

SIGNAL CORPS SUPPLIES THE DELICATE INSTRUMENTS USED BY ARMY AVIATORS

Small But Important Aids to Aerial Navigation Are Included in American Airplanes; Now Developing New Device

ARMY CO-OPERATES WITH MANUFACTURERS

Before an airplane can be put into military service it must be equipped with one or more delicate aeronautic instruments, some of which are absolutely essential to exact flying, and all of which contribute to the successful operation of the plane. Without them a pilot would soon lose his location as to height and direction; he would not know his speed through the air, the speed of his propeller, the amount of gasoline in his tank, the temperature of his cooling water, or if his oil was circulating. He could not tell whether he was banking properly on his turns. These comprise the necessary flying instruments, but an aviator could not fly to any great height without another valuable instrument, an oxygen applying apparatus, nor could he operate his guns, signal headquarters, release his bombs, or "shoot" his cameras without additional mechanisms.

Two Sets Sometimes Necessary
All these instruments must be ready for installation on the air planes as soon as they are assembled, for no plane is complete without them. In some instances, particularly for the two seaters and the heavy bombing machines, two and even three instruments of each sort are necessary, totaling sometimes as many as twenty-three, but for ordinary work only about nine of them are needed. The average cost of a set of navigation instruments for a single plane is \$350.

For operation of actual combat planes, such as observing, photographing, bombing, and fighting planes, many other complicated and expensive instruments are necessary. Among them are machine guns, gun mounts, synchronizers, bomb racks, bomb-dropping devices, bomb sights, radio, photographic, and oxygen apparatus, electrically heated clothing, lights, and flares. The cost of such additional accessories would bring the total cost of equipment for a plane to several thousand dollars each, depending upon the type of plane. But these devices will not be discussed in detail here.

One Purchasing Center
The Signal Corps is purchasing practically all the purely navigating instruments and selling them at cost to the manufacturers of the airplanes as they are needed to meet the actual output of planes. This provides one purchasing center and prevents the various airplane companies and the Government from competing against one another, creating disorder and confusion among the instrument manufacturers. At the same time it enables the Signal Corps to keep the supply of instruments adequate to the demands of the airplane builders, relieving them from this work, and also affords standard equipment and interchangeability.

Foreign Models Improved Upon
When the American air program began to be developed none of the instruments now so vital to the service as being produced in quantities, and some of them were not being produced at all. Over sixty per cent of these instruments had to be developed from foreign models, and the remaining forty per cent was secured by modifying or remodeling American automobile-type instruments. Numerous and serious difficulties were encountered in designing instruments, capable of quantity production, of the lightest possible weight and under exacting requirements as to accuracy. During this pioneer work new instruments were being developed abroad almost daily, each new design carrying an improvement.

Most of the work in this connection as done by the Signal Corps in connection with manufacturers. All available information and data were collected, foreign and domestic models and types were carefully tested, designs were standardized, and specifications prepared. Results show that types for every class of instruments have been adopted and put into production here. Far greater standardization has been achieved than exists in Europe today, leading to increase quantity production materially and decrease the number of replacement parts necessary.

New Sources of Supply
Quantity production on the scale necessary demanded the enlargement of all existing sources of supply and the creation of many new plants and factories. A certain amount of time was available before it was necessary to use these instruments on planes in service—planes themselves had to be built. Accordingly, order were placed from three to eight months ahead of requirements, not only in such quantities as would insure a steady production, owing to the

certainty of improvements in the various designs. The early plans of the production department have developed from two to five sources for each instrument, established both as a safety measure and as a means of placing future orders on a strictly competitive basis.

Some of the Instruments
Various instruments developed by the Signal Corps include:

The **tachometer**, or revolution counter, is an instrument which indicates the number of revolutions per minute at which the engine is running. Unlike the speedometer on an automobile, it does not translate revolutions into miles per hour; another instrument gives the speed in relation to the air. When instrument matters were taken up last July there were no tachometers manufactured in this country of the type which has proven most successful abroad; namely, the escapement or chromatic type. Two large manufacturing companies are now turning out these instruments in large quantities, one of them 100 a day, and a third company has also in production a new centrifugal type.

The Air Speed Indicator
The air speed indicator is a pressure gauge for showing the speed of the plane in relation to the air, not the earth. This instrument includes what is known as a Venturi-Pitot tube, which is fastened to a strut and takes in the air from ahead. The air sets up a corresponding pressure in an auxiliary tube, which is calibrated and indicated on a dashboard recording pressure gauge. The altimeter is an aneroid barometer, guaranteed to read height above the earth instead of pressure. Under standard specifications a reduction in weight and size was effected in the manufacture of these instruments, which are now being produced in large quantities and of a quality equal to the best foreign make. Three standard types are made, with ranges of 20,000, 25,000, and 30,000 feet. Production is now over 500 a week.

The Airplane Compass
After much experimental work the airplane compass has not yet reached the perfection desired. A new type, having advantages over any present form of compass, especially as to compactness, is now used. In the development of this instrument effort has been made to reduce the weight to the safest possible minimum and to decrease the space required in the airplane. One concern is now turning out compasses at the rate of 200 a week. Due to the development which had been made in clocks for automobiles, it was only necessary to standardize a design of mounting in order to adopt such clocks to airplanes. Sufficient quantities are now available for all needs. Instrument-board pressure gauges were already manufactured here in large quantities, and as soon as standard specifications were developed production started. Two types are used, one to register the air pressure which forces the gasoline to the engine and the other to show the pressure produced in the oiling system by the oil-circulating pump. Standard forms of cases and dials with interchangeable glasses and bezels have been designed.

The Radiator Thermometer
The radiator thermometer is mounted on the instrument board, where it indicates the temperature of the cooling water in the engine. Undue heating shows that the engine is not running properly or that more water is needed. Thermometers of this type, made here, were, and still are, being submitted to extensive tests. Efforts were also made to stimulate the trade toward developing more accurate and reliable instruments, and now a sufficient supply is available from two sources.

The **banking indicator** is an instrument used to show when a plane is correctly banked in making a turn. Spirit level, balance, and gyroscopic types are being used. The problem of indicating the extent to which a plane is inclined to the horizontal in the air is a very complicated one. No simple solution has yet been reached. Fortunately, it is not often necessary to determine whether the plane is exactly horizontal, except in connection with bomb dropping. Development work is under way which it is hoped will lead to improvement of devices already in use abroad.

The **Aldis sight**, which is used in connection with fixed guns firing through the propeller, has been copied, as regards its optical features, from an Eng-

lish instrument; but the construction has been modified in such a way that the behavior of the instrument in actual use will probably be very much improved. After a number of tests and experiments satisfactory instruments are now available. The makers have been assisted in recomputing the lenses to suit the optical glass available in this country. The illumination of these sights for night operation is also being studied.

Standardization of Parts
In connection with the design of the above instruments it has been found possible, without delaying production, to standardize them to a much greater extent than has been done abroad. In this way the number of necessary replacement of parts has been considerably reduced, and a uniform type of dial has been adopted which, as to legibility, will be equal to the best that has so far been used. All finished instruments are carefully tested before being mounted on the planes.

Among other things, safety belts for pilots, observers, and gunners have been designed and are now in production; radio and photographic apparatus, ordnance devices, and oxygen apparatus have also been developed and put in course of manufacture.

S. A. T. C. TRAINING CAMP AT PLATTSBURG FILLED

Twenty-two Students Selected as Acting Second Lieutenants

The organization of the Students' Army Training Corps Camp is now complete with a complement of about 350 students, mostly members of the Reserve Officers' Training Corps college units. The full quota allowed for the camp has been exceeded by close to 100, but the overflow will be allowed to remain.

Twenty-four companies have been organized and formed into two students' training regiments of three battalions each, and from the companies have been picked men to form classes for machine gun, bayonet, bombing and adjutants' instruction, 50 men to the class. While the preliminary instruction in infantry has been going on for two weeks, the real work in all branches begins on Monday.

Twenty-two students, who were here in the first camp in June and come from colleges where military training had been given for some time, have been selected by Col. Dentler to serve as acting second lieutenants for the period of the camp, but their privileges will be that of other students. These men will not be saluted and will wear a silver button on the right side of the olive drab shirt collar.

Of the number selected two are from New England. They are Curry S. Hicks, Amherst, Mass., of Co. A, and Reginald G. Harris, Manchester, N. H., of Co. O.

Night Guard Tours Started
Night tours of guard duty were started last night with 150 students, a hot lunch being served them at midnight. The students will have the actual care of the Army reservation from now on, as the 22d Regiment detachment here is soon to join its unit at another camp.

Three of the training battalions—the second and third of the 1st Regiment and the second Battalion of the second Regiment have battalion parades on Wednesday, Thursday and Friday, and the 1st Battalion of the 1st Regiment parades Mondays with the 1st Battalion of the second Regiment on Wednesday.

Second Lieut. Roger W. Thompson is an addition to the camp staff as senior instructor in automatic rifle work. He is one of the officers who has been returned from General Pershing's forces in France to instruct in methods employed on the other side.

The athletic field program to be held Labor Day, September 2, has been completed and includes the following events: 100-yard dash, 220-yard dash, 440-yard run, 880-yard run, mile run, pole vault, high jump, broad jump, equipment race, bayonet race, relay race.

Trials for these events will be held as soon as possible. One man in each event will be allowed to compete for each company.

NAVAL RIFLE RANGES HAVE BEEN OPENED TO CIVILIANS

In a letter sent to the governors of all states, Secretary Daniels called attention to the fact that all naval rifle ranges, except when within the limits of a station, are open to state troops and civilians for purposes of practice and expresses the hope that as many citizens as possible will avail themselves of the opportunity. The service of naval instructors are placed at the disposal of those using the ranges, the courses or instruction being the same as laid down for the regulars.

Records of firing will be maintained and individuals will be furnished with official certificates of qualification. Where facilities exist, civilians may stay on the ranges for the entire course.

Tech Students

CAN BE CLOTHED TO THEIR COMPLETE SATISFACTION BY

MACULLAR PARKER COMPANY

Manufacturers and Retailers

Dependable Fabrics, Workmanship and Styles
Garments Ready to Wear and to Measure

FINE FURNISHINGS STETSON HATS

Officers Uniforms Army and Navy
Made to Measure

MACULLAR PARKER COMPANY

400 WASHINGTON STREET BOSTON

BRANCH AT AYER

DU PONT AMERICAN INDUSTRIES

1802 DU PONT 1918

The Symbol of Efficiency for users of EXPLOSIVES

EFFICIENCY of methods and the selection of proper materials will achieve success in engineering fields.

The selection of explosives is a most important procedure and largely determines the progress of the work, the safety of employes and affects the cost of operations.

For the graduate engineer, there is one way to avoid improper selection of explosives,—state the conditions governing prospective blasting operations and ask us for recommendations. You are sure of obtaining practical data from those having a wide field practice and therefore knowing the particular explosive best adapted to your work.

Over 100 years' continuous progress in powder making is an assurance of the adaptability and efficiency of DU PONT EXPLOSIVES in any engineering work.

Our HIGH EXPLOSIVES' CATALOG is an illustrated, practical and instructive book giving valuable and necessary information to those having the selection and application of explosives in charge. This book is FREE. Write for it.

E. I. du Pont de Nemours & Co.

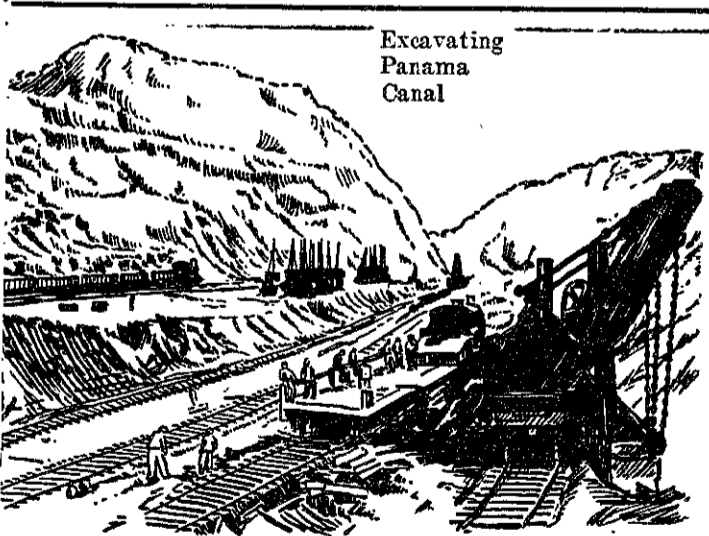
Powder Makers Since 1802

Wilmington Delaware

The DuPont American Industries Are

E. I. duPont de Nemours & Co., Wilmington, Del. Explosives, Du Pont Chemical Works, New York, Pyroxylin and Coal Tar Chemicals,
Du Pont Fabrikoid Co., Wilmington, Del., Leather Substitutes, The Arlington Works, 725 Broadway, New York, Ivory, Pyroxylin and Cleanable Collars,
Harrison Works, Phila., Pa., Paints, Pigments, Acids, Chemicals,
Du Pont Dye Works, Wilmington, Del., Coal Tar Dye Stuffs.

Excavating
Panama
Canal



FOR HIRE

PACKARD TWIN SIXES
Touring Cars, Limousines and Landaulets
by the hour, day, week or month.
CAREFUL COMPETENT CHAUFFEURS

FRANK McCANN

15 CAMBRIA ST. BOSTON, MASS
Telephone, Back Bay 4906-4907

Telephone Cambridge 6900

FRANK COHEN

MILITARY TAILOR

Massachusetts Institute of Technology
Army Aviation School
Room 1-871

Officers' Uniforms Reasonable Prices
a Specialty Best Quality Goods