroads War Board on this subject.

In the matter of optical glass, through its committee on this subject, the board arranged for additional facilities whereby the requirements of the Government could be taken care of.

Attention was also given to the supply requirements of the Medical Departments and recommendations made on this score.

LUMBER FOR ARMY VEHICLES.

Arrangements for lumber for Army vehicles were made on behalf of the Quartermaster's Department whereby that department was put in position to receive its required quota. In this, also, the matter of coordination was considered, and arrangements made whereby the Quartermaster's Department would act for the entire War Department in procuring lumber and wooden billets for its vehicle use.

The cooperation of the lumber committee and the Railroads War Board was particularly enlisted in assisting to organize the construction of the new Army cantonments, and every facility was offered the Quartermaster's Department in order that the cantonments might be prepared in time for the troops.

From the first two problems confronted the board in its efforts to assist in procuring materials, one priority of orders, the other a shortage of certain items, and the necessity for proper coordination for ordering those items. During the latter part of April the board addressed a communication to the Council, asking that it might exercise full power in the determination of priority of delivery of materials, in accordance with the general policy of the Government. Such authority was granted to the board by the Council, and certain principles laid down to guide the board in its priority work. Similarly, the board addressed a communication to the Council calling attention to the desirability of maintaining a list of materials and finished products, in the program of which industrial limitation appeared imminent and coordination of action appeared to be essential, and asking that no proposals of purchase orders be issued by any department until submitted for clearance to the board, except in cases of emergency.

The work of the board has consisted in directing and following up the work which it has delegated to its subcommittees in making recommendations thereon to the departments. To this end the board, or its executive committee, met almost daily and received constant reports from the subcommittees of the progress of their work.

COMMITTEE ON EMERGENCY CONSTRUCTION.

Early in April it became apparent to the General Munitions Board of the Council of National Defense that building construction and other engineering work was a vital part of the preparation for carry-

ing on the war. Enormous cantonments had to be constructed in order to provide for the training and housing of troops, and enormous additions had to be made to Government arsenals and other manufacturing concerns engaged in the production of war materials and supplies.

For consideration of this problem, the Committee on Emergency Construction was organized on April 28, 1917, with the following personnel: G. W. Lundoff, of Cleveland, Ohio (chairman); W. A. Starrett, of New York, N. Y.; Maj. Wm. Kelly, United States Engineers; Frederick Law Olmsted, of Boston, Mass.; M. C. Tuttle, of Boston, Mass.

The resolution defining its duties was in part as follows:

To suggest forms of day-work contracts applicable to the construction of cantonments and similar enterprises where rapidity in construction is essential; to formulate plans and methods of expediting the construction of housing facilities in connection with engineering and construction work and activities essential thereto.

Shortly after the formation of the committee, Mr. Lundoff resigned as chairman and Maj. W. A. Starrett, Engineers, United States Reserves, was appointed chairman in his stead.

Immediately it became apparent that the ordinary method of advertising for bids and awarding the contract to the lowest bidder could not be followed because of the necessity of getting the work under way at once prior to the developments of completed plans and specifications which could be used as a basis for competitive estimates. In other words, construction and design would have to go concurrently, especially since the sites for these cantonments had not even been determined. Since no form of Government contract met this situation a new form had to be developed.

MOBILIZING THE CONTRACTORS.

In collecting the information necessary for drawing a workable and satisfactory contract, the committee invited to Washington and interviewed a large number of the leading engineers and contractors of the United States, discussing with them the desirable features of such a contract and particularly the matter of compensation. The result of this study was embodied in a report, dated May 9, which outlined the principle which seemed to the committee desirable to embody in such a contract. This report was brought before the General Munitions Board, was discussed, certain changes were suggested and embodied, and the matter again brought before the General Munitions Board and the report approved. After which the committee, in cooperation with the legal committee, drew the cantonment form of contract which was approved by the General Munitions Board and has since been used on a large amount of the Government's construction.

A percentage or daywork form of contract is essentially one requiring mutual confidence between the parties thereto. Accordingly it was desirable to obtain rather intimate facts regarding a large number of contracting firms, and, since the basis of the award of emergency contracts was to be the capacity and capability of various contractors rather than competitive estimates submitted, it was necessary that there be available information regarding reputable contractors in the various districts in which emergency work was required. This information was gathered in the following manner: Inquiries concerning responsible contractors capable of handling construction under rush conditions were sent out to different groups to canvass the country's resources—(a) to the leading architectural firms throughout the country; (b) to the chief engineers of leading railroads; (c) to engineers of naval stations of the Government; (d) to a selected list of members of the American Society of Civil Engineers.

PROCURING DATA AS TO BUILDERS.

From recommendations and suggestions thus obtained and through later sources of information questionnaire blanks were sent out, and as replies came in from contractors references given were followed up to complete the desired information. In all some 3,000 inquiry blanks were sent out. Thus, lists of contractors are being amplified continually and extended. These lists were cross indexed and further subdivided as regards localities and magnitude of operations which, through experience, the various contractors were qualified to undertake. The credit rating of various concerns, as indicated by Dun and Bradstreet, was added to other information as well. From every available source this list has been expanded and information built up until the committee has in hand probably the most complete survey of the contracting field that has ever been made. From these lists, as the various cantonment sites were selected, recommendations of contractors were made by the committee at the request of the Quartermaster's Department, and upon their being approved by the General Munitions Board the awards of contracts were made. Since then the Signal Corps, the Corps of Engineers, and the Ordnance Department have requested that the committee from its records recommend contractors for different operations falling under their jurisdiction, preference in general being given to the best qualified contractor in the district in which each operation was to be situated.

THE BUILDING OF THE CANTONMENTS.

The question of the construction of cantonments for the National Army was a most pressing problem confronting the War Department at this time; that is, in April and May, 1917. Col. I. W. Littell

was assigned by the Secretary of War to take charge of cantonment construction, and the Committee on Emergency Construction immediately set about to assist him in building up an organization, an engineering division to develop plans and specifications, an administrative division to direct actual construction of the cantonments in the field, a purchasing division to mobilize the enormous quantity of material required in connection with cantonment construction (the providing of proper transportation facilities, etc.), and a finance division to keep the complex accounts necessitated by the size of the operation.

The committee suggested the names of various men who seemed to them particularly fitted to head the different departments of this work. The suggestions were largely accepted, and a chart of the organization was drawn up under Col. Littell's direction and submitted to the Secretary of War and approved by him.

It was necessary early in the spring to conduct investigations of sites for cantonments already selected. No funds were available for this purpose. Consequently a subcommittee was appointed, consisting of Leonard Metcalf, of Boston, Mass.; George W. Fuller, of New York, N. Y.; Asa E. Phillips, of Washington, D. C., to work with the committee, and through them an appeal was made to engineers, town planners, and sanitary engineers to aid in studying the conditions at each cantonment site and submit a report thereon. The work of this subcommittee was of great importance, as had they not conducted their investigations weeks would have been lost in the construction of the cantonments. They studied particularly transportation facilities, topography, water supply, and sewage disposal, and after the submission of their report the subcommittee cooperated actively with Col. Littell's engineering organization in solving the problems that their reports brought out.

OBTAINING BUILDING MATERIALS.

When the construction of the cantonments began it was most desirable to form committees representing the different trades whose material would enter into the Government building construction. For this purpose representatives of the different industries were called to Washington and requested to organize in such way that the Government could deal as nearly as might be with a single individual representing that whole industry. The result of this was the establishment of committees, some of them with permanent representatives in Washington. The Committee on Emergency Construction thus assisted in putting the Government quickly in touch with any line of building business needed.

Early in June the committee recognized that very probably the Government would require a large quantity of portable buildings,

and to this end it conducted a detailed survey and investigation of the whole temporary building proposition, studying all available types at present manufactured in this country and in use by the foreign armies. From the report of experts who were invited to handle the investigation for this committee, a standard type was developed embodying the more desirable features of all designs. When the demand for portable houses was felt, the existence of this report was of great assistance to the Corps of Engineers.

A subcommittee, consisting of Messrs. Leonard Metcalf, George W. Fuller, Asa E. Phillips, and L. B. Stillwell, prepared a report dealing with the form of contract with engineering concerns. This was an effort to standardize the business arrangement for engineers precisely as matters had been standardized for the engagement of contractors. This form of contract was used by the Quartermaster's Department in connection with cantonments where outside engineering services were required.

In addition to advice given to the cantonment division, the committee has advised various branches and departments of the Government, including the Signal Corps, the Ordnance Department, and the Corps of Engineers, in matters pertaining to building construction and has endeavored to coordinate, in so far as possible, all building operations in order to prevent competition for materials or duplication of effort in the matter of design with a view to saving time and effecting economy in the actual construction work itself.

COMMITTEE ON STORAGE FACILITIES.

The field of the Committee on Storage Facilities lies in planning and advising as to that group of activities affecting the movement of munitions and supplies of war from the point at which they are manufactured to the point at which they are utilized, either in this country or overseas. It covers such functions as warehousing proper, distribution, and traffic control. The policy of the committee has been to cooperate with every agency of the Government, military or civil, having such problems. This cooperation has been always of an advisory and supplementary character. The effort has been to build up existing governmental agencies and to bring to them the best thought of the industrial world. The purpose has rather been to visualize the mechanisms and policies, to urge their adoption, and, in some instances, to provide the personnel which, operating from within the service, should develop them. Through the appointment of the depot board of the Army and through representation upon this board of members of the Storage Committee it has been possible to bring to the War Department as a whole very considerable assistance in the working out of its storage policies and problems.

The work of the committee has been divided into three main parts, namely:

1. Plant and equipment.
2. Organization and methods.
3. Personnel.

These major functions in turn divide themselves somewhat as follows:

PLANT AND EQUIPMENT.

- A. Type and extent of space required.
- B. Suitable locations.
- C. Design and layout of structures.
- D. Types of labor-saving equipment: (a) Exterior local transportation and handling equipment; (b) interior conveying and handling equipment.

ORGANIZATION AND METHODS.

- A. Warehouse organization.
- B. Standard warehousing methods.
- C. Traffic and routing procedure.
- D. Statistical and graphical control.
- E. Study of the package: (a) Size, (b) baling, (c) type of box, etc.

PERSONNEL FOR STORAGE SERVICE.

- A. Finding of trained individuals for the storage service.
- B. Establishment of training schools.
- C. Determination of conditions under which women can be employed in storage service.

Under each of the above headings the committee's studies up to July 1, 1917, resulted in recommendations and actions as follows:

ACQUIRING STORAGE AREAS.

In order to determine the type and extent of storage space required by the Ordnance, Engineer, Quartermaster, Medical, and Signal branches of the Army, data and estimated needs of these departments were collected. Based upon this information and giving consideration to the vast amount of tonnage being exported from this country along the Atlantic coast, causing a serious congestion at different ports of shipment not only on docks and in warehouses, but even in freight cars by the trainload awaiting shipment abroad, a tentative recommendation was made for the Government to secure either by lease or purchase terminal storage areas at certain specified ports.

Due consideration was given to the necessity of having these storage areas of such capacity that in each area the five departments of the War Department could be properly taken care of under their

own officers and supervision and their supplies kept separately. In the location of the different storage areas it was recommended that proper consideration be given to the kind of materials and supplies that were to be stored. There were instances when it was possible to recommend certain storage space already constructed and available, but these were cases where the condition was acute, consequently temporary rather than permanent facilities would suffice.

The requirements of the various departments at the cantonments for divisional storage were estimated, and these estimates were adopted. As in the survey of terminal storage facilities, careful consideration was given to the requirements of the various types of supplies and materials to be stored. In addition to the consideration of storage areas at the points of embarkation and cantonments due consideration was given toward establishing proper storage areas and facilities as near central points of procurement as possible, in order to prevent undue and unnecessary congestion on the railroads and other methods of transportation between the points of manufacture and shipment overseas.

Close cooperation was maintained with the Committee on Emergency Construction. That committee was supplied with all data at hand on storage requirements at the cantonments. Original plans covering storage of the Ordnance, Quartermaster, including storage of perishables, and Medical departments, were revised resulting from information furnished by the committee.

TO EXTEND TRANSPORTATION METHODS.

Realizing the economic loss wherever a given tonnage of material is loaded, hauled, or unloaded more than once in its journey from point of manufacture to point of ultimate use or to point of shipment abroad, the committee planned that as soon as possible arrangements should be made for the efficient and cooperative use by shippers of methods of transportation other than railroads, such as electric railways, inland waterways, canals, and motor trucks. This plan would relieve the railroads from handling, to a very considerable extent, less than carload lot shipments.

Service was rendered the supply division in the Medical Corps by preparing and furnishing methods of procedure for both home and foreign service, and also cooperation along similar lines was effected with the Corps of Engineers and the Signal Corps. Satisfactory relations were early established between the ordnance supply division and the storage committee.

Through a study of the methods of packing it was concluded that a more intensive investigation would be necessary in order efficiently to use storage space, as the results of the general investigation showed that in some instances the saving in space

amounted to as high as 60 per cent, and in England the cost was reduced from an average of \$1.25 per box to 62½ cents per bale. These factors, of course, have a marked effect on the construction of storage buildings. In addition the necessity for establishing standard boxes or containers for supplies in some of the branches was deemed worthy of careful consideration in order to simplify the requirements in this respect.

PERSONNEL FOR STORAGE SERVICE.

Early in May the services of the committee were requisitioned by the Civil Service Commission, the Quartermaster's Department, the Corps of Engineers, and particularly the Ordnance Department, for the procuring of personnel, specially trained, for service in the several branches.

Upon the committee's suggestion, and in some cases under its direction, special eight-week courses were established in eight colleges and universities to train men intensively for service in stores work.

For the most part college graduates were enrolled, and approximately 1,200 men had either completed or were in course of training by July 1, many enlisting in the service of the Ordnance Department.

In consequence of the many requests of military departments for personnel a separate department became necessary, whose function is to keep on file experience records of exceptionally qualified men, properly recommended by responsible business executives. In fact, the appointments made ranged in type from executives of national distributing agencies, managers of warehouses, to the packer.

The necessity for increasing the employment of women in industry was foreseen, and steps were taken to investigate this possibility, particularly in stores work.

The efforts of the committee were to divide its work into sub-functions and to direct the efforts of those best qualified by experience in developing those functions.

MUNITIONS STANDARDS BOARD.

The Munitions Standards Board was formally created by the Council of National Defense by a resolution passed on March 20, 1917, to aid in insuring speedy and efficient quantity production of munitions. Its purpose was to standardize munition specifications. Under the authority provided in sections 120 and 123 of the national defense act of June 3, 1916, the Secretary of War was granted full power to provide specifications and detailed drawings and select gauges, dies, jigs, and tools for the immediate manufacture of arms and ammunition.

The creation of the board was in part a result of a special report published in Senate Document No. 664, and dated January 4, 1917, on the "Government manufacture of arms, munitions, and equipment," prepared by the board of which Col. Francis J. Kernan was president. The Kernan report recommended, among other things, that it was not desirable that the Government manufacture its arms, munitions, and equipment exclusively, and that it was important to accumulate a full supply of drawings and gauges and to standardize gauges, jigs, and tools as far as practicable, and as soon as practicable. Upon the indorsement of the Advisory Commission, the Council created a committee of six experts in munitions work to assist in carrying out the recommendations of the Kernan Board.

FOR INCREASED QUANTITY PRODUCTION.

The Munitions Standards Board has been engaged at first on its own responsibility and later in cooperation with the General Munitions Board in investigating the American manufacture of shells, guns, and all other forms of munitions and in holding conferences with manufacturers, with the result that modifications in specifications and design have been introduced to permit greater quantity production. This work, of course, has been carried on in constant cooperation with the various bureaus of the War and Navy Departments.

The officials of the Government early realized that if the country was to secure the immense increase in munitions output which the war would demand, the factories must be concentrated on as few types and sizes of product as was practicable. Improperly designed gauges with improper tolerance had already caused American manufacturers as well as the allies the loss of many millions of dollars, and the Government realized that its blue prints must be prepared with the proper tolerance proved by test and gauge practice. This would enable all factories to standardize their production. This work the Munitions Standards Board has assisted in carrying out.

USE OF FOREIGN EXPERIENCE.

One of its most notable services has been to aid the Government in finding ways and means of adapting peace-time standards to war-time conditions, together with suggesting the possibility of modifying designs to make them more practicable as manufacturing projects. The board has also served as a channel for bringing to the service of the military departments of the Government the manufacturing experience which had been developed through 2½ years of making war materials for foreign Governments. A comprehensive list of manufacturing establishments which had been manufacturing muni-

tions for the allies was compiled for confidential use, and their productive capacity along these lines was developed and tabulated.

The following experts were appointed to compose the board: Frank A. Scott, of the Warner & Swasey Co., Cleveland, manufacturers of automatic machinery and optical instruments, chairman; W. H. Vandervoort, of Root & Vandervoort, builders of special machine tools, and president of the Moline Automobile Co.; E. A. Deeds, formerly general manager of the National Cash Register Co., president of the Dayton Engineering Laboratories Co., and interested in many industrial activities; Francis Pratt, of the General Electric Co., Schenectady; Samuel Vaucrain, of the Baldwin Locomotive Works, Remington and Westinghouse Companies; and John N. Otterson, vice president of the Winchester Arms Co.

COMMITTEE ON COAL PRODUCTION.

On April 27, 1917, the Council of National Defense created the Committee on Coal Production, with jurisdiction over anthracite and bituminous coal and coke, and instructed the committee to make every effort possible to increase the output of coal at the mines and cooperate with the transportation committee of the Advisory Commission to accelerate the movement of coal to points where the need is greatest.

The personnel of the committee includes mine owners, mine workers, coke producers, distributors, consumers, transportation agencies, representatives of the United States Geological Survey, the United States Bureau of Mines, and the United States Department of Labor.

The first meeting of the Committee on Coal Production was held May 9, 1917. Immediately thereafter its organization was completed and specific duties assigned to the various members.

While the production of both bituminous and anthracite coal in 1916 was the greatest in the history of the industry, nevertheless at the outset it was the opinion of the committee that the total requirements for the current year would very considerably exceed the 1916 production, not only by reason of increased domestic requirements, but also because of the enormously increased demand for American coal by the allied nations and Central and South America.

CHARTING THE COAL RESOURCES.

To ascertain as accurately as possible the amount required and how it could best be produced and distributed, the Committee on Coal Production, with the assistance of the Bureau of Mines and the United States Geological Survey, prepared maps definitely locating

all coal deposits and producing mines in the entire United States, and, in addition, made a comprehensive survey of the consumers, showing the estimated amounts required by the various classes of industries, including the amount in storage. This survey clearly showed that the limiting factors in the problem of securing the needed coal requirements were shortage of mine workers and inadequate distributive facilities and not potential capacity, which was in excess of the maximum requirements.

The survey also confirmed the previous surmise of the necessity for increasing the 1917 production over the 1916 maximum—1916 production of bituminous being approximately 503,000,000 net tons, anthracite being approximately 67,000,000. The shortage of mine workers was aggravated by voluntary enlistments of the younger men who handle electric locomotives and perform other duties requiring long continued physical exertion, which when performed by older men, experience has shown, results in retarded production; the stoppage of immigration which alone supplied annually over 80,000 mine workers, and a loss to the coal industry of great numbers of mine workers and unrest among those remaining created by higher wages and more regular employment offered by other industries.

As regards inadequacy of distributive facilities, this was not confined to coal; the general congestion of shipping and of the railroads of the country on account of war conditions, the frequent resulting embargoes on shipments of all kinds and scarcity of shipping despite splendid efforts of the railroads and shipowners to meet the unprecedented conditions are so well known as to require no further elaboration here. With respect to coal, even under normal conditions there are periods occurring in almost every year during which the coal-car supply is inadequate to meet current demands. Under the abnormal war-time demand this condition has become chronic, and the entire situation showed clearly that no immediate relief could be expected through increases in rolling stock or shipping.

All the foregoing indicated that the only solution to the problem of securing adequate production and distribution of coal lay in making greater use of existing instrumentalities of production and distribution and at the same time establishing a much higher degree of cooperation than has heretofore existed between transportation agencies, producers, mine workers, distributors, and consumers. To make the most efficient use of the existing instrumentalities and to secure this cooperation has been the aim of the Committee on Coal Production. To trace all the steps by which this was accomplished would make this report excessively voluminous. A few of the more important activities are briefly referred to in the following:

INCREASE IN EFFICIENCY OF COAL DISTRIBUTION.

LAKE COAL POOL.

The Northwest is almost entirely dependent upon lake navigation. The lake season, i. e., the period during which the Great Lakes are open for navigation, usually extends from early in April to early in December. Owing, however, to the late spring the navigation season this year did not open until May, heavy ice interfering with navigation until June 10, a further aggravation to an already serious situation. As a result of this late opening, the stock of coal on hand at the head of the Lakes had reached the lowest point in the history of the industry, and the seven-months period within which all shipments had to be made was shortened by three weeks. To evolve a remedy to prevent this threatened calamity, the lake coal shippers and representatives of the railroads and steamship companies serving Lake Erie ports were called together and an arrangement concluded whereby the number of lake port consignments was reduced from 677 to 97, through pooling coal of similar characteristics. Only the unselfish and patriotic attitude of the coal operators in sacrificing their long-established trade names and sinking the individual identities of their companies made this possible. This resulted in decreasing the average days' detention at Lake Erie ports of coal cars from three and one-half days to two days, thereby increasing the number of coal cars available for transporting coal to lake ports and increasing very greatly the movement of coal to the Northwest.

TIDEWATER COAL POOL.

Beneficial results of the lake coal pool were immediately apparent and prompted the Committee on Coal Production to undertake similar arrangements on a much greater scale, affecting the entire Atlantic seaboard, as a step toward supplying the abnormal coal demands for the Navy, Army transports, and allied and South American countries heretofore supplied by Great Britain. The tidewater coal shippers evidenced the same patriotic spirit shown by the lake shippers in sacrificing their long-established and valuable trade names and individual commercial identities, thereby insuring a success even greater than was achieved through the lake pool. By way of illustration, consignments were reduced from over 1,100 to 47. During the first 15 days' operation the average detention to coal cars had been cut one-half. At Newport News, where 6,600 tons were being loaded in one day on Government vessels under ordinary conditions, under the pooling plan 21,400 tons have been loaded in one day, an amount far in excess of any previous records, a result impossible of accomplishment under the old system.

NAVY COAL.

The Navy Department having been unable to secure bids for supplying the coal requirements of its battleships, the Secretary of the Navy called upon the committee to secure at satisfactory prices the coal required by the battleships of the Navy. This coal required for battleships was of a special quality, produced by a few mines enumerated on the Navy Department's "acceptable list." The owners of these mines were immediately called to Washington. Notwithstanding practically their entire output was already sold, they voluntarily agreed to supply the Navy requirements of this special coal, amounting at that particular time to 1,700,000 tons, at a price to be later determined by the Government.

COAL SUPPLY FOR OTHER GOVERNMENT PURPOSES.

Contemporaneously with the difficulty experienced by the Navy Department in obtaining coal for its battleships, the other governmental departments were unable to secure the coal required for their current or future consumption and were facing a total deficiency, including the Navy Department, of approximately 8,000,000 tons. The serious problem of supplying this coal was complicated, in the case of the various public buildings in the District of Columbia, by the absence of terminal or haulage facilities and by the inability of the local dealers who had heretofore supplied this coal to secure protection on purchases from mine owners on account of the inflexible nature of the then existing Government coal specifications and the guaranties required. After obtaining consent to the modification of these specifications, impracticable on account of the existing abnormal conditions in the coal industry, and revising them to conform to commercial usages, and after concluding arrangements for necessary haulage, for satisfying the statutory requirements based on wagon-load instead of carload weights, the Committee on Coal Production was obliged to supply not only the Government coal deficiency in the District of Columbia, but also the coal deficiencies of the Government throughout the entire United States. This the Committee on Coal Production was able to accomplish by reason of its complete mobilization of the coal industry of the country.

LABOR.

The abnormal labor conditions existing in the entire industrial life of this country under war conditions has been reflected sharply in the coal industry. Abnormally high wages and steady employment in rapidly expanding war industries not only attracted from the coal industry large numbers of mine workers but also created a feeling of unrest and dissatisfaction in many of those remaining. This mani-

fested itself in the form of strikes, disputes, etc. It is safe to say that never since the Civil War in this country has the labor situation in the coal industry been in such a precarious condition. The success in overcoming this serious menace, which on many occasions threatened entirely to block progress toward cooperation, was primarily due to the self-sacrificing spirit manifested by the representatives of the United Mine Workers of America, the American Federation of Labor, and the Department of Labor, who are members of the Committee on Coal Production.

The results accomplished through the foregoing efforts of the Committee on Coal Production and those assisting it throughout the country can best be summarized by the following figures:

During the week ending January 6, 1917, the average daily production of bituminous coal was 1,840,000 net tons, of anthracite coal 228,490 gross tons; during the week ending April 21, 1917, the time of the creation of the Committee on Coal Production, the average daily production of bituminous coal had decreased to 1,682,000 tons, of anthracite 223,680 gross tons. From the latter date production progressively increased, until at the end of June bituminous coal was being produced at the rate of 1,902,864 tons per day and anthracite at the rate of 281,960 gross tons per day, the greatest output of both bituminous and anthracite coal in the entire history of the coal industry, an output which, if maintained, not only would be sufficient to supply the entire coal requirements of this country but also would create a large surplus to relieve the coal shortage of the allied nations.

Every indication pointed to a still further increase in production, which would, in the opinion of the committee, automatically have reduced existing excessive prices through the normal operations of the economic law of supply and demand. Nevertheless, in order to hasten this result, a body of over 400 men, representing all the coal operators in the United States, were called together.

MEETING OF COAL OPERATORS.

A meeting was held in Washington, at which there were present among others, the Secretary of the Interior, the Secretary of the Navy, a representative of the Department of Justice, and a member of the Federal Trade Commission. At this meeting the coal operators of the United States, through their representatives, voluntarily agreed to accept whatever maximum prices for their coal might be considered just and fair after costs of production had been ascertained. Pending this investigation, and to secure immediate results, a resolution was passed whereby the coal operators of the United States voluntarily offered to accept whatever tentative prices might be established by a committee composed of the Secretary of the In-

terior, a member of the Federal Trade Commission, and the chairman of the Committee on Coal Production.

Pursuant to this resolution, the latter committee, on June 28, published a proclamation, naming tentative maximum prices, above which the representatives of the coal operators of the United States promised they would not charge. No authority was assumed by the committee, so far as the Government and the public were concerned, nor was there any agreement or understanding which prevented coal operators from charging less than these prices in case they so desired, and in some districts lower prices than those contained in the proclamation were actually charged. This action was in the nature of a voluntary temporary expedient, subject to revision after determination of actual costs by the Federal Trade Commission. According to estimate made by the United States Geological Survey, these reductions would have effected a saving of \$15,000,000 a month to the consumers of bituminous coal based upon the May tonnage not under contract. The accomplishment of this voluntary reduction in the price of coal by operators in the face of a buyers' panic marked, in the opinion of the committee, a unique degree of cooperation in the coal industry.

COMMERCIAL ECONOMY BOARD.

On March 24 the Council established the Commercial Economy Board to study and advise how commercial business might best meet the demands to be made on it by the war. It was apparent that many men and materials ordinarily employed in these activities would have to be taken for war work and fighting. It was also clear that if business was to give them up without unnecessary hardship to itself and to the civilians dependent on it for supplies, comprehensive planning would be required. The Commercial Economy Board was assigned to guide and cooperate with business men in this planning and in making the necessary readjustments.

TO CUT DOWN NEEDLESS ACTIVITIES.

The problem was to find out what activities within the various lines of business were nonessential, and to reduce them, or at least be prepared to reduce them. On the labor side, the immediate object was to prepare concerns which were to lose men through the draft, volunteering, and other war causes, to get on as far as possible without replacing them from the limited labor supplies available for farming, shipbuilding, munitions making, mining, railroads, and other vital industries. Instead of using labor for unnecessary activities, the concerns were to be asked, as the need appeared, to drop these activities. It was equally important from the outset to conserve

certain essential materials in order to prevent shortages or keep existing shortages from growing worse.

Much of what the board did up to the end of the fiscal year was preliminary. Some of the campaigns which have been carried on through the summer and fall, with considerable savings of men and materials, were only well started by that time. One campaign, however, had yielded quite definite results, and this, together with what had been done on the others, will illustrate the board's method and the nature of the larger work that has followed.

The board has made plain to all the business men it has dealt with that it has no power of legal compulsion. What has been accomplished has been the result of voluntary cooperation.

RETURNS OF UNSOLD BREAD.

The board's first undertaking was a campaign to stop returns of unsold bread to bakeries from retailers. Attention had been called to the practice by a letter from a baker to the Department of Agriculture, which the department had referred to the board. Agents of the board studied the practice in a number of bakeries. Information was then gathered by mail from 235 bakeries in 35 cities. In these bakeries the returns averaged 4.87 per cent of the total quantity delivered. The bakeries were so distributed as to kind and location that the percentage could be taken as fairly representative of the entire industry.

The returns involved a considerable waste of labor and equipment, due to the useless double hauls between the bakeries and the retailers. But what was more important, they wasted wheat. The data gathered showed that approximately one-half of the returned bread was sold to the poor. At least one-third of it, however, was not used for human food at all. It was fed to live stock or thrown away—easily enough of it, for the whole country, to keep 200,000 people in bread. But since the system represented a competitive effort to stimulate bread sales, and as a result people often bought more than they really needed, the waste was even greater—and this in the face of the wheat shortage among the allies.

The return privilege had grown up in times of plenty, and the industry had not generally realized the changed conditions. Some disinclination to give up such a deep-rooted practice, a practice upon which many bakers had built up their business, was only natural. The retailers, in turn, foresaw the inconvenience the change would mean to them; that they would have to order with much greater care and at best, perhaps, stand some of the loss the bakers had borne. Nevertheless the great majority of the bakers and retailers to whom the situation was presented agreed that returns should be abolished.

Accordingly, on June 6, the board addressed a circular letter to the wholesale bakers of the country asking them to accept no more returns of unsold bread after June 24. At the request of some of the bakers the date was later changed to July 9. By July 1, however, reports to the board had indicated that the recommendation had already been carried out in many places and would be carried out generally.

RESULT OF CAMPAIGN.

From the beginning there was a quantity of detailed executive work in the campaign. Meetings of bakers were held in many cities. Hundreds of bakers needed to be called on personally. Results had to be checked up. This work was done largely by the State councils of defense. The Council's Section on Cooperation with States directed their work for the board. In numerous cases the board dealt directly with bakers. The success of the campaign was practically assured by July 1. By that time the entire industry, with a few scattering exceptions, was free of returns.

Early in April the board began a study of the delivery service of retail stores. Facts and suggestions were first sought from the retailers themselves. Conferences were held with representative merchants. Agents of the board visited stores in a number of cities. Questionnaires were sent to 500 retail grocery stores and to 1,000 retail dry-goods and department stores. Information on the experience of cooperative delivery system in 35 cities and towns was gathered for the board by the National Wholesale Grocers' Association. Censuses of delivery men and equipment in Massachusetts and Vermont were taken by the councils of defense in those States. The board also had advantage of valuable material which had been collected by the Department of Commerce.

It was evident that the retail grocery, dry-goods, and department stores of the country employed not less than 200,000 men in delivery service. The board was convinced that by reasonable forethought and cooperation half of them could be released for war duty without hardship to the merchants or their customers.

WASTE IN RETAIL DELIVERY SERVICE.

Customers had demanded "service," and merchants had competed with one another in rendering it until it had grown to enormous proportions. Three or four deliveries a day were common, and these were supplemented by practically unlimited special deliveries. Liberal return privileges were allowed. In one large store 25 per cent of all packages delivered were returned; 20 per cent was common for department stores. The C. O. D. privilege was quite as badly abused. Of 2,274 C. O. D. packages delivered by one store

on a typical day, 54 per cent were of such small value that they were delivered at an actual loss.

It was the waste of labor in all this that interested the board primarily. Like bread returns, this practice had developed in times of plenty. In such times it might be permissible, but with the country at war it called urgently for curtailment.

On June 2, therefore, the board asked the Council for authority to secure economies in retail delivery service, and the authority was granted.

Accordingly, on June 26 and 27, the board issued certain recommendations to retail stores, particularly to grocery, dry-goods, and department stores, because it was in these that deliveries were most important. The stores were asked to limit their regular deliveries, if possible, to one a day over each route and to stop making special or "accommodation" deliveries. Dry-goods and department stores were asked to restrict return goods and C. O. D. privileges to an absolute minimum. Cooperative delivery systems which, the data gathered by the board showed, had commonly saved from 50 to 60 per cent in labor as compared with the individual systems replaced, were recommended for small and medium-sized cities and towns.

This work of course hardly began to bear fruit before the end of the fiscal year. It is perhaps proper to note here, however, that the recommendations have been adopted as a whole or in part in communities with a total population of more than 15,000,000. How many fewer men the stores have been able to get on with can not yet be estimated, but the number is well into the thousands. There has been a considerable incidental saving of money, which in several thousand stores definitely known to the board, and probably in many others, is being passed on in one way or another to the customers.

CAMPAIGN FOR WOOL CONSERVATION.

During May and June the board carried on a study of the wool situation. Here again studies were made by agents of the board and conferences were held with representative men in the industry. Conferences were also held with representatives of the French and British Governments; with officials of the Departments of Agriculture, Commerce, War, and Navy, and with other authorities on wool and woolen clothing. The object was to determine the probable supply and demand, to find out if economies were necessary in civilian consumption on account of the large Army and Navy requirements, and if such economies were necessary how they might best be brought about. The board also desired to reduce the need of imports as far as practicable, thus saving shipping for more vital uses. On this aspect of the work, conferences were held with repre-

representatives of the Shipping Board and the War Trade Board and its forerunners.

These investigations resulted in a campaign for wool conservation, another major section of the board's work which was hardly past its preliminary stages on July 1. It was determined as early as the last of May, however, that if civilian consumption of wool continued at the usual rate there would be a serious shortage before the end of the year.

Early in June the woolen and worsted cloth manufacturers were asked to manufacture for the spring of 1918—the season they were then preparing for—samples of only such fabrics and designs as they were certain they could sell in commercial quantities. They had been accustomed to make up many more samples, at a large extra cost in both wool and labor. They were also asked to confine their business to standard fabrics and designs and to produce reworked wool or cotton mixtures as far as possible.

WOOLEN MANUFACTURERS COOPERATE.

Assurances were promptly received from the executive offices of the American Association of Woolen and Worsted Manufacturers and the National Association of Woolen Manufacturers, which together include nearly all the woolen and worsted manufacturers of the country, that they would urge their members to carry out the recommendations; and effects were almost immediately noticeable. One concern which the season before had produced one mixed and six all virgin wool fabrics arranged at once to produce one all virgin wool and six mixed fabrics for the approaching season. It has carried out this program, using 50 per cent less virgin wool for civilian cloth than last year. Several important mills have reported savings of from 10 to 50 per cent.

The possibility of saving through simplifying styles in men's and women's clothing and through cutting down the number of styles was also taken up in conferences with representative clothing and garment makers. A program calling for the elimination of style features which took up cloth needlessly had practically been formulated by the end of June. At the same time the National Association of Clothiers named a committee to cooperate with the board in carrying out such a program.

CONSERVATION OF LEATHER.

A similar study of leather resources and of the possibilities of conserving leather by simplifying shoe styles was made in May and June. Conferences were held with tanners, last makers, shoe manufacturers, and shoe wholesalers and retailers, and independent investigations were made by members of the board's staff. Recom-

mendations for bringing about economies were formulated. This work also was followed up after the close of the fiscal year.

Not waiting until shortages are upon us, but looking ahead for them and taking measures to prevent them—that, it will be seen, is the policy underlying the board's work. It is an agency for research into forthcoming supplies and demands and for determining probable shortages on this basis; then for getting the trades, the individuals most expert on the matters concerned, to cooperate in meeting these shortages forehandedly.

The board has made studies of a number of materials and practices besides those mentioned above. It expects to make further recommendations as the need becomes apparent.

The Commercial Economy Board is composed of the following: A. W. Shaw, president A. W. Shaw Co., chairman; W. D. Simmons, president Simmons Hardware Co.; E. F. Gay, dean of the Graduate School of Business Administration, Harvard University; George Rublee, member of Eight-Hour Commission; Henry S. Dennison, president Dennison Manufacturing Co.; Dr. Hollis Godfrey, member ex officio.

SECTION ON COOPERATION WITH STATES.

On April 6, 1917, there was established a department to coordinate the State defense activities throughout the Nation. This department later developed into the Section on Cooperation with States, with George F. Porter, acting as an assistant to the director of the Council, as chief of section, under the general supervision of the director.

THE NEED FOR UNITY.

The need for such a department was urgent. In several States, especially along the Atlantic seaboard, committees of public safety, or similar bodies, had already been organized and were each independently proceeding to work. The declaration of war had also brought about the growth of numerous other war organizations and had stimulated existing civic, benevolent, and patriotic societies to undertake activities related to the war. All of these organizations naturally turned to Washington for information and advice, and the office of the Council was besieged with requests of this nature. It was obvious that decentralization was necessary and that the work of these organizations should be directed by some central body in each State. On the other hand, it was equally necessary that there be some centralizing organization at Washington to act as a clearing house between the States, to secure uniformity when uniformity was desirable, and to make the services of the organizations in the several States available to the various branches of the Federal Government.

To meet this need, on April 9, the Secretary of War in his capacity of chairman of the Council of National Defense issued to the governors of all of the States and to the commissioners of the District of Columbia, a request to create State councils of defense, or similar committees with broad powers, representative of the resources, industries, and activities of each State, to cooperate with the national council.

Following this action there was called likewise by the chairman of the Council of National Defense a conference of the States. This conference met in Washington on May 2, 1917, and remained in session for two days. Every State in the Union sent representatives, among whom were the governors of 12 States. The conference was opened by the chairman of the Council of National Defense, and was later addressed at the White House by the President of the United States. Meetings subsequently held were addressed by the Secretaries of the Navy, Interior, Labor, and Commerce; by representatives of the Department of Agriculture; and by members of the Advisory Commission and the director. Frank and thoroughgoing explanation of the outstanding needs of the Nation in the prosecution of the war with Germany was given to the State representatives, and specific outline was made as to how the State defense activities could best be linked up with the work of the Federal Government in the most intelligent and efficient coordination for the Nation's defense.

INDORSEMENT BY THE STATES.

At the conference in question the following resolution, proposed by the representative from Rhode Island and seconded by the governor of Iowa, was unanimously adopted by the officially accredited representatives:

We, the representatives of the various States of the Union, assembled here in conference by invitation of the Council of National Defense, desire to express our appreciation of the opportunity the Council has given us to become more familiar with the herculean task they are performing and the magnitude of the patriotic work they are accomplishing.

We desire also to express our entire confidence in their ability to carry to a successful fruition their organized endeavors to assist the Government of the United States in the present emergency and to pledge each our several States to the fullest cooperation in any direction which may suggest itself to the Council of National Defense wherein we as units may be now or may hereafter become helpful in this their great national undertaking.

Within four weeks of the conference State councils had been organized in nearly every State. By the end of June this national chain of State councils of defense had been completed. In all States the councils were created by appointment of the governor or by act of the legislature. The members were invariably chosen on a nonpartisan basis, were representative of the various interests of the State, and

included some of the most influential citizens. In those States where official committees of public safety were already in existence these bodies continued to exist as the official war organization. In those States whose legislatures have been in session since the beginning of the war, the State councils of defense have generally been created by act of legislature, with appropriations and varying, but broad, powers. By the 18th of June, 14 State councils had been established by legislative enactment. The Council, through the Section on Cooperation with States, has from the start recommended such legislation, and to this end has sent information and suggestions to the governors and the chairmen of the State councils of all States where legislatures were in session. Even in those States, however, where the adjournment of the legislature has made such statutes impossible the State councils have great authority. In addition to such powers as accrue to them as agencies of the governor, they exercise a large prestige, due to the high quality and representative character of their membership and to their position as the official war organization of the State.

COUNTY UNITS.

Besides assisting and stimulating the creation of this system of State councils, the Section on Cooperation with States has concerned itself with the development and promotion in each State of a system of county or other subsidiary councils of defense. As a result, such systems have been effectively established in a majority of the States, and in some cases are extending even to townships and municipalities. As the systems of local councils have been perfected, the State councils report an ever-increasing decentralization of their work. It has been found that local councils which know local conditions are able to undertake more effectively than the State councils, not only such work as relates to a specific locality but even State or National activities, especially those in which personal touch or an understanding of local conditions is of value. The utilization of local councils to carry on all activities which are capable of decentralization therefore in most cases follows promptly the creation of a well-organized State-wide system. Through its efforts in this direction the section expects that ultimately all State councils will develop a complete system of local councils of defense, thus establishing an organization by which connection is effected between the Federal Government and the individual citizen.

OTHER OUTSTANDING FUNCTIONS.

In addition to its primary task of promoting the development of this organization, the Section on Cooperation with States has from the start exercised three distinct functions:

First. To transmit to the State councils the requests and recommendations of the Council of National Defense and the different departments and new official war organizations in Washington, for information and assistance, and through recommendations to assist the State councils in accomplishing the ends sought.

Second. Through the cooperation of the State councils of defense, with their knowledge of local conditions, to apprise the appropriate Federal authorities in Washington of the development throughout the country of situations of importance in the prosecution of the war, of needs in the several States developed by the war, and of the general temper of public opinion.

Third. To act as a clearing house for information between the different States, carrying to each the experience of others. By this means repetition of mistakes is avoided, and effective work by one State council stimulates similar undertakings in other States and furnishes a basis on which the undertakings may be planned. In transmitting this information, the section encourages useful activities, stimulating all councils to undertake work found successful in one State, and endeavors to discourage undertakings which conflict with national policy or which promise to be generally unsuccessful.

Through its bulletins to the State councils the Section on Cooperation with States has succeeded in obtaining the effective assistance of State councils in furthering important campaigns of Federal authorities.

At the request of the War Department, the State councils undertook the celebration of registration day, in some cases assisting in the registration itself, and rendered efficient aid in recruiting.

The Commercial Economy Board of the Council of National Defense asked the assistance of State councils in its campaign to eliminate the return of unsold bread, and helped materially to eliminate this wasteful practice.

ADING FOOD CONSERVATION.

In its campaign to increase the food supply, the Department of Agriculture received effective help from State councils. At the request of the Department of Labor, the Section on Cooperation with States recommended that State councils organize branches of the Boys' Working Reserve and do all in their power to build up the system of labor exchanges, both State and Federal. In both directions the State councils rendered efficient aid. The Treasury Department used the organization of State councils to assist in floating the first Liberty loan of 1917, and though the request for aid was made at a very late date, in several States effective assistance was rendered.

The Section on Cooperation with States has transmitted from time to time to those interested in Washington, an ever enlarging fund of

information as to State activities of importance and as to the local aspect of situations of national importance.

WOMAN'S COMMITTEE.

The Council of National Defense appointed on April 21, 1917, the Woman's Committee to coordinate and centralize the organized and unorganized forces of women throughout the country. The principal objects before this committee were to provide a new and direct channel of communication between American women and their Government; to enlist the cooperation of all women, whether organized or not, and to ascertain and report upon the patriotic work being done by them; to endeavor, through coordination and centralization, to obtain greater efficiency in women's defense work, and to impress upon women the importance of all methods of economic warfare as a vital aid to winning the war.

The Woman's Committee had its first meeting on May 2, 1917. It then formed and adopted a plan of organization which provided for the creation of so-called State divisions, or woman's committees, in each State of the Union, in the District of Columbia, in Alaska, and in Hawaii.

ORGANIZATIONS WITHIN THE STATES.

The State division includes all women and all organizations of women within the State. It elects its chairman and executive committee, and upon it rests the responsibility of forming similar committees in counties, cities, and towns throughout the State.

The State divisions are urged to cooperate with the State councils of defense, and in many of the States the chairman of the State division is also a member of the State council.

The departments of work undertaken by the committee are as follows:

1. Registration for service. This registration is for the purpose of ascertaining and putting on record the woman power of the country. It is taken on official cards approved by the Council of National Defense and by the United States Census Bureau.

2. Food production and home economics. Whatever relates to the production and saving of foodstuffs concerns this department. It will cooperate so closely with the Department of Agriculture as to form a direct channel for all information and instructions to the State divisions from that source.

3. Food administration. This department acts solely as a medium through which the cooperation of the women of the Nation is given to the United States Food Administration.

4. Women in industry. This department cooperates in the work planned and executed by the Department of Labor and the advisory

committee on labor of the Advisory Commission of the Council of National Defense.

5. Child welfare. This work is conducted under the advice and with the cooperation of the chief of the Children's Bureau, Miss Julia Lathrop, of the Department of Labor.

6. Maintenance of existing social-service agencies. The object of this department is to give stimulus and support to efforts to maintain the already existing social agencies and to promote the formation of such new ones as altered conditions may make necessary. The underlying endeavor of this branch of work is to safeguard public health and public morals, with a view to increasing the efficiency of the producing forces of the Nation.

7. Health and recreation. This department cooperates with the commission on training camp activities. Through the State divisions it assists in focusing the efforts of women upon the work promoted by the commission.

8. Educational propaganda. This department will take all possible means through literature, meetings, pageants, parades, etc., to stimulate patriotism and to further the general understanding as to the causes and aims of the war. This propaganda will be conducted at large, but special efforts will be made to reach the school children.

9. Liberty loan. In this branch of work cooperation was given in the raising of the first Liberty loan.

10. Home and foreign relief. This department cooperates with the Red Cross and any other authoritative organizations for allied relief.

Early in June the Woman's Committee had a conference in Washington of representatives from the State divisions of the mid-Atlantic States. Twelve States were represented. Enthusiasm for the work and determination to use every effort to forward it made the conference stimulating and helpful.

CONFERENCE OF NATIONAL BODIES.

On June 19 representatives from 60 national organizations met with the Woman's Committee at Washington. About 200 delegates were present. An honorary committee of the presidents of all the national organizations was then formed, the object of this committee being to achieve as complete cooperation as possible between the national organizations and the Woman's Committee.

The Woman's Committee has established active connection with the departments and with other governmental agencies whose activities seek the cooperation of women, especially with the Departments of the Interior, Agriculture, and Labor, the American National Red

Cross, the Food Administration, the Committee on Public Information, and the Commission on Training-Camp Activities.

On registration day, June 5, the Woman's Committee, through such of its State divisions and local units as were organized to date, distributed several millions of the President's message to Congress of April 2. It cooperated with the Commercial Economy Board in the campaign to save bread, and with the Food Administration in the food-pledge drive.

The first two months of the committee's existence necessarily had to be given over largely to the work of organization and to forming plans for future work.

NATIONAL RESEARCH COUNCIL, ACTING AS THE DEPARTMENT OF SCIENCE AND RE- SEARCH OF THE COUNCIL OF NATIONAL DEFENSE.

The Council of National Defense, at its meeting on February 28, 1917, adopted the following resolution:

Resolved, That the Council of National Defense, recognizing that the National Research Council, at the request of the President of the United States, has organized the scientific forces of the country in the interest of national defense and national welfare, requests that the National Research Council cooperate with it in matters pertaining to scientific research for national defense; and to this end the Council of National Defense suggests that the National Research Council appoint a committee of not more than three, at least one of whom shall be located in Washington, for the purpose of maintaining active relations with the director of the Council of National Defense.

Since that time the National Research Council has served as the department of science and research of the Council of National Defense, and, in such capacity, has been charged with the organization of scientific investigation bearing on the national defense and on industries affected by the war.

SCIENCE AND THE NATION'S DEFENSE.

One of the most striking results of the war is its demonstration of the importance of scientific research in strengthening the national defense. Soon after the opening of hostilities England and France were faced with industrial and military demands soluble only in their research laboratories. As a consequence there arose, through governmental action, in England, France, Italy, Australia, New Zealand, Canada, and South Africa a group of research organizations charged with the mobilization of scientific men and laboratories for the study of military and industrial problems. The value of their contributions to military practice has been recognized, and the success

of their efforts to relieve industrial distress resulting from the stoppage of exclusively German products has greatly enhanced the appreciation of scientific research by British and French manufacturers. Thus the scientific methods which lie at the basis of Germany's military and industrial strength have been effectively adopted by the governments and peoples of the entente.

In April, 1916, soon after our demands for the cessation of submarine warfare had developed a critical situation with Germany, the President requested the National Academy of Sciences to organize the scientific resources of the United States in the interest of national security and welfare. The request of the President called for immediate and vigorous action. He expressed the desire that the academy should coordinate the scientific resources of the entire country and secure the cooperation of all agencies, governmental, educational, and industrial, in which research facilities are available.

The National Research Council, comprising the chiefs of the technical bureaus of the Army and Navy, the heads of Government bureaus engaged in scientific research, a group of investigators representing educational institutions and research foundations, and another group, including representatives of industrial and engineering research, was accordingly constituted with the active cooperation of the leading national scientific and engineering societies. The representatives of the Government were appointed by the President, who promised his cordial support and the cooperation of the Government departments.

In times of peace the work of the National Research Council involves the promotion of research in every branch of pure and applied science. At present, however, the attention of the council is concentrated upon war problems, both military and industrial, a large number of which have been initiated through the active cooperation which has been maintained with the Council of National Defense.

ORGANIZING RESEARCH ACTIVITIES.

Shortly after the National Research Council had been requested to serve as a department of the Council of National Defense, offices were secured in the Munsey Building in Washington, and the chairman of the council personally undertook the organization of research activities, in direct cooperation with the United States Government and its various departments. Office accommodations were provided for the chemistry, the engineering, the medicine and hygiene, and the physics committees of the council; and arrangements were made to provide such accommodations also for the agriculture and the psychology committees.

The chairman of the physics committee was appointed a vice chairman of the council, and consented to give his entire time upon leave of absence from the University of Chicago to work in Washington as executive officer of the council.

The military committee of the council, which consists of the chiefs of the technical bureaus of the Army and Navy and of various scientific bureaus of the Government, as well as a representative of the Council of National Defense, has undertaken the formulation of many of the military problems and the designation in each case of an officer in one of these technical bureaus who is familiar with the requirements and with whom the investigator engaged in the work may keep in touch. If, as is usually advisable, several investigators attack a problem simultaneously, the executive officer arranges for desired cooperation between them.

GLEANNING EUROPEAN KNOWLEDGE.

One of the first steps of the National Research Council was to learn what had already been accomplished in the same field, particularly inasmuch as great progress had been made abroad since the beginning of the war by the scientific investigators of the allied countries. A foreign service committee was accordingly appointed with a membership representing a wide range of scientific activities. This committee was expected to report upon scientific progress at the front, and to arrange for cooperation in the study of questions still underlying military and industrial problems. Much valuable information has been obtained by members of the committee, but perhaps the most important result of its cooperation abroad has appeared in the organization of a corresponding scientific mission to the United States with representatives from Great Britain, France, and Italy. These gentlemen, as well as members of the foreign service committee of the council, have given freely of their information and advice to members of the Council of National Defense and other governmental representatives.

Without recounting the activities of the major committees of the National Research Council, particular mention may be made of the work of a few of these committees and of the work of special committees which have been more closely associated with the activities of the Council of National Defense. Three members of the council were asked to serve as members of the General Munitions Board, and through this board recommendations were made for necessary governmental action and appropriation to secure desirable cooperation and funds in making adequate provision for supplies of optical glass necessary to cope with the exigencies of a war-time situation and to provide investigations requisite for carrying on an effective offensive and defensive gas warfare. Upon request of the General Munitions Board a special committee on navigation and nautical instruments

was organized by the research council for the purpose of providing information and advice, particularly to the United States Shipping Board and the Emergency Fleet Corporation.

The chairman of the committee on medicine and hygiene of the council serves also as chairman of the research committee of the General Medical Board of the Council of National Defense, thus avoiding duplication of effort.

VARIED FIELDS.

A large number of problems which have come before the chemistry, engineering, and physics committees of the council have arisen as a result of information or inquiries referred to these committees from the Advisory Commission of the Council of National Defense. The operations of the first-mentioned committee are very extensive and all of its work is carried on in close cooperation with the work of chemical research in technical bureaus of the Government. This is also true of the engineering committee and of the physics committee, while in addition, through the activities mainly of the latter committee, the National Research Council has been requested by the Chief Signal Officer of the Army to serve as the department of science and research of the United States Signal Corps. Acting in such capacity, extensive plans are being made for work in meteorology, including the establishment of aerological and forecasting services for the Army in France and in aviation camps in this country, for the sound-ranging service of the Army, and for the design and specification of instruments used with airplanes.

The Navy Department has recently established a special board to coordinate and organize all problems relating to submarine warfare and the executive officer has been requested to meet with this board as the representative of the National Research Council, the general plan adopted by the Navy Department contemplating the closest possible cooperation between the Navy Department bureaus, Navy Department boards, Naval Consulting Board, and the National Research Council. A group of 40 leading physicists was convened by the council for an exhaustive discussion of submarine problems with the members of the French scientific mission and several groups of physicists have been organized to work in cooperation with the above-mentioned special board in tests and in investigations of various devices for submarine offense and defense.

AGRICULTURAL RESEARCH.

The agricultural committee of the council is serving as a clearing house and as a medium for cooperation in researches in this field. Investigators working upon similar problems are brought together and cooperative enterprises covering a wide range in agriculture are being provided for.

Upon recommendation of the committee on anthropology the minimum requirement of stature in the Army has been reduced, thus rendering eligible for the Army additional men belonging to or descended from many foreign nationalities in the United States and preventing the placing of a disproportionate burden in the formation of the Army on the naturally taller and native American. The psychology committee, furthermore, has organized a carefully planned campaign for the application of psychological methods in relation to military activities, such as the training of recruits for various services, the classification and rating of men and officers, the study of visual problems, and work in incapacity, reeducation, and vocational training. The War Department has approved such investigations and has made provision for the examination of drafted men in cantonments.

Mention should also be made of a special committee of the National Research Council which has been appointed to consider and report upon desirable means of cooperation between the National Research Council and research committees which may be appointed in the various States as a result of the activities of State councils of defense, with which the Section on Cooperation with States of the Council of National Defense is in constant touch.

COMMITTEE ON SHIPPING.

On April 21, 1917, the Council of National Defense created a committee on shipping, headed by the chairman of the United States Shipping Board and composed of P. A. S. Franklin, president International Mercantile Marine; H. H. Raymond, president Coastwise Shipping Association; Eugene T. Chamberlain, commissioner Bureau of Navigation, Department of Commerce; D. T. Warden, manager of the foreign shipping department, Standard Oil Co.; L. H. Sherman, vice president W. R. Grace & Co.; E. M. Bull, vice president of E. M. Bull & Co.; and Frank C. Munson, president of the Munson Steamship Line. The function of the Committee on Shipping has been to advise with the United States Shipping Board and report through the chairman of that board to the Council as to the best method of increasing tonnage available for shipment to the allies.

COMMITTEE ON INLAND WATER TRANSPORTATION.

The Council's Committee on Inland Water Transportation was appointed on June 15, 1917, with Gen. W. M. Black, Chief of Engineers, United States Army, as chairman, and Daniel Willard, chairman of the Advisory Commission of the Council, in special charge of transportation matters as a member *ex officio*. The other members of the

committee are: Walter S. Dickey, vice chairman, Kansas City, Mo., president Kansas City-Missouri River Navigation Co.; George E. Bartol, president of the Philadelphia Bourse; Capt. J. F. Ellison, Cincinnati, formerly secretary of the National River and Harbors Congress; Joy Morton, Chicago, director in many financial, mercantile, and transportation companies; James E. Smith, St. Louis, president Mississippi Valley Waterways' Association; M. J. Sanders, president New Orleans Board of Trade, representative Harrison-Leyland Lines; Lieut. Col. C. Keller, of the Corps of Engineers, secretary.

The work of the committee is to bring together the companies engaged in inland water transportation, including those on the Great Lakes, in order better to meet the war situation and increase and make more efficient the freight-carrying facilities of the country's waterways, with the further intention of aiding in meeting the shortage in freight cars in sections where water transportation is possible.

INDUSTRIAL INVENTORY SECTION.

On December 12, 1916, the material collected by the Committee on Industrial Preparedness of the Naval Consulting Board was transferred from the New York office of the committee to the Council of National Defense. The material consisted of 18,654 industrial inventories. The purpose of these inventories was to furnish sufficient information concerning each producing plant to make possible an intelligent decision on the part of any purchasing division of the War or Navy Department as to the plant's general fitness as a source of supply in time of need and as to the specific type of article which its equipment best fits it to supply. The data contained in the inventories were classified and tabulated, and first used in the report of the board of Army officers headed by Col. Francis J. Kernan, United States Army.

Additional inventories were being received continually when the offices of the Council were established. After the declaration of war the data on file were used by various committees and boards of the council. Information was also furnished to various purchasing divisions of the War and Navy Departments. Approximately 22,000 plants had been inventoried on June 30. New reports are constantly being secured and made available to the Government organizations in need of them.

INTERDEPARTMENTAL ADVISORY COMMITTEE.

The function of the Interdepartmental Advisory Committee, which was established March 29, 1917, is to keep the several branches of the Government engaged in work for the national defense in close touch

with each other, to suggest means of cooperation in carrying out the same ends, and to avoid duplication of effort. It is composed of a representative from each of the 10 executive departments of the Government, a representative of the National Research Council, and the chief of the Section on Cooperation with States. The committee is presided over by the director of the Council, who reports the formation of all committees by the Council or Advisory Commission, with regard to whose purpose the various departments may have valuable information. The committee discusses recommendations and suggestions, and the director reports methods through which the various departments have suggested possible assistance. The committee meets twice a week at the office of the Council.

COOPERATIVE COMMITTEES OF THE CHAMBER OF COMMERCE OF THE UNITED STATES.

One of the channels which the Council has used in keeping in touch with American industry and in securing the cooperation of representative American business men has been the Chamber of Commerce of the United States.

As a connecting link between the Council and the chamber, the chairman of the chamber's committee on cooperation with the Council of National Defense has been appointed an assistant to the director of the Council. In this way the Council has been able to keep in the closest touch with activities of the chamber and to assist the chamber in determining where its facilities for assistance may be made most valuable.

Under the direction of the chamber's cooperative committee the chamber of commerce has issued frequent bulletins to its member organizations, keeping them informed of the more important activities of the Council and advising them on the best methods for assisting the movements which the Council might have on foot.

The work of this cooperative committee has undoubtedly assisted materially in enlightening American business men as to the war need of the Government and in taking advantage of their willingness to assist in every way the successful conduct of the war.

ASSISTING LOCAL QUARTERMASTERS.

Specifically the advisory committees of the chambers of commerce appointed at the request of the Council have been aiding local quartermasters in many cities in the purchase of Army supplies. Their knowledge of business and local traffic conditions has been of the greatest service to the Government. They have constantly supplied the Government with lists of buyers in various lines available for

service as inspectors of merchandise, as well as competent traffic and shipping men to cooperate and advise with the local quartermasters. The committees have been particularly valuable in rendering advice and assistance to the local quartermasters when it has become necessary upon short notice to make purchases in unusually large quantities:

DIVISION OF STATISTICS.

The work of the Division of Statistics from its inception on April 9 up to the first of July, 1917, may be divided into three classes.

That which consumed the major part of the time and energy of the staff may be described as organization work:

In the early months of its existence the division was in reality a division of statistics and organization. The workers were trained in dealing with the problems of organization and office procedure, which demanded more attention in the early stages of the development of new and numerous war agencies than did the purely statistical problems.

During April, May, and June hundreds of organization charts were drawn up and plans were worked out, wholly or in part, for mapping out the functions and administrative relationships of the new sections and committees constantly coming into being. This work was directed toward the creation and arrangement of smoothly running office machinery. It included not merely the making of plans and charts of organization, but also the preparation of rules concerning the routing and handling of correspondence, compiling lists of personnel, arranging systems of passes, and the like. While most of this work related to offices within the Council, a surprisingly large number of requests for similar advice and assistance was received from the new war agencies outside the Council.

The second of the three important classes of work done during this period related to the compilation of statistical data bearing on the progress of material preparation for war. Tabulations were made of the output of munition plants in the United States, and maps were prepared to show the results in graphic form. Other maps showed the progress of the organization of the medical profession for war service, the location of aircraft-training fields, the number of horses in each Army department, and so on through a long list of similar efforts to secure a fact basis for thinking and acting, and to present the results in easily comprehended graphic form.

FILING AND RECORD SYSTEMS.

The last of the three major types of work was the installation of filing and record systems. In the early stages of the development of the Council offices it became evident that numerous changes, com-

binations, and divisions of the different sections might confidently be looked forward to in the future. It was clearly necessary that these different offices should have not only efficient and easily expanded filing systems, but that these systems should be so arranged as to provide for the combination of different offices, or the division of offices as the work expanded without entailing a serious disarrangement of the filing systems.

To meet this need, almost the entire staff of the Division of Statistics spent some ten weeks in installing record and filing systems in the different offices, all so arranged as to permit of future combinations and divisions which, as subsequent events have demonstrated, took place later on in even greater numbers than had been expected.

To summarize, it may be said that during the first three months of war the division was in reality a division of statistics and organization, carrying forward three main classes of work which were, respectively, aiding in the organization of war agencies, compiling data as to progress of material preparations for war, and finally the installation of filing and record systems.

INVENTIONS.

(Naval Consulting Board of the United States.)

The Naval Consulting Board of the United States, headed by Thomas A. Edison and composed of eminent scientists and inventors, acts as a board of inventions for the Council of National Defense, under the following resolution adopted by the Council on February 15, 1917:

Whereas the Naval Consulting Board has informed the Secretary of the Navy that it holds itself at the service of the Department of War or the Council of National Defense to act as a board of inventions or in any other capacity which may be of use to the Government in the present emergency:

Be it resolved, That the Council of National Defense hereby express its appreciation of this action on the part of the Naval Consulting Board:

And be it further resolved, That the Council call upon the board for advice and assistance whenever the occasion therefor shall arise.

The board is now, and has been for some time, actively engaged in the investigations of plans to counteract the submarine menace.

COMMITTEES UNDER THE ADVISORY COMMISSION.

COMMITTEE ON TRANSPORTATION AND COMMUNICATION.

It has been the purpose of the Committee on Transportation and Communication to organize the transportation facilities of the country for the most effective aid in preparing the country for war and

in expediting military movements, including the shipment of supplies and munitions. The main body of the work was undertaken in the first instance upon the passage on April 7 of a resolution by the Council requesting the chairman of the Committee on Transportation to call upon the railroads so to organize their business as to lead to the greatest expedition in the movement of freight. Acting in response to that request, the chairman wired the presidents of all the important railroads in the United States, asking them to meet in Washington on Wednesday, the 11th of April, for the purpose of considering the matter. Nearly 50 presidents responded to the call, and all of the important railroad systems were represented, either direct or by proxy.

The following resolution was adopted by this conference of railway executives:

Whereas this meeting has assembled in response to an invitation from the Council of National Defense, and has had laid before it a resolution by that Council as follows:

“Resolved, That Commissioner Willard be requested to call upon the railroads so to organize their business as to lead to the greatest expedition in the movement of freight.”

Now therefore be it

Resolved, That the railroads of the United States, acting through their chief executive officers here and now assembled, and stirred by a high sense of their opportunity to be of the greatest service to their country in the present national crisis, do hereby pledge themselves, with the Government of the United States, with the governments of the several States, and one with another, that during the present war they will coordinate their operations in a continental railway system, merging during such period all their merely individual and competitive activities in the effort to produce a maximum of national transportation efficiency. To this end they hereby agree to create an organization which shall have general authority to formulate in detail and from time to time a policy of operation of all or any of the railways, which policy, when and as announced by such temporary organization, shall be accepted and earnestly made effective by the several managements of the individual railroad companies here represented.

The committee appointed by the conference of railway executives to report on the form of organization for all of the railways of the United States to cooperate with the Government in the conduct of the war beg to recommend as follows:

1. That the whole problem of cooperation with the Government be committed to the present special committee on national defense of the American Railway Association. This involves making the commission on car service a subcommittee of the special committee, as has already been done with the committees on military passenger tariffs, military freight tariffs, military equipment standards, and military transportation accounting.

2. That the special committee be enlarged by additions to a total of approximately 25 members.

3. That an executive committee, selected from 25 members of the special committee on national defense, consisting of the chairman of the special committee, who shall also be chairman of the executive committee, and four other members

to be selected by him, be created, such executive committee to sit in Washington in frequent or, if necessary, continuous session.

4. That Mr. Willard, as chairman of the Advisory Commission of the Council of National Defense, be ex officio a member of the executive committee.

That the Interstate Commerce Commission be invited to designate one of its members to be ex officio a member of the executive committee.

5. That the railways agree to the direction of the executive committee of five in all matters to which its authority extends, as expressed in the resolution heretofore adopted, and to which we hereby subscribe; and that the general secretary of the American Railway Association be instructed to secure the execution by signature of all American railways.

This resolution is the basis of the present plan of railroad operation in the United States.

RAILWAY SUBCOMMITTEES.

In furtherance of the plan adopted, the railroads established subcommittees of executive officers in each of the six military departments of the United States, and these subcommittees established intimate working relations with the military commander in each department. The executive committee of five railroad presidents (often spoken of as the Railroads War Board) mentioned in the resolution was selected, with instructions to establish permanent headquarters in the city of Washington, and they were authorized to create such an organization as they might find necessary in order to carry out the spirit of the agreement and to deal effectively with the situation. At the present time the Washington organization occupies five floors of a building on Thirteenth Street, and consists of about 485 men, including outside inspectors and subcommittees. This is mentioned merely as an indication of the magnitude of the problem.

The executive committee held its first meeting in Washington on April 23, and since then has spent from two to five days each week in session in this city.

Second only in importance to the executive committee and subordinate thereto is the subcommittee on car service, which is also located in Washington. This subcommittee, by a system of regular reports from all of the railroads, keeps fully advised concerning the car situation in all parts of the United States. It has 28 subcommittees located in the more important cities and traffic centers, which subcommittees cooperate closely with the State railway commissions, boards of trade, and other representative bodies. These subcommittees submit weekly reports to the central car service committee in Washington, and the Washington committee presents a weekly report of the entire situation to the executive committee.

By virtue of the agreement entered into on April 11 the executive committee in Washington has authority, regardless of ownership, to order the movement of cars and engines from one part of

the country to another and as the traffic situation seems to demand. Between May 1 and June 30 orders were given (and executed) requiring the movement of fully 110,000 empty freight cars from sections of the country where they were not needed to other sections where they were needed in the public interest. This authority of the committee, it was understood in the agreement, was to be exercised only where it was clearly demanded in the public interest, not in the interest of any particular carrier.

READJUSTMENT OF PASSENGER TRAFFIC.

Realizing that the railroads would be called upon to move a much larger volume of traffic than ever before, the executive committee, among other things, urged the independent companies to consider the possibility of eliminating unimportant passenger trains where such elimination seemed feasible, having due regard to the public requirements; and while this matter is still in the process of adjustment much has already been accomplished. Passenger trains making over 24,000,000 miles per year in the aggregate have already been discontinued. This, it is estimated, will result in a saving of approximately 1,500,000 tons of coal per year and will release 3,000 men and a considerable number of engines for other and more important service. The railroads, in effecting this reduction, have conferred freely with the public authorities and there has been very little opposition to the program. In some cases, where it was found that a real hardship had been worked by such reduction, certain trains were restored.

From time to time the executive committee has issued bulletins to the independent companies calling attention to particular features of operation where increased efficiency seemed possible. In these bulletins the railroads were urged to improve the condition of their cars and locomotives in order that more service might be obtained from the equipment already owned, and they were also urged to increase the carload and to endeavor to procure more prompt handling of cars at terminals. It is apparent by the monthly reports that the efficiency of operation of all the roads has been materially increased, and it is believed that these bulletins have had much to do with the improvement.

During the three months April, May, and June this year the American railroads moved in the aggregate approximately 15,500,000,000 ton-miles, which was 18 per cent more than the ton-mileage of the same three months in the previous year; and the figures for July will show an increase of more than 20 per cent this year over the same month a year ago. It should be remembered that during the same period last year the business of the country was very active and the railroads were working at what they then believed to be

their full capacity. The cars and engines in service this year are substantially the same in number as in service a year ago.

The building of the 32 cantonments required by the National Army and Guard presented a somewhat difficult problem to the railroads, but they are handling it effectively, and there is every indication that there will be no serious delay to the construction of these cantonments because of anything the railroads may do or fail to do.

MOVING THE TROOPS.

In cooperation with Col. Baker, of the Quartermaster's Department, the car service committee in Washington has worked out a very comprehensive schedule for the troop movements necessitated by the war conditions. Complete lists of equipment and routes have been prepared and approved by the quartermaster, and the full burden of executing such schedules has been transferred from the Quartermaster's Department to the railroads, and the carriers in turn have created a sufficient organization to deal with this matter effectively. A representative of the Washington committee has been located at all mobilization points in the United States, with instructions to work with the military commander at each point and to keep in close communication with the Washington office. All troop movements ordered up to this time have apparently been taken care of in a way that has been generally satisfactory, and the railroad committee believes it is prepared fully to meet the situation that will be developed by the mobilization of the new National Army.

While there is an unusually large volume of business being offered to the railroads at the present time, due to the industrial activity and to the fact that many of the coastwise and lake-carrying boats have been diverted to other service, it is believed that the railroads will be able to handle promptly everything necessary for the successful carrying on of the Government's war program, including, of course, the transportation requirements incidental to the movement of munitions and food supplies for our allies. It is recognized, however, that the real test of the situation is yet to come, and the committee is laying plans for the winter, when the hauling capacity of the locomotive is adversely affected by cold weather and the transportation problem will undoubtedly be a difficult if not serious one.

It should be remembered that the locomotive builders at the present time have instructions to give substantially their entire output to our allies—France and Russia. This action makes it necessary for the railroads to do more with the locomotives they already have.

The coal situation in the Northwest has been a very difficult problem to deal with. Pooling arrangements for both the Northwest and

New England are aiding in its solution, and further steps to relieve the difficulties are under way. These are two of the many problems constantly developing in connection with the transportation situation.

TONNAGE.

Owing to the magnitude of the railroad problem in this country it is extremely difficult for the average person to grasp it. There is nothing with which the American railroad system can be fairly compared. This is illustrated somewhat by the following figures: The American railroads as a whole in 1915 carried 274,000,000,000 tons 1 mile. In 1917 it is estimated that at the present rate they will carry an increase of 120,000,000,000 tons above what was carried in 1915. This increase alone is greater than the entire tonnage carried in one year by all of the railroads in Great Britain, France, Germany, Austria, and Russia put together.

The executive committee, for the purpose of keeping the public fully informed concerning the situation and in the hopes of stimulating public cooperation (which has been very freely accorded), has issued a number of statements dealing with different phases of the subject.

Under the committee on national defense of the American Electric Railway Association, acting in cooperation with and at the instance of the chairman of this committee, a body under the chairmanship of Gen. George N. Harries, was organized and has been cooperating with the special defense committee of the American Railway Association.

Before July 1, also, a general cooperative agreement for the promotion of the common purpose had been reached between the railway executive committee and the Committee on Inland Waterways of the Council.

In brief, it may be said that at the present time the railroads of the United States operating as a unit are carrying, and with substantially the same facilities as they had a year ago, something like 20 per cent more business than was being carried a year ago, and because of the central direction established in Washington it is possible to use all of the cars and engines in such a way as to meet any unusual or critical situation which might develop in some particular region.

RAILWAY WORKERS TO FRANCE.

Among other accomplishments of the special defense committee which may be mentioned are the undertaking of the enlistment of the nine reserve engineer regiments composed of skilled railway workers to aid in the rehabilitation of the railways of France, as well as in the operation of the French railways behind the English

lines; an arrangement for the movement of coal for naval use from mines in West Virginia to the Pacific coast in box cars instead of in open cars, in order to prevent the uneconomical empty haul of open cars from Pacific coast points to the East; the handling of a vast number of requests for priority in car supply and in movement, these questions having been brought to the attention of the special committee by agencies of the Government, Members of Congress, and commercial interests; the preliminary work on relocation of cars so as to produce the largest measure of transportation; the perfection in connection with the proper officers of the Army of a complete scheme of cooperation in the movement of troops and supplies of every description.

The chairman of this committee also assisted in the creation of a committee of which John Stephens, one time chief engineer of the Panama Canal, is chairman, and four other men prominent in railroad work are members, which went to Russia, properly accredited by the President, to call on Russian officials. They are now investigating Russian railroad conditions to find out what particular things are needed in the way of equipment that we can furnish and what materials or men we can send that will be helpful.

WIRE COMMUNICATION.

Through the Committee on Telegraphs and Telephones, which cooperates with the Committee on Transportation and Communication, the country's electric communication facilities have been focused on preparation for the war. On the committee are represented the American Telephone & Telegraph Co., the Western Union Telegraph Co., the Postal Telegraph-Cable Co., and through a common representative all the leading independent telephone companies. Through the combined cooperation of these establishments Government business has everywhere been placed on a preferential basis, greatly facilitating the mobilization of the national resources through giving the authorities at Washington practically instantaneous access not only to every center of activity throughout the United States but to all the individual concerns which make up these centers. In addition a great deal of emergency assistance has been rendered to these firms.

FURNISHING EXPERTS FOR SIGNAL CORPS.

The war work of the telephone and telegraph companies may be divided into two distinct classes, the one bearing directly on the conduct of the war, the other on work more or less related to actual war activities. In the former class may be placed the assistance furnished by telephone and telegraph engineers to the Signal Corps and the other branches of the Army and Navy which have to do

with communication in active administration, in the development of material, and in the promotion of military communication science. This includes the furnishing of more than 14 battalions of officers and men for the Signal Corps, besides a great deal of assistance of all kinds given the Army and Navy authorities by experts who have not gone directly into the service. In the second class of indirect assistance may be placed the work of the telephone companies in increasing plant equipment and personnel in all parts of the country for the use of Government departments and industries employed in making munitions and supplies for the Government.

The formation of more than 14 reserve battalions for the Signal Corps from the telephone and telegraph companies was on July 1 rapidly nearing completion. The majority of the units were recruited practically up to full strength and nearly all of the officers had received their commissions. Several battalions were already in camp receiving intensive training under officers of the Regular Army. Wherever possible the members of the battalions which had not been called into active service were drilling and attending lectures conducted by Army officers. Where drilling was impracticable, literature relating to Signal Corps work and military tactics had been distributed and courses of study outlined.

Men from telegraph companies at marine observatories, cable terminals, and on the Mexican border have been enrolled as Army and Navy censors and have ably assisted in this work. At least one of the telegraph companies sent out registration blanks returnable by all employees who registered for the draft, so that the company might aid the Government in determining the particular service for which these drafted men were best suited. New men were constantly being trained for service in the Signal Reserve Corps and plans were being worked out to utilize various educational institutions in this work.

WIRING THE CANTONMENTS.

Wherever Government construction projects were going forward, the telephone and telegraph systems were called in to place them in quick contact with the department centers, and in the case of cantonments and training camps to establish permanent telephone systems both internal and external for the convenience of the department authorities. For additional circuits already completed it has been necessary to provide hundreds of miles of copper wire, and to build many miles of new pole line.

Among the important new trunk lines which the communication engineers were undertaking during the last of June as a result of war pressure may be mentioned the cable from Washington to New York and thence to Boston, connecting Washington with Baltimore,

Wilmington, Philadelphia, Trenton, Newark, New York, Bridgeport, New Haven, Hartford, Providence, and Boston. All these points are centers of great activity in the manufacture and supply of munitions and war materials of all kinds. They also include many important military and naval centers. Satisfactory progress on this cable was being made in spite of the difficulty of obtaining raw material. Another full-sized cable was being pushed forward from Chicago to Great Lakes Ill., requiring 12,000 miles of wire, and similar undertakings were being started between other vital points.

Work was being pushed forward actively on the installation of the third addition made since February to the toll switchboard at Washington. This addition was designed to increase the capacity of the board to 220 per cent of what it was the preceding February. By means of these frequent additions it had been possible to keep ahead of the rapid increase of the war toll service in Washington, but the end was not yet in sight and further additions to the board were being engineered and the material was being ordered.

INCREASED SERVICE FOR WAR TRAFFIC.

Special additions to toll switchboard equipments were also being installed at many other important points throughout the country where war activities were expected to increase the traffic.

Besides these additional toll facilities much work has been necessary, particularly in Washington, to extend local switchboard equipment in anticipation of further increases of war traffic. A large amount of underground cable work had been done. In many instances, for example, the increase in business called for cables between scattered buildings housing the various Government departments. Practically every Government post in the country has had to have additions to its telephone system.

As soon as the location of all the National Army cantonments had been definitely decided upon, the work of providing adequate telephone facilities, with suitable stock of switchboards, loading coils, cable, and other material, progressed swiftly, and shipment of this material was being made as rapidly as required. The housing of the cantonment central offices was under way and the permanent equipment was expected to be installed by the time the camps were ready for occupation. Because these camps are in most cases several miles from the nearest city, it was necessary to plan for a large increase in the trunks of the near-by city, often necessitating long lengths of cable containing from 50 to 100 pairs of wire. The same process was being carried on in the National Guard cantonments, and although their location was determined much later, the installation promised to be completed in ample time.

SPECIAL SERVICE FOR RAILROADS.

The same emergency plans were made for the communication work for aviation training fields, for guards at bridges, water supplies, and other public works, and for plants involved in war activities, where service had to be installed without delay. Particular attention was also given to the telephone requirements of the railroads to enable them to handle efficiently the transportation of large bodies of troops.

The work on the Coast Guard telephone lines was being continued actively in all sections where reconstruction or repair work had been requested. Hundreds of miles of armored submarine cable were being used in Coast Guard projects along the New England coast and the work of constructing land lines to connect with the submarine cables was well under way.

In addition to these activities, telephone and telegraph officials, at the request of the Government, were assisting in solving many communication problems. Information concerning telephone and telegraph matters was being furnished to members of foreign missions. Telephone companies had also been called upon to do special construction work, such as erecting very high poles for wireless masts. A large number of engineers in the employ of telephone companies have been devoting their efforts to laboratory research on special Government work.

COMMITTEE ON SUPPLIES.

By a resolution of the Advisory Commission of the Council of National Defense of February 12, 1917, the Committee on Supplies was created to cooperate in an advisory capacity with the purchasing officers of the War and Navy Departments in securing their requirements of clothing, equipment, and subsistence, and in coordinating the buying by the departments of these supplies. On July 1, 1917, the committee was composed of six men, chosen from as many lines of business, devoting their entire time to the work of the committee. Associated with these men was an officer of the Army, detailed to aid in familiarizing the members with Army requirements.

ADVISING THE PURCHASING DEPARTMENTS.

The regular method of purchasing supplies by the War and Navy Departments in peace times was by advertising for proposals from bidders. This committee early foresaw the very serious disadvantages in time of war, when the requirements of the Government were multiplied manyfold, of the peace-time method of buying, and advised the purchasing departments of the Government that adver-

tisements for the unprecedented quantities of heavy staple commodities required would greatly disturb industry and inevitably stimulate the market, with resultant great inflation of prices. On April 12, therefore, the Secretary of War issued a declaration to the effect "that an emergency exists within the meaning of section 3709, Revised Statutes, and other statutes which except cases of emergency from the requirement that contracts for and on behalf of the Government shall only be made after advertising, as to the contracts under the War Department for the supply of the War Department and supply and equipment of the Army for fortifications and other works of defense, and until further order such contracts will be made without resort to advertising for the bids in the letting of the same." From that time the committee has, wherever possible, assisted the purchasing officers in dealing directly with the prime producers of the commodities required. At all times Government purchases are in quantities large enough to command quotations and offers direct from manufacturers, without tribute to middlemen of any capacity.

In the past it has been the practice of many middlemen and professional Government contractors to secure options in advance on supplies which it was obvious the Government would soon need and, when bids were invited, to quote them to the Government at enhanced prices. This committee has been subjected to some criticism by some of these eliminated middlemen.

In a good many instances this committee has succeeded in "pegging" the price on a given article to be required in large quantities by the Government, maintaining purchase prices which existed at the date of our entrance into the war. In some cases figures even lower than those then prevailing have been obtained. The committee has also secured to the Government options on large supplies of materials to be required and at prices in effect when the war began, available for the Government's acceptance for periods of from four to six months.

The Committee on Supplies has successfully endeavored with reference to the most important commodities to coordinate the requirements and purchases of the various departments. This has averted competition between numerous purchasing branches of the Government.

READJUSTING SPECIFICATIONS.

The standard specifications in use by the Government until this year were written when the Government's needs were, by comparison with the requirements of the present emergency, small and conditions of world trade normal. Radical trade changes and enormous increase in Government requirements by this country's entrance into the world war necessitated many changes in specifications for such

commodities as shoes, textiles of all kind, and other items. Limited supplies of raw materials and the joint needs of our Government and of its allies made imperative many immediate changes. This committee has cooperated with the proper departments in drafting new specifications, which provide the best available substitutes for those articles now difficult or impossible to obtain in the quantities required.

The Committee on Supplies organized to advise and assist its various subcommittees, each to function in its single industry, such as cotton goods, woolen goods, knit goods, shoes, leather equipment, canned foods, and other industries. Assisted by these subcommittees this committee has mobilized industries, bringing to the service of the Government many mills and factories which had never before produced Government goods, and which would not now be aligned to make materials for Government use but for their responses to this committee's call to place at the disposal of the Government portions of their plants. Thus has been enlarged greatly the field in which the Government is able to buy, and the total manufacturing capacity in several lines has been increased. In some lines the demands of the Government are still far in excess of the present capacity, so that great effort must be put forth by this committee and the manufacturers to secure the enormous requirements of the Army.

COOPERATION BY THE CANNERS.

At the beginning of June there was created a section of this committee for assisting the Army and Navy in subsistence and forage purchases. There was called in Washington on June 14 a conference of the canned-food industry to consider the requirements of the Army and Navy in canned foods, and to organize the trade for supplying them. On the day previous, those canners not members of the National Canners' Association, met and appointed a committee to represent them at the conference. The members of the National Canners' Association, who number approximately 80 per cent of the canners of the United States, were represented at the conference by the executive committee of the National Canners' Association. The conference resulted in an understanding by the canners of the requirements of the Army and Navy and in their undertaking to supply them. A cooperative committee of canners was appointed to assist the committee on supplies. At subsequent meetings, arrangements were completed to secure to the Army and Navy their requirements of such heavy staples as canned peas, corn, string beans, and tomatoes, by allotment to all the canners of the country. Fixed percentages of the total pack of each canner were asked to be reserved for Government purchase and the allotments were universally accepted by individual canners.

The work of the Committee on Supplies has principally been concerned with those commodities which involved unusual difficulty, either because of large quantities required, or of the shortage of materials involved in their manufacture, or, in some cases, because of an unusual competitive demand for similar articles for civilian use. By the securing of options, the "pegging" of prices of various articles, the allotment of large requirements throughout the industry, the elimination of middlemen, and the curbing of competition between Government departments, the committee has enabled the Government to make substantial savings in its purchases.

COMMITTEE ON RAW MATERIALS, MINERALS, AND METALS.

In a statement entitled "Minerals of military importance," compiled by the Bureau of Mines of the Department of the Interior, issued prior to the outbreak of the war, there appears the following passage:

The United States is deficient in certain minerals of great importance, particularly in war time. This deficiency may be due to actual lack of suitable ore deposits or to the fact that our deposits are of low grade and more expensive to work than available foreign ores. In some cases the imports are due to cheap freights and ballast movement, and to the fact that our own deposits are far from the point of use. Where deposits exist on this continent, either in Canada or Mexico, the situation would not be so acute, although embargoes such as have been established in the present war might prove very inconvenient to our industries and our foreign trade. The remedy depends on the situation in each case. It may mean the accumulation of a reserve supply, either by the Government or by private companies, the stimulation of home production by assurance of protection from competition, research to develop and cheapen processes to utilize low-grade ores, stimulation of exploration and discovery of new deposits, or development of substitutes and new uses for the various products.

Coupled with the considerations set forth in the foregoing statement there should be borne in mind that unprecedented activity throughout this country during the two years immediately preceding its entrance into the war had exhausted surplus stocks of many raw materials other than those to which the statement refers. Furthermore, the few months preceding the declaration of war and during its imminence found much raw material, produced and in process of production, under contract for future business.

The Committee on Raw Materials of the Advisory Commission began operations by making a survey of the general situation, over as wide a range as consistency would permit, in respect of the primary products necessary for the conduct of the war. At first steps were taken to make a study of those articles which had to be imported, such as nitrates, pyrites, rubber, mica, tin, platinum, and palm oil. An elaborate survey was undertaken and prepared by the Bureau of

Mines, and the report was made the basis of certain recommendations to the Council of National Defense. Eventually, investigation developed the fact that owing to special considerations it seemed advisable for the Department of Commerce to handle some of these important subjects, such, for instance, as nitrate, and the Committee on Raw Materials was so notified.

AN EMERGENT SITUATION.

Maximum results in minimum time being essential, it was determined that the work in hand could be performed best through organization of various industries and utilization of the brains and experience of their representatives, working under the supervision of the committee and in conjunction with departmental representatives and others qualified to cooperate. Had there existed a sufficiency of materials to supply the needs of all those whose requirements were legitimate, it might have been unnecessary to appoint a committee on raw materials, but the Government was confronted with the necessity of expeditiously solving the problem of how best to provide for its own rapidly expanding war machine, for the allies, and for essential American private commerce. Its departments, suddenly called upon to handle a tremendously heavy burden of important business which taxed their resources to the limit, would have operated under a prohibitive handicap in attempting to meet the situation through the regular channels. Prior to the beginning of hostilities, supply had fallen far short of demand, with the inevitable and consequent tightening of prices. The elements of the situation were such that without coordination competitive buying would have created an impossible situation.

COOPERATIVE COMMITTEES OF INDUSTRY.

To facilitate the study of sources of supply, production, and its increase, stocks on hand, probable demand, the possible substitution, cooperative committees were appointed from leading representatives of the following industries: Alcohol, aluminum, anthracite and bituminous coal, asbestos, magnesia, and roofing, brass, cement, chemicals, copper, lead, lumber, mica, nickel, oil, rubber, steel and steel products, and zinc.

As subordinate to these general committees, there were appointed also advisory committees to cover special constituent fields, as, for instance, in respect of the following steel and steel products: Pig iron, iron ore, and lake transportation, tin plate, sheet steel, steel distribution, wire rope, malleable castings, ferro alloys, tubular products, cold-rolled and cold-drawn steel, pig tin, wire products, and scrap iron and steel.

These committees were drawn from men in high standing in the respective industries, representing, generally speaking, the whole country, geographically and otherwise, and from representatives of Federal departments whose activities are relevant. They assisted the Committee on Raw Materials in assembling trade information and mobilizing sources of supply, as well as in facilitating the operations of the Government through conferences with departmental representatives. To the end that they be of maximum usefulness, several committees established headquarters in Washington, permanently maintaining representatives therein. Experience has shown that they are of great service to the departments in assisting them to obtain lower than market prices and early deliveries.

The Committee on Raw Materials is not a purchasing body, but its chairman in March of this year made arrangements whereby the Army and Navy Departments bought 45,000,000 pounds of copper at 16 $\frac{2}{3}$ cents at a time when the market price was about 35 cents.

STEEL FOR THE NAVY.

This was followed by similar arrangements for the procuring of some 500,000 tons of steel for the Navy program at about one-third to 50 per cent below the market price. Large purchases of zinc and lead were also arranged for at from 33 $\frac{1}{3}$ to 50 per cent below market price. This also served to break the continuity of thought toward higher prices, and to show that the business men of the country were willing to and would voluntarily reduce their prices to the Government in time of war. As heretofore the departments of the Army and Navy purchase their own supplies of raw materials, while the Committee on Raw Materials renders assistance in the way of developing sources of supply, keeping prices within consistent limitations, and expediting deliveries. While without authority and power to buy, it is gratifying to observe that practical accomplishment in a very high degree has resulted through the cooperation of the departments and the Committee on Raw Materials.

As exemplifying in a general way the variety and extent of cooperative committee activities, the following extracts from the report of the chairman of the cooperative committee on lumber are quoted :

The cooperative committee on lumber began active work about May 1. It consists of six executive members on practically continuous duty in Washington, and six field members in different parts of the country, all of whom but one have been in Washington to some extent. Chief Forester Graves, of the Department of Agriculture, was an active member until sent to France on a Government errand.

The most important work of the committee has been to mobilize the lumber industry to furnish promptly and reasonably the tremendous quantity of material required by the wooden-fleet program and by barrack construction for the draft Army, the aviation fields, and other training camps. It has also assisted

in more special wood problems connected with Army vehicles, artillery wheels, aircraft, etc.

The work has involved not only questions of supply and price but also the preparation of specifications. Lumber is not a standard commodity, but embraces countless species, grades, and sizes, and especially when such a heavy and widely distributed demand must be met, it is necessary to correlate, compare, and systematize the classification of material from many and differing producing regions.

The architects and purchasing agents of the Government have not the information on which to do this. The schedules they prepare call for lumber which is highly expensive, or perhaps is unavailable in large quantities at any price. Consequently the lumber committee has had to do an immense amount of detailed work in revising their demands to meet actual producing exigencies, or to obtain favorable prices. The saving to the Government in this way has amounted to several million dollars, besides making it possible to get the material in time.

No actual purchasing has been done by the committee. It has confined its activity in this connection to mobilizing the manufacturers by regional groups to furnish the material direct from mill to builder, then recommending to the governmental purchasing agencies how best to utilize the facilities so provided. It has negotiated prices on the various lumber schedules, and recommended their acceptance as maximums, and also recommended as to the allotment of orders, so as to accomplish both fair distribution and the prevention of confusion through cross hauling and traffic congestion. In no case has it actually placed individual orders. The departmental purchasing agencies have done this, utilizing the advice given only as far as they have seen fit.

The price policy recommended by the committee has been simple. It has been to eliminate middlemen, except where extreme emergency requires taking lumber from local stocks, and to induce the mills to furnish at a price well below the market in return for being afforded certainty as to what is expected of them and for being given prompt car service. This policy "pegged" prices at a very reasonable point, whereas if the purchasing had been unsystematized the demands of dealers expecting to get Government business would have skyrocketed prices beyond reason. Nor would it have been possible to get a dependable supply when and where needed.

Government lumber requirements are continually changing with changes of building plans, but probably a billion feet at least has been or will be bought under present plans. Probably \$10,000,000 has been saved by the committee's mobilization of the producers as described in the foregoing pages.

The work of the cooperative committee on lumber is typical. Others operated along similar lines, the degree of their usefulness largely depending upon the relative difficulty encountered by the departments in securing supplies.

A MEDIUM OF CLEARANCE.

Meanwhile the Committee on Raw Materials, possessed of dependable information procured through its subcommittees, through Government departments, and otherwise, applied itself to a study of the general situation in its larger aspects. Directly and through representation on the General Munitions Board, it served as a medium of clearance as between producer and consumer—our Government, the

allies, and private industry. It devoted much time to the consideration of price fixing—a subject of paramount importance under current conditions, the judicious treatment of which involves determining accurately the lowest figure at which an article may be bought without stifling that which is most essential to quantity and quality production—enthusiasm.

Without authority to fix prices, the committee has succeeded in obtaining raw materials at substantial price reductions without trade disturbance of real consequence. By voluntary cooperation it has been instrumental in many cases in diverting output in such manner as to secure the greatest general benefit. By persuasion it has brought specialized private business efficiency into immediate and effective cooperation with a well-ordered Federal system.

COMMITTEE ON ENGINEERING AND EDUCATION.

It has been the function of the Committee on Engineering and Education to make available to the Government in the most effective possible form the services of the engineering and educational professions.

The engineering section of the committee has been appointed by different engineering groups to assist in the solution of problems of engineering policies. In the field defined by the second function of the committee, similar action was taken. Through a meeting of the heads of 187 colleges, universities, and technical schools, held in Washington on the 5th of May, the work of establishing an effective relationship between the colleges and the Nation was turned over to the educational section. Progress has been made in organizing both of these groups for national service.

ENLISTING THE ENGINEER.

In the effort to bring together for the national defense the various branches of the engineering profession particular attention has been paid to developing and explaining for the benefit of applicants the various methods of entering the reserve corps. Charts have been made up and printed matter circulated to show how the engineering profession could enter the Army most effectively. Advice has been made available to various officers of the Army and the Navy as to where engineering men could be obtained. An attempt has been made, as far as possible, to fit men to each given place. As the work developed the personnel branch of it has been turned over to other agencies, the assistance of the committee being given in all cases to these transferences and every effort being made to assist in developing the relations between the different organizations in such a way as to secure effective results.

The most important work was the designing of a proposal of a centralized bureau for the development of—

(a) A method of obtaining the definite requirements of technical training for the Army, Navy, and the governmental service.

(b) Necessary action to be taken to keep up the supply of technically trained men.

This work is still going on, and although obviously no definite solution has been reached, recommendations for assisting in its solution have been made.

The engineering committee appointed by the profession has made progress toward engineering coordination, although it is still far from complete; and every effort has been made to develop channels for securing to the Government the best technical advice available among American engineers.

EDUCATIONAL SECTION.

The university and college section has organized the universities and colleges of the United States. From the date of the meeting in Washington of the representatives of the principal higher institutions of learning, means of communication have been established through which the advice of the colleges has been made available to the Government and the advice of the Government to the colleges. Many conferences looking toward making the American college of more assistance to the national defense have been held in Washington and elsewhere with appreciable results.

The value of the committee's work as a clearing house for educational policies in time of war has been demonstrated in many ways by the colleges, and recent meetings have proved it even more than before. Through reciprocal visits of educational representatives coordination between the Canadian and the American universities has been established, with the result that the war experience of the Canadian institutions has been made available to American colleges through various mediums of information.

A research into chemical resources was carried through to a considerable degree of completeness. It listed in detail raw materials which were needed in the productions required by war, their imports and exports, and the possibility of obtaining substitutes for them. This study has been made available in a number of ways and is still in use. Among other matters connected with this study may be noted the fact that a complete record was made of all materials forbidden export by belligerent countries, and such materials were examined with special care.

A production engineering division was created to study the organization of the cotton industry and to see what possibilities there were for developing new sources of supply of cotton duck. The studies

made along this line with the assistance of the cotton trade were very extensive. They showed where approximately 200 per cent more tentage could be obtained. At the same time the committee was able to keep the industry in many ways in quite as effective a condition as before, despite the change in the product, and as a result of the engineering work carried on the entire industry has probably been bettered and strengthened in every way.

COMMITTEE ON LABOR.

(Including conservation and welfare of workers.)

The Committee on Labor entered upon its activities before the declaration of war by this country. The chairman called together representatives of the organized labor movement, who met in Washington February 28, 1917, and passed resolutions dealing with labor's position. The situation being thoroughly discussed, it was decided at this conference that the labor movement should make a definite statement as to its willingness to proceed in support of the Government. The chairman, as president of the American Federation of Labor, called a special meeting of the executive council of that body for March 9, and also for a general labor conference at Washington on Monday, March 12, to consider labor's attitude on the war.

ORGANIZED LABOR AND THE WAR.

The executive council met on March 9 and devoted three days to the preparation of a statement defining the position of American labor upon fundamental principles in peace and war. There were present on this occasion, in addition to the executive council, 148 representatives of 79 affiliated national and international unions, 5 unaffiliated organizations, and the 5 departments of the American Federation of Labor. Foremost among the resolutions adopted was the following:

We, the officers of the national and international trade-unions of America, in national conference assembled in the Capital of our Nation, hereby pledge ourselves in peace or war, in stress or storm, to stand unreservedly by the standards of liberty and the safety and preservation of the institutions and ideals of our Republic. * * * We, with these ideals of liberty and justice herein declared as the indispensable basis for national policies, offer our services to our country in every field of activity to defend, safeguard, and preserve the Republic of the United States of America against its enemies, whomsoever they may be, and we call upon our fellow workers and fellow citizens in the holy name of labor, justice, freedom, and humanity to devotedly and patriotically give like service.

The chairman of the Committee on Labor called a meeting for organization purposes in Washington April 2, 1917. More than 150 persons attended, including representatives of labor from the

leading international unions and the railway brotherhoods, employers, welfare experts in the leading industries, and the general public, with a wide range of commercial, transportation, financial, and civic interests. A unity of purpose was developed among the diverse groups represented, a permanent organization was formed, and an executive committee was selected, as follows:

Executive committee and advisers: Chairman, Samuel Gompers, president American Federation of Labor, Washington, D. C.; William B. Wilson, Secretary of the Department of Labor, Washington, D. C.; V. Everit Macy, president the National Civic Federation, New York; James Lord, president mining department, American Federation of Labor, Washington, D. C.; Elisha Lee, general manager Pennsylvania Railroad Co., Philadelphia, Pa.; Warren S. Stone, grand chief Brotherhood of Locomotive Engineers, Cleveland, Ohio; C. E. Michael, National Association of Manufacturers (president Virginia Bridge & Iron Co.), Roanoke, Va.; Frank Morrison, secretary American Federation of Labor, Washington, D. C.; Lee K. Frankel, third vice president Metropolitan Life Insurance Co., New York; James O'Connell, president metal trades department, American Federation of Labor, Washington, D. C.; Louis B. Schram, chairman labor committee, United States Brewers' Association, Brooklyn, N. Y.; Ralph M. Easley, assistant to Samuel Gompers, New York; James W. Sullivan, assistant to Samuel Gompers as member of Advisory Commission, Brooklyn, N. Y.; Gertrude Beeks, secretary executive committee, New York.

Among the organizations represented were: American Federation of Labor; the National Civic Federation; National Association of Manufacturers; American Institute of Architects; National Fire Prevention Association; National Board of Fire Underwriters; Illuminating Engineering Society; National Council of Safety; American Museum of Safety; National Consumers' League; National Child Labor Committee; American Public Health Association; Young Men's Christian Association; National Association for the Promotion of Industrial Education; Joint Conference of Coal Miners and Operators of Illinois, Indiana, Ohio, and Western Pennsylvania; and Mining and Metallurgical Society of America.

To the general membership list of the Committee on Labor additions have since been made from all walks of life, until at present it numbers several hundred.

Besides the executive committee the following national committees have been formed: Wages and hours, Frank Morrison, chairman, Washington, D. C.; mediation and conciliation, V. Everit Macy, chairman, New York; welfare work, Louis A. Coolidge, chairman, Boston, Mass.; women in industry, Mrs. Borden Harriman, chairman, Washington, D. C.; information and statistics, Dr. Frederick

L. Hoffman, Newark, N. J.; press, Grant Hamilton, Washington, D. C.; cost of living, domestic economy, S. Thurston Ballard, Louisville, Ky.

A resolution was offered at the conference of State governors called by the Council of National Defense in the spring recommending that in forming State councils of defense provision be made for State committees on labor similar in scope and similarly organized to cooperate with the national Committee on Labor.

TO MAINTAIN EXISTING STANDARDS.

A resolution was adopted at a meeting of the executive committee, Committee on Labor, and approved by the Advisory Commission and Council of National Defense April 6, embodying a declaration of the attitude of American labor with regard to the war. The resolution was as follows:

The defense and safety of the Nation must be the first consideration of all patriotic citizens. To avoid confusion and facilitate the preparation for national defense and give a stable basis upon which the representatives of the Government may operate during the war, we recommend:

First. That the Council of National Defense should issue a statement to employers and employees in our industrial plants and transportation systems advising that neither employers nor employees shall endeavor to take advantage of the country's necessities to change existing standards. When economic or other emergencies arise requiring changes of standards, the same should be made only after such proposed changes have been investigated and approved by the Council of National Defense.

Second. That the Council of National Defense urge upon the legislatures of the States, as well as all administrative agencies charged with the enforcement of labor and health laws, the great duty of rigorously maintaining the existing safeguards as to the health and the welfare of workers, and that no departure from such present standards in State laws or State rulings affecting labor should be taken without a declaration of the Council of National Defense that such a departure is essential for the effective pursuit of the national defense.

Third. That the Council of National Defense urge upon the legislatures of the several States that before final adjournment they delegate to the governors of their respective States the power to suspend or modify restrictions contained in their labor laws when such suspension or modification shall be requested by the Council of National Defense, and such suspensions or modifications, when made, shall continue for a specified period and not longer than the duration of the war.

The foregoing resolution was adopted by the council on April 6, by motion of the executive committee of the Committee on Labor. Owing to some public discussion of the meaning of the phrase "no departure from such present standards," the statement was later amplified as follows:

There seems to be some misunderstanding of the scope of the statement made by the Council of National Defense when it advised "that neither em-

ployers nor employees shall endeavor to take advantage of the country's necessities to change existing standards." In order that that misunderstanding may be removed, the following amplification is made.

There have been established by legislation, by mutual agreement between employers and employees, or by custom certain standards constituting a day's work. These vary from 7 hours per day in some kinds of work to 12 hours per day in continuous-operation plants. The various States and municipalities have established specific standards of safety and sanitation and have provided inspection service to enforce the regulations. They have also established maximum hours of work for women and minimum age limits for children employed in gainful occupations. It is the judgment of the Council of National Defense that the Federal, State, and municipal governments should continue to enforce the standards they have established unless and until the Council of National Defense has determined that some modifications or change of standards is essential to the national safety; that employers and employees in private industries should not attempt to take advantage of the existing abnormal conditions to change the standards which they were unable to change under normal conditions.

The one other standard that the council had in mind was the standard of living. It recognizes that the standard of living is indefinite and difficult to determine, because it is in a measure dependent upon the purchasing power of wages. It believes, however, that no arbitrary change in wages should be sought at this time by either employers or employees through the process of strikes or lockouts without at least giving the established agencies, including those of the several States and of the Government, and of the mediation board in the transportation service, and the division of conciliation of the Department of Labor in other industries, an opportunity to adjust the difficulties without a stoppage of work occurring. While the Council of National Defense does not mean to intimate that under ordinary circumstances the efficiency of workers is the only element that should be taken into consideration in fixing the hours of labor, safety, sanitation, women's work, and child-labor standards, such efficiency is the object that must be attained during the period when the Nation's safety is involved. It may therefore be necessary for the Council as a result of its investigations and experiences to suggest modifications and changes in these standards during that time. It is not the purpose of the Council, however, to undertake to determine the wage rate that will be sufficient to maintain the existing standards of living. Such questions as can not be adjusted by private negotiations should be referred to the mediation agencies above referred to or to such other constituted agencies as may exist to the end that such questions may be adjusted in an orderly and equitable manner to avoid the stoppage of industries which are so vital to the interests of the Nation at this critical time.

THE BRITISH LABOR MISSION.

The chairman of the committee, impressed with the desirability of promoting a good understanding between England and the United States and of securing the benefit of their experience in matters affecting labor under war conditions, cabled Premier Lloyd George on April 12, suggesting that representatives of England's wage-workers be sent to America as a part of the visiting (Balfour) British commission. Action was taken at once by Mr. Lloyd George, who named as the labor members of the commission Right Hon.

C. W. Bowerman, privy councilor and member British House of Commons, secretary of British Trades Union Congress Parliamentary Committee; Hon. James H. Thomas, member of Parliament, general secretary National Trade Union of Railwaymen, Great Britain and Ireland; Joseph Davies, member of the secretariat of the prime minister; H. W. Garrod, representing the labor department of the Ministry of Munitions.

In response to a request made to the Government of Canada, two representatives, G. D. Robertson, vice president National Association of Railway Telegraphers, and J. C. Watters, president Trades and Labor Council of Canada, were sent from that country to take part in a special meeting of the Committee on Labor in Washington which took place May 15.

There was a very large attendance of the members of the committee, and the addresses, especially of Messrs. Bowerman and Thomas, were comprehensive, illuminating, and helpful. These addresses and the proceedings of the three sessions of that day have been printed in full as Senate Document No. 84, Sixty-fifth Congress, first session, under the caption "British labor's war message to American labor." This document has been given a very large circulation throughout the United States and Canada.

During the day of May 15 President Wilson received the committee and its guests at the White House.

The British labor representatives made a tour of the country, which included Pittsburgh, Chicago, Cleveland, Albany, Schenectady, Boston, and New York, the last four having been under the auspices of the National Civic Federation. In all the cities visited the delegates were greeted with the liveliest interest, and the questions relative to the industrial problems of Great Britain, which also might soon be those of the United States, were discussed. In each community the representatives of the State and local federations of labor and railway brotherhoods cooperated with employers and public men in arranging for mass meetings and other functions.

Notable also were the visits at meetings of the executive committee of members of the French and later of the Italian missions to the United States.

On April 30 M. Viviani, formerly minister of labor for France, addressed an open meeting of the executive committee at which a considerable number of labor and other representatives were present.

During the meeting of the executive committee on June 1, the committee received a visit from Mr. Francesco Nitti, formerly minister of agriculture and of labor of Italy, accompanied by Mr. Paolo de Parento, secretary of the war mission in the United States, and Mr. Augusto Ciuffelli. The chairman extended the welcome of the Committee on Labor to the Italian representatives, explaining the func-

tion of the committee in the mobilization of industrial resources for the national defense. Mr. Nitti addressed the committee on the attitude and interest of labor in both countries in the cause in which they are jointly engaged.

SPECIAL AND SUBCOMMITTEE WORK.

Various subcommittees of the Committee on Labor were organized in the months of April, May, and June, men and women of suitable qualifications being chosen from all occupations, whether employers or employees, from all parts of the country.

NATIONAL COMMITTEES.

NATIONAL COMMITTEE ON WAGES AND HOURS.

Through an executive committee of the committee on wages and hours, composed of representatives of labor organizations and employers, full representation has been secured in conference on matters of policy related to labor conditions under the war. This committee assisted through conference in incorporating in proper form in Government contracts the standards for wages and hours already established by Federal legislation.

NATIONAL COMMITTEE ON MEDIATION AND CONCILIATION.

The national committee on mediation and conciliation, 75 in number, was organized to include three groups, respectively, wage earners, employers, and the general public, with an executive committee of five members. It was designed to include local committees similarly constituted.

It was not intended that this committee should arbitrate disputes, but where conciliation should fail it was expected that arbitration should be urged between contending parties—they selecting their own arbitrators—and that it should cooperate, upon call from the Council of National Defense, its Advisory Commission, the board of Federal mediators, the commissioners of conciliation of the United States Department of Labor, and the State boards of conciliation.

The committee rendered mediation service in several important cases where an adjustment was made, e. g., in Cincinnati by a representative of the committee during the first week of June, and during that month cooperated in the settlement of industrial disputes in Philadelphia, San Francisco, Omaha, Pittsburgh, and Jackson, Ohio.

Pending consideration of various plans for handling disputes, further development of this committee has been held in abeyance, its machinery being available when called upon as indicated by the various Government agencies concerned.

Other members of the Committee on Labor have also been in communication, personally or otherwise, with trade-union officials having grievances related to war work, and with employers. In some cases misunderstandings were removed merely by conveying information, quoting the law relative to Government contracts. These negotiations represented many thousands of men, including iron and steel workers, packing-house employees, milling employees of Minnesota, railway men, and New England textile workers.

NATIONAL COMMITTEE ON WELFARE WORK.

The directing motive of the committee has been that indispensable service under war conditions must be organized in furtherance of two purposes—conservation of human life and productivity. The work of the committee has been so divided as to take into account the needs of the workers during and after working hours. It has been taken into consideration the fact that to secure the best service in peace or in war, there must be insured the existence of good will and initiative on the part of the workers, and that good will can exist only under equitable conditions. This committee planned to safeguard the health of workers chiefly through a campaign of education and in cooperation with existing agencies, the means to be employed being illustrated lectures, moving pictures, illustrated literature for employers, workers, lecturers, and preachers. Among the agencies used have been churches, chambers of commerce, fraternity lodges, employers' trade organizations, trade-unions, miscellaneous conventions, etc.

The committee proposed to undertake to bring home to employers in the most forceful way the necessity of establishing correct standards to the end that the Government shall receive from the industries engaged in the production of war materials the best possible results and at the same time conserve the health and efficiency of the human machine. On the theory that the industrial army which will supply the fighting forces of the country with arms, clothing, and food is second in importance only to the military establishment of the Government, the committee has been working industriously on plans for the conservation and welfare of workers throughout the Nation. Industrial and health experts are now working on reports which it is hoped will be of value to manufacturers in increasing their output and to the workers in improving their condition in factories and at home.

The principles upon which these features of welfare work, in the committee's assigned task, are based are the health, welfare, and efficiency of the workers in the vital industries upon which all else depends. Only those matters that relate to the successful prosecution of the war have been included in the program of work.

The sections on compensation for enlisted men and their dependents, on housing, and on industrial training for the war emergency promise to be particularly important.

The definition of welfare work adopted by the committee on labor is: Maintaining and improving working and living conditions of employees; especially applicable to mines, railroads, factories, stores, and public institutions.

The types of employees considered are (a) industrial; (b) public; (c) soldiers and sailors and their dependents; (d) field mechanics in active service.

SECTIONAL AND DIVISIONAL NATIONAL SUBCOMMITTEES.

SUSTENANCE FOR DEPENDENTS OF SOLDIERS AND SAILORS.

Preliminary effort was devoted, by a special committee appointed April 30, 1917, to consideration of means to provide sustenance for the dependents of those who enter military and naval service in the defense of the country in this war.

The subject was discussed by correspondence with the President and in conference with representatives of the American Red Cross, National Charity Organization Society, and others likely to be concerned. The committee advocated and made clear the position of labor against providing sustenance for such dependents, directly or indirectly, through any charity organization and urged that such provision for the care of the dependents should be made by the Government itself and dispensed by it.

The executive committee of the Committee on Labor recommended on May 29, 1917, to the Advisory Commission and the Council of National Defense that the Committee on Labor be authorized to prepare a tentative bill dealing with provision for the care of dependents of enlisted men. This authorization was granted, and there was created on June 28 as an activity of the committee on welfare work, a section on compensation for enlisted men and their dependents, to consider the subject of separation allowances, compensation for injuries sustained by men in military and naval service, compensation to families of those killed in the war, and kindred subjects.

A committee on draft, composed of experts on social insurance, was in process of being formed on July 1 to assist in the preparation of a bill, and conferences were being planned with the Treasury Department, the Department of Commerce, the Navy Department, and the Department of Labor to secure common counsel in the project.

SECTION ON SANITATION.

Men experienced in dealing with this subject, in direct contact with industry, and of great technical ability have given their time unstintedly to this work since the 5th of April. Important topics most concerned with the health of workers engaged in the manufacture of war products have had first attention and there are in preparation, with a view to their circularization in pamphlet form, reports which should aid employers in providing healthful conditions in dangerous trades.

MANUFACTURE OF EXPLOSIVES.

The report of the division on the manufacture of explosives, now under preparation, will include recommendations concerning equipment to provide adequate ventilation, to insure personal cleanliness, including types of washhouses and requirements for change of garments as well as washing before eating luncheon, to care for injuries and cases of sickness, for physical examination to detect the possible effect of poisonous substances with a view to suspension of the workers affected, education of the workers in their own languages as to the dangers inherent in the work, and recommendations with reference to cleaning vats, tanks, machinery, stills and pipes for nitro and amido compounds, etc., as well as rules covering protection for employees engaged in packing picric acid and in emptying drying houses, and standards concerning the placement of platforms with relation to space for ventilation.

LIGHTING.

The division on lighting had about completed its principal work at the end of June, having formulated a code for factories, mills, and other work places covering the essentials for proper and adequate light, intensity required, the shading of lamps, the distribution of light, emergency lighting and switching, and controlling apparatus.

INDUSTRIAL FATIGUE.

This division has had a large number of factories, including those making munitions, under investigation for three or four weeks at a time. A report is under preparation dealing with such topics as the following: Amount of output; amount of power used; other indicators of fatigue; laboratory tests of fatigue. Under "Ways of reducing fatigue" it will give consideration to introducing recess periods, introducing variety into work, adjusting the speed, omitting unnecessary motions, providing adjustable seats, ventilation of work-rooms, sanitary conditions within factories, alternating day and night work, adjusting hours of work, avoiding overtime, omitting Sunday work, and sanitary conditions outside factories.

HEATING AND VENTILATION.

The work of this division will deal with inadequate or inoperative State laws concerning ventilation, the necessity of doing research work through a national agency in order that certain fundamentals may be established, and the necessity and desirability of initiating educational measures for both the employers and the workers.

DRINKING WATER.

The committee has under consideration artificial cooling, recommendations with reference to separate containers for ice, healthful temperature of the water which in general it believes to be safe from 45° to 60°, the quantity of water required for health, the consensus of opinion at the present stage of the division's work indicating in general one-half pint to a pint for a workman every hour or a gallon a day to be sufficient. Recommendations as to types of drinking fountains and other factors are also under consideration.

INDUSTRIAL DISEASES.

This division is preparing a report on industrial diseases and poisons and how to prevent and control occupational diseases. It will cover specific precautions, agencies propagating infections, advice concerning personal hygiene, and factory and shop equipment for both locker and washing facilities, the disposal of excreta and the provision of suitable cuspidors, and instructions to plant medical officers.

HOME NURSING.

The purposes of this division are:

1. To furnish information concerning all industrial nursing service throughout the country.
2. To make available the service of established home nursing and other public-health nursing agencies in the United States to people needing such care through direct communication with inquirers concerning these agencies.
3. To stimulate employment of public-health nursing service for industrial workers.

The plan of the work is:

1. To keep a registry of all resources for home-nursing care. This will be placed at the disposal of the secretary of the committee through the courtesy of the national organization for public-health nursing.
2. To gather from time to time information on subjects pertaining to home-nursing care of industrial workers and their families; this to be available at all times to the section on sanitation.

3. The committee will, upon solicitation, consider questions concerning conditions of work from the standpoint of the physical effect of various occupations of the worker, especially the effect of work on women and children, reports on such subjects to be incorporated with related studies that may be made by the section on sanitation.

The division on home nursing has cooperated in its work throughout with the committee on public-health nursing of the Medical Section and with the nursing committee of the American Red Cross. A survey of all industrial nursing resources has been made, and the division has available in its files a list of these agencies in the United States.

The division is now exerting its influence to increase medical and nursing care to these workers and their families because of the extra war hazards.

In particular it is hoping to secure provision for community centers, including nurses and social service agents, in the plans that are being considered for housing the growing numbers of industrial workers and their families in new and unequipped centers of industry.

MEDICAL SUPERVISION.

The aim of this division is to have created expert medical departments through which the employers may learn of the value of the recommendations upon the various health measures covered by the other divisions above enumerated. The installation of medical departments, or industrial health-service departments, to care for the human element, this division believes, can be made of economic value to the industries involved.

SECTION ON INDUSTRIAL TRAINING FOR THE WAR EMERGENCY.

This section is concerned especially with plans for training highly skilled workmen, such as those in the building trades who may be shifted into shipbuilding, as well as unskilled men and boys and women to supplement skilled men. It is also studying the problem of readjustment of this labor after the war. The feasibility of vestibule schools adjacent to the industries is being considered.

State committees are being formed composed of representatives of labor, employers, and educators from manufacturing and commercial establishments where munition making is intense, and in cooperation with State councils of defense.

Manufacturers of airplanes and air motors and heads of mechanical industries have made requests for assistance in this connection.

Many endowed and public vocational schools have offered their services to the Government, but their field of usefulness has not been

determined. This, partly, at least, because proper determination depends not upon considerations that are primarily educational but upon factory and industrial conditions in the several communities. In substantially all cases the corporations with war orders or making machinery and other things necessary for war production offer a basis for local action in consultation with this section. For instance, in 1914 a vocational training school devoted a considerable part of its machine shop to the production of tools and templets, with which a foremost producer of small arms for the allies produced great quantities that could not have been produced without these tools, for there was an apparently insuperable shortage of toolmakers. The educational quality of the school was improved by this experience.

It is the intention to help the endowed and technical schools in all communities to be as useful to industry as possible without interfering with their educational program as desired by them.

The section emphasizes that its work is primarily not educational, not even industrial education as commonly defined, but rather training of shop operatives solely to the end that the necessary munitions and other Government requirements may be produced.

HOUSING.

The chairman of the committee on housing received his appointment on May 3. On June 28 he began a tour of the country to investigate housing congestion in war-order plants. The section has come to the conclusion that only in the greatest emergency are temporary shacks permissible. Permanent foundations, walls, and roofs may be planned for dormitories, hospitals, and living quarters, fitted in temporary fashion but readily convertible into permanent housing quarters after the war. It has been estimated that many of England's temporary quarters cost 30 per cent of what permanent quarters have cost.

On July 1 a great deal of further investigation was under way in an effort to secure a thorough basis for comprehensive recommendations on the housing problem.

SECTION ON RECREATION.

The section on recreation is in process of organization.

SECTION ON PUBLIC-HEALTH EDUCATION.

It was deemed advisable to confine the work of the section to home instruction, for there is not only great opportunity for rendering valuable service in this direction, but by restricting the scope of the work in the manner referred to there was considered to be less

likelihood of invading the domain of other committees which form part of the Council of National Defense.

There are three factors of special importance in the education of the public concerning the preservation of health: (1) The dissemination of information which emanates only from authoritative sources; (2) general education upon the subject throughout the country in order that all may receive like instructions; (3) the selection of proper agents and means by which the information may be conveyed to the homes of those in need of this education.

In the selection of means by which information relating to the preservation of health may be conveyed to the public there is no more effective and valuable agent for this purpose than the trained nurse who visits the home and personally instructs the members of the household upon the subject of health protection. Furthermore, the heads of the various organizations to which wage earners belong, particularly those of foreign birth, would willingly serve the same purpose. Such assistance would go far to bring about the desired result, provided the instruction was more or less continuous and the information imparted by these agents was supplied by a body of known experts and was uniform in character. Moving pictures and the distribution of properly prepared tracts may also be utilized with profit.

It seemed quite clear that the function of this committee is to prepare a plan of operation for national action, and, after proving its action by practical demonstration, subsequently to seek the cooperation of persons and societies throughout the United States to take part in the general fulfillment of this plan. Plans are under way for carrying out such an educational scheme.

COMMITTEE ON WOMEN IN INDUSTRY.

The committee on women in industry was appointed to advise on women's employment in such ways as to bring about the maximum effectiveness of the woman power of the country.

The committee has a membership of 84 women, 35 of whom are representatives of labor. The remainder are experts on labor problems and representatives of the employers and the general public. The official status of the committee makes it desirable to secure representation of all the interests of the community.

The committee holds bi-monthly meetings in Washington to formulate general policies. One of its main functions is to advise on the replacement of men by women workers and to see to it that women are not subjected to overstrain in the new occupations and that existing wage standards are not undercut.

The work of its growing number of State committees is supervised by the national committee. It cooperates with them by draw-

ing attention to problems of national importance which may arise in in their various territories. It coordinates the work of its State committee by keeping an oversight of the entire field and serves as a channel of communication in reporting to the Government.

The executive committee, consisting of 13 members, holds meetings once a month. It outlines plans of work and acts in a supervisory capacity for all field work and investigations.

An important part of the State work now being planned will be to aid in securing labor laws. This means close cooperation with State factory inspectors, a concerted effort to stimulate their activities, and, where necessary, to create public sentiment that demands efficient work on the part of the inspectors.

In many States there has been an apparent tendency toward the repeal of laws restricting hours of work or toward giving State officials authority to abrogate the law under certain conditions. Where such authority has been given to State officials it is the duty of the committees to appear at any public hearings at which exemptions are considered, to watch the operation of any exemptions that are granted, and to keep the national committee currently informed of all such action.

PROTECTING UNSKILLED WORKERS.

Thousands of unskilled and unorganized workers are being employed in the manufacture of war supplies. In the rush of this work an unfortunate tendency has been noted in some instances to break down existing standards. It is therefore important to report and to endeavor to prevent all deviation from the rates established under collective agreements for the locality for every industry and occupation in which such agreements exist.

General questions which will receive attention are:

(a) The amount of unemployment, what industries are laying off women, and what industries are needing more women workers.

(b) Shifting of women to new centers of industries. While this committee has no active part in the placement of such workers, it will observe the general living conditions offered to transported workers as well as local conditions of labor.

A most important economic change confronting the country is the employment of women on work customarily done by men. With the mobilization of the National Guard and the organization of the selective army over 1,000,000 men between the ages of 21 and 30 years will be withdrawn from civil occupations. No estimate has been made of the loss to industry, but already many vacancies in subordinate positions are being filled by women, and there is no doubt that this process may be greatly hastened within the next few months. Wherever this change is contemplated or is taking place in any in-

dustry or occupation, inquiries will be made immediately. The committee has taken the view that the health of the women should be especially considered, and whether the work is suitable to them. Wherever, for instance, it requires them to carry heavy loads, to work on heavy machines, or to stand for long periods it will be necessary to modify the processes.

Whenever disputes arise involving women, the committee plans to acquaint itself with the facts at issue at the earliest moment and make attempts to secure a fair adjustment without a discontinuance of work. In case of a strike the committee should be prepared to give exact information to the official mediating agency.

State committees are at work on the lines above indicated, but no final reports have as yet been made.

SPECIAL SERVICE OF THE CHAIRMAN.

The chairman of the Committee on Labor, as a member of the Advisory Commission, has been in attendance at its sessions, with scarcely an exception, and much of his time has been taken up with a necessary discussion of labor problems arising out of war conditions.

The chairman has been called upon to visit many cities, in some cases being asked to address large public audiences and committees on the general subject of the war and the duties of the Advisory Commission and of the Committee on Labor. In other cases he has adjusted the differences between employers and employees. While in Washington he is daily waited upon by individuals and delegations from every part of the country seeking information as to the committee's work and asking for his aid in solving labor questions in which employers and employees are vitally interested. Attendance at meetings of the various committees, especially of the executive committee and the important committees dealing with wages, has taken up much of his time. He has also in the course of his duties waited repeatedly upon the President of the United States for the purpose of presenting an interpretation of labor's sentiment with regard to the war, and announcing the conclusions of the Committee on Labor's subcommittees on several matters considered by them.

Many of the persons coming to the office of the assistant to the chairman are trade-union officials who desire to present grievances to those branches of the Government which may appropriately deal with them or who wish to get into communication with Government officials in order to obtain consideration of trade-union proposals in connection with war work. On occasions these committees have represented many thousands of men in practically all industries. Conferences have also been frequently held with heads of

departments, other governmental agencies, and many employers of labor.

The machinery of various departments of the National Civic Federation was turned over by that organization to the Committee on Labor at its inception, and accepted by the chairman of the committee, who publicly stated recently that it could not have accomplished what it has done had not the National Civic Federation been in existence and extended patriotic service through its welfare, compensation, mediation, and other departments.

Officials of the National Civic Federation have given their time since the 1st of April, and are continuing to do so.

AUTOMOTIVE TRANSPORT COMMITTEE.

The Automotive Transport Committee has held conferences with representatives of the British munitions minister, offering, through the Institution of Automobile Engineers of Great Britain and the Society of Automotive Engineers of this country, a program for increasing the small grains crop in England and on the subject of farm tractor design, manufacture, and application.

Conferences have been held in connection with the board for motorizing the field artillery of the United States Ordnance Department, outlining experience in the British Army and conditions on several phases of military transport and traction in France. The discussion related to the extent to which it shall be advisable to attempt motorization of field artillery and what types of motive power will be most efficient.

Many sessions have been held with representatives of the Quartermaster's Department with regard to specifications of the War Department for class B and class A motor trucks. The purpose in view was to secure greater clarification of the then existing specifications for these trucks, making it possible to comply with them in a more thorough commercial way.

MILITARY TRUCKS.

The issuance of the military truck specifications, under which bids were opened June 10 in Chicago, marked the final steps in the result of the long cooperation between the War Department motor transport board and the Society of Automotive Engineers in an endeavor to arrive at a set of specifications having maximum value to the Army, and yet drawn in a way to encourage and protect manufacturers in the greatest practicable manner and accomplishing greater uniformity of detail parts furnished by various manufacturers.

EVOLVING THE STANDARDIZED WAR TRUCK.

In May a conference of 15 chief engineers, representing the principal truck manufacturers of the United States, was held in the rooms of the committee, under the auspices of the Society of Automotive Engineers. The special detail equipment on trucks for war service demanded by the Quartermaster's Department was considered and complete standardization of many of these details was accomplished as between practically all makes of trucks. A great degree of uniformity was obtained in those details which were not completely standardized. This particular work was in a way the entering wedge toward the completely standardized heavy-duty, medium-duty, and light war trucks. In addition, an agreement was reached to cooperate in the purchase of the particular parts under consideration, these including towing hooks, to be attached to the front and rear ends of the trucks; the bumpers which are also attached to the front and rear to avoid damage from collisions; radiator guards, magneto fastenings, and other details. In this way much tool expense was saved, by concentrating on types of details satisfactory to all the engineers, giving economical production in quantities sufficient for all Army needs from a relatively small number of sources of supply. In the aggregate this constitutes a large saving to the Government and made it possible for the engineers to concentrate their labors on the production of essential developments. It is especially desirable in the machining trades to avoid unnecessary duplication of dies and tools.

The committee has all along kept in close touch with the aeronautic program of the Government, and held regular communication with members of the aeronautic division of the standards committee of the Society of Automotive Engineers, which has been cooperating with the War and Navy Departments, the Aircraft Production Board, the National Advisory Committee for Aeronautics, and the Bureau of Standards.

The committee has held various meetings to take up questions involving cooperation with the Government, including standardization of motor trucks, aircraft, motor boats, tractor parts, and the establishment of courses of instruction for operatives of these forms of apparatus to be used by the Government. The committee has done coordinating work involving the facilities of schools and private companies, in the direction of stimulating enlistment in the reserve corps, and giving proper instruction to round off the preparation of thousands of passenger-car drivers into motor-truck drivers.

FARM TRACTORS.

The committee has called attention clearly to the needs of the farm-tractor industry in the way of increasing supplies of raw materials

and machine tools, in order that the output of tractors could be stimulated sufficiently to have a marked effect on the food production of the United States this year.

In connection with the truck-standardization work a very important meeting, attended by 30 delegates from representative manufacturers of engines and transmissions, was held under the auspices of the Society of Automotive Engineers, in cooperation with the Quartermaster's Department. At this meeting, which lasted throughout morning, afternoon, and evening sessions of two days, highly satisfactory progress was made in standardizing the mounting dimensions of the units to be used in the assembly of military trucks. The steps taken at this meeting were so momentous that another meeting of three days' duration was held in June, the engineers and the chief executives of all truck manufacturing companies expecting to do business with the Government and of all the principal frame, radiator, transmission, engine, and rear-axle builders, being invited to attend.

The automotive committee has handled questions arising in connection with business relations and arrangements of production as distinguished from technical and engineering matters pertaining to automotive products, the cooperation of the Society of Automotive Engineers having been enlisted in connection with the latter as far as possible.

The committee early in June initiated and before July 1 carried far to completion an inventory in short form of the plants of the automotive industries, with regard to machine tool equipment particularly. This inventory, which is supplemental to that made by the Committee on Industrial Preparedness of the Naval Consulting Board, has proved of great value to the Council of National Defense and to the automobile industry.

Motorcycle manufacturers had a meeting June 28, under the auspices of the committee, with the cooperation of the Society of Automotive Engineers, progress being made toward the development of standard specifications for certain elements of military motorcycles.

The Motor and Accessory Manufacturers' Association appointed a number of subcommittees, with jurisdiction over various classes of products made by its members, for cooperative work with the committee.

GENERAL MEDICAL BOARD AND MEDICAL SECTION.

The General Medical Board has created the following committees: Executive committee and committees on State activities and examinations, hygiene and sanitation, research, dentistry, medical schools,

and hospitals. The work of the members of these committees has from the first been supplemented by volunteers not officially members of the General Medical Board, but serving as full-time advisors in residence at Washington.

At the General Medical Board meetings, which were held at first every week and later at longer intervals, matters of general medical policy are discussed, committee reports are received, discussed, and analyzed, and nonmembers are encouraged to present ideas bearing on medical problems of war. These various reports are then further studied and analyzed in the smaller and necessarily more effective executive committee, where a decision is reached and reported by the chairman to the Advisory Commission of the Council of National Defense of which he is a member.

The first meeting of the General Medical Board was held on April 19, 1917, and was devoted largely to the appointment of committees. At the next meeting the important topics of control of alcohol and venereal disease were considered, the military authorities were supported in their stand on both these questions, and recommendations for the further control of these evils were made. The committee on medical schools made its first report at this meeting in order to offset early the danger of depletion of medical schools. The inability of one of the allies, in her sudden stress, to provide against such an exigency resulted in a threateningly acute situation for her civil population. The committee on medical schools, in conjunction with the efforts of the committee on legislation, was successful also in convincing the medical schools of the inadvisability of unduly speeding up educational methods. This same committee was active in its advocacy of compulsory training in military surgery for third and fourth year medical students, who would thus be graduated with a knowledge of at least the rudiments of military surgery.

STANDARDIZATION OF SUPPLIES.

The committee on hospitals set about to solve the important question of standardization of supplies. The crux of this problem lay not only in the fixing of standards, but also in the so-called "stapleization" of supplies; that is, determining what staple materials on the market, or in process of manufacture, could be used, even though not meeting previously established Army and Navy standards. The success of the committee's efforts is well illustrated by the fact that in spite of an 80 per cent decrease in the normal supply of surgical instruments in this country and of a tenfold increase in demand, the exigency has been met and the manufacturers will be able to fill both civil and military needs. A similarly good state of affairs applies to hospital and laboratory supplies, X-ray apparatus and supplies, medicines, antiseptics, and disinfectants.

The activities of the General Medical Board have comprised organization of the medical profession for purposes of stimulating recruiting, investigation of patent laws in their relation to drugs needed for civil and military welfare, supporting the Public Health Service officials in their efforts to maintain, during war, the high standard set by them for the care of the civil population in peace, promulgating measures directed against the spread of venereal disease, studying the problems of the growth of digitalis in America, of corn starch fermentation in the production of acetone, of the cultural variations of the gas bacillus, of the possibilities of dried tetanus antitoxin, and of possible cheaper substitutes for phenol and cresol to be used as disinfectants, emphasizing the need of trained entomologists in the training camps, and of psychological examination of recruits, cooperating in planning the structural details and costs of the base hospitals, and organizing the dental profession on a basis of greatest possible service to the country.

STUDYING VARIED PROBLEMS.

Problems related to specific and seemingly less important details have been considered most carefully. The questions of ear protection against the concussion effects of high explosives, the cultural reactions of dysentery bacilli, the production of adequate portable X-ray outfits, the phenomena of shell shock, the development and manufacture of improved gas masks, and the proper type of paraffin mixtures to be applied to burns—all these were detailed for study, or in some form carefully considered.

Many broader and more far-reaching problems have been discussed, such as cardio-vascular disease and tuberculosis in the Army, the proper management of physically defective conscripts so that they may be restored to health or greater usefulness, and the rehabilitation and reconstruction of the war crippled, with reeducation of both these and the blind and deaf and physically impaired soldiers.

WORK OF THE MEDICAL SECTION.

Under the general advice of the General Medical Board the Medical Section of the Council of National Defense mapped out a program resting fundamentally on 12 basic efforts, as follows: (1) To ascertain civilian medical resources; (2) to ascertain medical resources of the Army, Navy, Public Health Service, and Red Cross; (3) to ascertain foreign medical advances and deficiencies; (4) to promote medical research; (5) to increase the value, volume, availability, and efficiency of civilian medical resources; (6) to increase value, volume, availability, and efficiency of medical resources of Army, Navy, Public Health Service, and Red Cross; (7) to coordi-

nate activities in all lines; (8) to provide for welfare of men at the close of the war; (9) to prevent spread of disease by return of troops; (10) to prevent spread of disease by refugees; (11) to protect food and water against pollution by civilian population; (12) to protect in the event of pollution.

CIVILIAN MEDICAL RESOURCES.

As an example of the accomplishments of the Medical Section, the work done on the first topic, "Civilian medical resources," is detailed herewith. It is admittedly true that the great body of American medical practitioners were more than adequate to meet war needs. The problem was to determine which individuals were minded to serve, which ones were qualified to meet the physical requirements of the Army and Navy, which ones were morally and intellectually qualified, and most important of all the degree and special type of their intellectual and professional qualifications. Through the agency of the States activities committee of the General Medical Board, the status of practically every medical practitioner of the United States is ready to hand. More than that, this same committee has in various ways furnished the leaven necessary to inspire these men with a spirit of service. The result from a practical point of view is a commissioned medical personnel of some 20,000 doctors, highly selective in type, and placed at the disposition of the Government catalogued as regards special fitness for special type of medical activity. As far as possible, the Surgeon Generals of the Army and Navy have detailed specially qualified men to posts calling for the exercise of their specialized knowledge and skill.

Another example of the work done may be cited in regard to the problem of ascertaining foreign advances and deficiencies. At the time of our declaration of war more than 300 American surgeons had served in the medical ranks of our allies. These men were sought and solicited to furnish reports based on their personal experiences and observations. When these reports were furnished, they were carefully studied to determine what lessons of value they held for us. Furthermore, a very limited number of special medical men were detailed to go abroad with the object of observing and furnishing reports of their observations. All these reports, which were finally discussed with and submitted to the proper Army, Navy, and Public Health Service officers for their final judgment, constitute an invaluable mine of experience.

Research has been promoted most assiduously. Every medical novelty with any warrant of merit has been studied and especially investigated by qualified specialists, selected by the committee on research of the General Medical Board.

INVENTORYING THE HOSPITALS.

Through the activities of the Medical Section of the Council there has been prepared a list of every available hospital in the United States. The affiliated staffs of these hospitals, the physical character of the hospital, and the purposes it could serve the Government in case of need are known. Moreover, through these same activities, caution has been practiced not to deplete these hospitals either of their professional attendants or surgical supplies, thus in due measure protecting the interest of the civil population in their own need of adequate medical and surgical care. Similar precautions have been taken regarding the nursing personnel, through cooperation with the American Red Cross and the National Nursing Association. Nor is this all. The physician giving his service to his country makes a willing material sacrifice far beyond that commensurate with his well-being or with the sacrifice made by the average layman who similarly volunteers. The Medical Section has sought to equalize this discrepancy by establishing a redistribution of medical fees. Along these various lines, therefore, the Medical Section has served the fighting force, the medical professional personnel, and the civil population.

Appended hereto you will find a full list of the personnel of all subordinate bodies of the Council and Advisory Commission on June 30, 1917, together with a statement of expenditures and liabilities for the year ending on that date.

Very respectfully,

W. S. GIFFORD,
*Director of the Council of National Defense
and of the Advisory Commission.*

**ORGANIZATION OF THE COUNCIL OF NATIONAL DEFENSE, ITS ADVISORY
COMMISSION, AND THE BOARDS, SECTIONS, AND COMMITTEES
UNDER THE COUNCIL AND ADVISORY COMMISSION.**

COUNCIL OF NATIONAL DEFENSE.

Secretary of War, **NEWTON D. BAKER**, Chairman.
Secretary of the Navy, **JOSEPHUS DANIELS**.
Secretary of the Interior, **FRANKLIN K. LANE**.
Secretary of Agriculture, **DAVID F. HOUSTON**.
Secretary of Commerce, **WILLIAM C. REDFIELD**.
Secretary of Labor, **WILLIAM B. WILSON**.

JUNE 30, 1917.

ADVISORY COMMISSION OF COUNCIL OF NATIONAL DEFENSE.

DANIEL WILLARD, transportation and communication (president Baltimore & Ohio Railroad), chairman.
HOWARD E. COFFIN, munitions and manufacturing (including standardization) and industrial relations; vice president Hudson Motor Co.,
JULIUS ROSENWALD, supplies (including clothing), etc.; president Sears, Roebuck & Co.
BERNARD M. BARUCH, raw materials, minerals, and metals; banker.
DR. HOLLIS GODFREY, engineering and education; president Drexel Institute.
SAMUEL GOMPERS, labor, including conservation of health and welfare of workers; president American Federation of Labor.
DR. FRANKLIN MARTIN, medicine and surgery, including general sanitation; secretary General American College of Surgeons, Chicago.

WALTER S. GIFFORD, director of Council and Advisory Commission.
GROSVENOR B. CLARKSON, secretary of Council and Advisory Commission.

RICHARD H. WILLIAMS, Jr., assistant to director.
EVERETT L. CRAWFORD, assistant to director.
PERCY R. PYNE, 2d, assistant to director.
GEORGE F. PORTER, assistant to director.
PRESTON DAVIE, assistant to director.
WADDILL CATCHINGS, assistant to director.
E. K. ELLSWORTH, chief clerk.
DR. LEONARD P. AYERS, statistician.

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Miss ANNA MAXWELL, New York City.		Miss JANE A. DELANO, Washington.
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COUNCIL OF NATIONAL DEFENSE.

Statement of expenditures and liabilities Dec. 11, 1916, to June 30, 1917.

Appropriations, "Council of National Defense, 1917" ----- \$200,000.00

Expenditures:

Salaries¹—

Administrative division—	
Office of the director-----	\$7,269.40
Office of the secretary-----	6,762.28
Office of the chief clerk-----	3,019.91
Laborers, watchmen, and messengers-----	3,792.68
Total-----	20,844.27
Medical department-----	10,243.08
General Munitions Board-----	5,266.26
Aircraft Production Board-----	894.69
Committee on Supplies-----	1,618.90
Commercial Economy Board-----	1,577.51
Committee on Labor-----	960.83
Science and research department-----	200.00
Statistical department-----	954.17
Woman's Committee-----	654.75
State Councils Section-----	724.46
Coal Production Committee-----	250.00
Total salaries-----	44,188.92
Furniture and equipment-----	41,155.00
Printing, stationery, and supplies-----	16,679.34
Rent of offices-----	12,800.08
Telegraph and telephone service-----	6,828.33
Travel and subsistence-----	2,976.96
Miscellaneous expenses-----	2,498.28
Total expenditures-----	127,126.91
Balance-----	72,873.09

¹ On June 30, 1917, there were 408 persons engaged on the work of the Council. Of this number 168 persons were receiving compensation.

Statement of travel performed by the officers and employees of the Council of National Defense from Dec. 11, 1916, to June 30, 1917.

Date.	Name.	Title.	Destination.	Purpose of travel.	Expense.
Dec. 2 to Dec. 17, 1916.....	Franklin Martin.....	Member Advisory Commission.	Washington, D. C.....	Advisory Commission meetings and work.	\$52.00
Jan. 4 to Jan. 10, 1917.....	do.....	do.....	do.....	do.....	82.75
Feb. 3 to Feb. 7, 1917.....	do.....	do.....	do.....	do.....	56.75
Feb. 11 to Feb. 17, 1917.....	do.....	do.....	do.....	do.....	74.00
Feb. 21 to Feb. 25, 1917.....	do.....	do.....	do.....	do.....	88.00
Feb. 28 to Mar. 7, 1917.....	do.....	do.....	do.....	do.....	89.50
Mar. 22 to Mar. 24, 1917.....	do.....	do.....	do.....	do.....	56.75
Mar. 28 to May 5, 1917.....	do.....	do.....	do.....	do.....	210.00
May 9 to May 14, 1917.....	do.....	do.....	do.....	do.....	57.00
May 18 to May 21, 1917.....	do.....	do.....	do.....	do.....	51.00
May 25, 1917.....	do.....	do.....	do.....	do.....	29.50
May 30 to June 2, 1917.....	do.....	do.....	Pittsburgh, Pa.....	Conference on mobilization of medical resources.	20.00
June 4 to June 8, 1917.....	do.....	do.....	New York, N. Y.....	do.....	13.80
June 14 to June 21, 1917.....	do.....	do.....	Minneapolis and Rochester, Minn.....	do.....	72.86
Dec. 17 to Dec. 19, 1916.....	Frank F. Simpson.....	Chief of section.....	Pittsburgh, Pa.....	do.....	17.58
Dec. 29 to Dec. 19, 1916.....	do.....	do.....	do.....	do.....	17.58
Jan. 4, 1917.....	do.....	do.....	Baltimore, Md.....	do.....	2.00
Jan. 10, 1917.....	do.....	do.....	do.....	do.....	2.00
Jan. 14 to Jan. 16, 1917.....	do.....	do.....	Pittsburgh, Pa.....	do.....	17.58
Feb. 2 to Feb. 4, 1917.....	do.....	do.....	Cleveland, Ohio.....	do.....	28.25
Jan. 3, 1917.....	D. Dana Bartlett.....	Secretary of Council.....	Philadelphia, Pa.....	Conference with chairman of the Advisory Commission.	9.95
Jan. 16, 1917.....	do.....	do.....	do.....	do.....	10.05
Jan. 31, 1917.....	Walter S. Gifford.....	Director.....	do.....	do.....	9.95
Do.....	Newton D. Baker.....	Chairman of Council.....	do.....	do.....	12.05
Jan. 13 to Jan. 19, 1917.....	John S. Pearson.....	Clerk.....	do.....	Correcting industrial inventory reports.	23.39
Apr. 16 to Apr. 19, 1917.....	Edwin F. Gay.....	Member Commercial Economy Board.....	Washington, D. C.....	Consultation with Commercial Economy Board.	37.80
May 2 to May 3, 1917.....	do.....	do.....	do.....	do.....	30.45
May 30 to June 2, 1917.....	do.....	do.....	do.....	do.....	33.10
June 5 to June 7, 1917.....	do.....	do.....	do.....	do.....	31.85
May 4 to May 9, 1917.....	M. Florence Donnelly.....	Assistant chief of section.....	Chicago, Ill.....	Assisting Dr. Franklin Martin.....	51.00
May 7 to June 23, 1917.....	Maude K. Wetmore.....	Member Woman's Committee.....	Washington, D. C.....	Conference and work of Woman's Committee.	55.20
May 24 to May 30, 1917.....	Agnes Nestor.....	do.....	do.....	do.....	70.65
June 16 to June 26, 1917.....	do.....	do.....	do.....	do.....	72.45
Apr. 30 to June 22, 1917.....	Mrs. Philip N. Moore.....	do.....	do.....	do.....	169.30
May 2 to June 22, 1917.....	Mrs. Joseph R. Lamar.....	do.....	do.....	do.....	137.40
Apr. 29 to June 10, 1917.....	Mrs. Josiah E. Cowles.....	do.....	do.....	do.....	339.35
May 2 to May 9, 1917.....	Anna Howard Shaw.....	do.....	do.....	do.....	41.84
June 4 to June 22, 1917.....	do.....	do.....	do.....	do.....	68.76
Apr. 29 to June 14, 1917.....	Antoinette Funk.....	do.....	do.....	do.....	184.85

Statement of travel performed by the officers and employees of the Council of National Defense from Dec. 11, 1916, to June 30, 1917—Continued.

Date.	Name.	Title.	Destination.	Purpose of travel.	Expense.
May 10 to May 18, 1917.....	Warren J. Keyes.....	Clerk.....	Philadelphia, Pa., New York, N. Y., and Newark, N. J.	Investigations for Commercial Econ- omy Board.	\$37.09
June 1 to June 5, 1917.....	do.....	do.....	Boston, Mass., and New York, N. Y.	do.....	44.50
May 13 to May 21, 1917.....	T. Russell Robinson.....	do.....	Pittsburgh, Pa., Cincinnati, Ohio, and Nashville, Tenn.	do.....	82.23
May 19 to May 28, 1917.....	Albert D. Ballou.....	Chief of section.....	Chicago, Ill.	Investigation for medical supply catalogue.	53.85
June 5 to June 12, 1917.....	G. B. Clarkson.....	Secretary of council.....	New York, N. Y.	Conferences in reference to aircraft production.	50.50
June 20 to June 24, 1917.....	J. A. B. Scherer.....	Expert.....	Washington, D. C.	Conference on State council work.....	104.80
May 10 to May 11, 1917.....	Tyler W. Carlisle.....	do.....	Eddystone, Pa.	Inspecting work in rifle factories.....	6.18
May 13 to May 16, 1917.....	do.....	do.....	Ilion, N. Y.	do.....	36.01
May 22 to May 23, 1917.....	do.....	do.....	Eddystone, Pa.	do.....	13.43
May 27 to June 1, 1917.....	do.....	do.....	New Haven, Conn., and Ilion, N. Y.	do.....	46.20
June 6, 1917.....	do.....	do.....	Eddystone, Pa.	do.....	8.93
June 12, 1917.....	do.....	do.....	New Haven, Conn.	do.....	24.74
June 24 to June 27, 1917.....	do.....	do.....	Ilion, N. Y.	do.....	40.21
Total expenditure for travel and subsistence.					2,976.96