ABSTRACTS.

Naval Aircraft Factory (U.S.A.).

The article deals in the first place with the erection and development of the U.S.A. Naval Aircraft Factory at the League Island Navy Yard, Philadelphia.

The original manufacturing unit has a ground area of 160,000 sq. ft., and was built and equipped in three months at a cost of a million dollars. A large assembly plant was added subsequently, and the factory now extends over 40 acres of ground with nearly 10,000 workers employed by the factory and private firms.

Regarding internal organisation there is an Employment Division which organises an apprentice school as well as providing for the supply of man-power. The Engineering Department covers the designing of experimental and production machines and the inspection and testing of material; it also includes a Trials Section for the testing of finished seaplanes under the direction of skilled pilots. The Manufacturing Office receives the requirements of the Navy Department, and accumulates all necessary data for requisition purposes. The Supply Department ensures the rapid transportation of the finished aircraft to their destination. Also, the Contract Manufacturing Department is responsible for maintaining the output of the assembly plant at its highest capacity by supplying the component parts of the finished product for final assembly. ("Aviation," February 1, 1919.)

Aeromarine Type L 6-Cylinder Aero Motor.

A short description of this motor manufactured by the Aeromarine Plant and Motor Co., of Keyport, N.J., is given and illustrated by photographs. The motor is a six-cylinder, four-cycle engine with water-cooled valves in the head. The main portion of the crankcase and cylinder jackets are integrally cast of aluminium alloy; the cylinder head and valve gear form a complete self-contained unit removable from the motor in a few minutes, the head being of aluminium alloy with grey iron valve seats cast in position; also the pistons are of aluminium alloy ribbed under the head. The crankshaft and connecting rods are of alloy steel drop forgings.

The motor has been designed for training and sporting aeroplanes and its chief characteristics are:—

Cylinder bore 4.25 in., stroke 6.5 in.

Weight 375 lbs., with electric starter and generator 405 lbs.

Rated horse-power 130 at 1,625 r.p.m.

The motor has run up to speeds in excess of 2,500 r.p.m. and a chart giving h.p. plotted against r.p.m. gives a curve up to 2,100 r.p.m. (169 h.p.). ("Aerial Age Weekly," February 24, 1919.)

Model H, 300 h.p., Hispano-Suiza Engine.

Two diagrammatic cross sectional views of model H illustrate the article describing the differences between this, the most powerful of the series of Hispano-Suiza engines, and the Model I described previously.

The model H is of the water-cooled V-type, with eight cylinders arranged in two blocks of four at an included angle of 90°. The bore is 140 mm. and the stroke 150 mm. The engine weighs, complete with carburettor and magneto, 600 lbs.

The construction of the cylinders consists of an aluminium cylinder block completely lined with separate steel sleeves. The valve seatings are cut into the steel heads of the cylinder sleeves and the valve stems project vertically upward through cast iron guides screwed into bosses in the aluminium. The tappet

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arrangement is very ingenious so that the washer beneath each tappet cannot turn on the valve, while if the washer is held the tappet is free to turn. The camshaft is mounted in three bronze bearings bolted to the top of the cylinder block.

The aluminium crankcase is cast in two portions, split at the centre line of the crankshaft. The crankshaft is hollow throughout for lightness and for the passage of oil.

Two magnetos are used firing two sets of plugs simultaneously.

The pistons are aluminium alloy of very simple design with a head ½ in. thick, the side walls tapering from this thickness down to 3/16 in. There are two types of connecting rod, one forked and terminating in two flat feet, and the other split and provided with a cap.

A steel tube cast in the lower half of the crankcase forms the one main oil channel from which oil passes to the four main bearings of the crankshaft. Camshaft and valve lubrication is obtained by leading the oil from a groove around the front end main bearing up through two small steel pipes. To ensure proper lubrication there are three gear pumps, one being a force and the other two suction pumps.

The water pump is a simple centrifugal one which delivers through two pipes to the lower outside rear corners of the cylinder blocks and thence to the radiator.

The carburettor is a Stromberg, specially designed for this engine.

The Model H was used in a Bristol biplane by Capt. Schroeder when making the world's altitude record of 28,900 feet on September 18, 1918. The Loening monoplane, fitted with this model, has developed 145 m.p.h. with full military two-seater load, and has climbed to 25,000 feet. ("Aviation," February 1, 1919.)

Miller 125 h.p. Aircraft Engine.

A short note gives a few general details and two illustrations of this engine, which is of the vertical type, having four cylinders of 4 in. bore and 7 in. stroke, placed in line. Its power output can be raised from 125 h.p. to 155 h.p. by running the engine up to a speed of 2,900 r.p.m.

The water jackets, crankcase, pistons and cylinder are cast alloyanum, a special alloy developed by the Miller firm, while the cylinders are sleeves cast of vanadium iron, completely machined. The lubrication is on a dry base system.

The height over all is 34 ins. and the width 18¼ ins. The weight complete is 410 lbs. ("Aviation," February 1, 1919.)

Sunstedt-Hannevig Seaplane.

This machine has been designed chiefly for long-distance flying over the sea, and the pontoons, wings, and entire rigging are of extra heavy construction. The pontoons are of special design and are each divided into eight watertight compartments. They are 32 ft. long. Their centres are 16 ft. apart and each weighs 400 lbs., including fittings. Each pontoon has an emergency food locker accessible from the deck. The fuselage is flat-sided and has a curved streamline bottom and hood. The machine carries two pilots and two passengers in a cabin at the front end of the fuselage. Directly behind the cabin, balancing with the centre of pressure, is the main gasoline tank, which has a capacity of 750 gallons, sufficient for 22 hours full-speed flying.

The control system is of the standard type, but all the cables are placed beneath the floor, leaving the control column and rudder bar without any wires in the cabin. Dual control is fitted so that the machine can be operated by either pilot. All engine controls and switches are also operative from both seats. The power is given by two Hall-Scott Model "L-6" h.p. engines, directly connected to two-bladed pusher propellers.

The wings are so constructed that the pontoons, power plant and fuselage can be assembled completely before adding the outer wing sections. The central sections of the wings are 18 ft. 10 in. long. There are five sections in the upper plane, and three in the lower. The upper wing has a chord of 10 ft. near the junction to the central section, and it narrows to 8 ft. 6 in. at the inside of the aileron cut-out. Of this, 8 ft. is of rigid construction, while the rest forms a very flexible trailing edge, increasing the stability and gliding efficiency. The lower plane is entirely constructed of solid ribs.

The dimensions are as follows:—

Span, upper plane	100 ft. 0 in.
Span, lower plane	71 ft. 6 in.
Wing chord, lower plane	8 ft. 0 in.
Wing chord, upper plane	8 ft. 0 in.
Gap between wings	8 ft. 7 in.
Length of machine over all	50 ft. 6 in.
Height of machine over all	17 ft. 7 in.
Dihedral angle, lower plane	2°
Wing curve	U.S.A. No. 5
Total lifting surface	1,537 sq. ft.
Rudder area	22 sq. ft.
Elevator area	54 sq. ft.
Weight	10,000 lbs.
Speed, estimated, full load	80 m.p.h.
Climbing speed, estimated	3,000 ft. in 10 min.
Horse-power, total	440

(" Aerial Age Weekly," February 24, 1919.)

Aeromarine Flying Boat: Sportsman Model.

The hull is constructed of waterproof plywood, which avoids seams and the large amount of riveting required when narrow planking is riveted to battens.

An interesting feature of the hull is the use of frames sawed in one piece from a large sheet of waterproof plywood. The bottom of the boat is constructed of built-up plywood riveted with cloth and marine glue between.

The pilot and passenger sit side by side.

It is proposed to equip the machines with six-cylinder 130 h.p. L type engines with electric starters.

TABLE.

General Characteristics.

Spread, upper wing	48 ft. 4 in.
Spread, lower wing	37 ft. 4 in.
Stagger	10 in.
Chord	75 in.
Gap	78 in.
Dihedral	2 degrees
Areas, upper panel (with ailerons)	304 sq. ft.
Areas, lower panel	200 sq. ft.
Ailerons, each	29 sq. ft.
Elevators	15.29 sq. ft.
Stabiliser	39.5 sq. ft.
Vertical stabiliser fin	15 sq. ft.
Rudder	15 sq. ft.
Skid fin	5.5 sq. ft.
Length over all	25 ft. 6 in.
Weight (light)	1,925 lbs.
Weight (loaded)	2,485 lbs.
Gasoline	35 gals.
Wing float buoyancy	264 lbs.

(" Aviation," February 1, 1919.)

Curtiss Model K.6 and K.12 Aero Motors.

The K.6 is a six-cylinder water-cooled engine—cylinders *en bloc*—rated at 150 h.p. at 1,700 r.p.m.; the K.12 is a 12-cylinder V motor, water-cooled, rated at 375 h.p. at 2,250 r.p.m., with a 5 : 3 gear reduction to the propeller shaft.

The crankcase consists of two aluminium alloy castings, the upper half being integral with the cylinder water jackets. This ensures extreme rigidity and an appreciable saving in weight.

The cylinders are rough machined from a hydraulic forging of special steel heat treated and then machined all over, with the cylinder head forged integrally. The top of the cylinder is threaded and screwed into the cylinder head casting. Each assembly of six-cylinder heads is bolted to the crankcase which forms the water jacket around the cylinder sleeves.

It is claimed that the new valve gear used on the K.12 motor is a distinct advance over previous practice. The light cam follower relieves the valves of any side strains due to cam action, and provides means of easy adjustment of clearance. As the camshafts are directly over the valves, all rocker arms, push rods, etc., are done away with and the whole assembly is absolutely oil tight.

There is double ignition from two separate magnetos and a duplex carburettor (K.12 has two). Each tube of the carburettor supplies three cylinders. There are hot water jackets on the manifolds to assist in vaporising the petrol.

Lubrication is provided for by an adjustable pressure feed of oil, while a separate return pump with double intake prevents accumulation of oil in either end of the pan, and consequent flooding of the cylinders when the machine is climbing or gliding. ("Aerial Age Weekly," February 3, 1919.)

King-Bugatti Aviation Engine.

The King-Bugatti aviation engine is the American development of the French Bugatti engine, which, when it was decided to put it into manufacture in the United States, aroused very great interest—second only to that evidenced in the Liberty engine. The Bugatti was of the geared type possessing certain features not embodied in the Liberty, and with the special feature of being able to mount a 37 millimetre gun firing through the propeller shaft.

The U.S. Government put the re-designing of the French Bugatti engine for production purposes in the hands of C. B. King, A.M.E. Owing to the fact that the French engine sent over to the U.S.A. had only had a limited test in Paris of 37 hours and had not been in flight, all the points in the design were very carefully considered, both from the performance and production points of view. It was soon discovered that from both these standpoints numerous changes would have to be made.

Upon the completion of the re-designed engine Mr. King sent in a report on the performance of the engine and described in detail the numerous departures from the French design and their effects. The tests thoroughly demonstrated the reliability of the engine and endorsed all the changes which were made.

The article, which is based on Mr. King's report, gives a comprehensive description of the engine, and shows, with the aid of many drawings, the points of difference between the French and American designs.

General Particulars.

Number and arrangement of cylinders	16 vertical, 2 rows of 8 in blocks of 4
Bore	4.33 in. 110 mm.
Stroke	6.3 in. 160 mm.
Compression ratio	5 : 1
Normal brake h.p.	410 at 2,000 r.p.m.
Type of valve gear	Overhead camshaft and valve rockers
Number of carburettors	Four Miller special
Ratio propeller to crankshaft speed ...	.666 : 1

("Aerial Age Weekly," February 10 and 17, 1919.)

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Douglas Automatic Aeroplane Ignition Interrupter.

This instrument was developed by Theodore Douglas, President of the Duplex Engine Co., of Brooklyn, New York, under the auspices of the National Advisory Committee for Aeronautics. The function of the instrument is to interrupt automatically the engine ignition, thereby stopping the engine, in the event of the airscrew breaking or other similar breakage resulting in a seriously unbalanced condition of the power plant.

Under war conditions such breakages are very frequent and a large percentage of cases end fatally for the pilot. One of the dangers is the intense vibration resulting from the breakage, which may possibly cause a breakage in a petrol pipe with ensuing risk of fire. Sometimes the most perfect mental and physical co-ordination on the part of the pilot fail to prevent this, a fact which may be better realised to be true when it is remembered that the time interval per revolution varies from roughly one twenty-third to one twenty-seventh of a second.

The interrupter is thought to be particularly desirable on twin engine machines where it may be so installed as instantly to cut out both engines.

In the equipment, too, of "blimps" the instrument would find another important application, as it would tend to reduce the fire risk following airscrew breakages since the airscrew fragments are apt to puncture the gas bag.

As for the instrument itself, it is quite simple and weighs not more than ten ounces. Essentially it consists of a vertical pendulum pivoted so as to swing under the influence of transverse vibrations of the engine and controlled by springs in such a way that only the most intense oscillating shock causes sufficient swing of the pendulum to work the ignition breaking mechanism. The details of the instrument are explained with the aid of photographs.

Two general types of interrupters are made; "maker" instruments, in which there is no flow of current through the instrument except at the moment of interrupting the ignition; and "breaker" instruments, intended for Liberty engines, using the Delco system, where the flow of current is normally constant through the instrument.

Results of tests made by the Navy Department are given, from which it is seen that the instrument possesses all the advantages claimed for it without attendant disadvantages of any consequence. ("Aerial Age Weekly," February 17, 1919.)

Altitude Adjustment for Aircraft Engines.

It has long been recognised that the efficiency of an aeroplane engine varies to a certain extent with variations in atmospheric pressure, and various devices have been patented to compensate for this. The present article describes and illustrates a few barometric regulators, and also a mechanical control in which the air to the carburettor of the engine is compressed in a chamber by a pump driven by the engine itself. The various devices described are illustrated. ("Der Motorwagen," February 28, 1919.)

Instruments for Cross-Country Flying.

The article gives a very brief account of the use of the U.S. Navy Standard No. 1 Aircraft Compass, of which quantities are now available. The compass must be mounted so that it is free from violent vibration, and it must be carefully compensated; moreover, the compensation must be frequently checked, since the magnetism of the metal parts of the machine is continually changing. When the compensation is as accurate as possible, a chart of errors should be drawn up and placed beside the compass. A machine has flown from Akron, Ohio, to Washington, D.C., entirely by compass with a final error of only 8 miles.

Other instruments which are necessary are enumerated, including a turn indicator and an automatic rudder control, and the author suggests that the American Air Mail Service has not sufficiently appreciated the need for such instruments. ("Aerial Age Weekly," February 3, 1919.)

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Bijur Electric Starter for Aero Engines.

This has been designed at the request of the Airplane Engineering Department of the Signal Corps, to fit on the propeller end of the crank casing of the Liberty and other engines without the use of intermediate brackets and without making necessary any alteration of the engine. It is built by the Bijur Motor Appliance Company for special use on seaplanes, and consists of a small electric motor 4 ins. diameter, of special design, fitted with double gear reduction and a special form of the Bijur automatic pinion shifting mechanism.

A gear ring is held by the propeller bolts inside the hub flange, and the depression of the starting switch causes the pinion of the starting motor to mesh with the teeth of the gear ring and so cranks the engine. The starting of the engine under its own power automatically de-meshes the pinion. It is not possible to mesh the pinion with the gear ring by depressing the switch whilst the engine is running.

General Particulars.

Weight of starting motor ...	20.5 lbs.
Weight of gear ring	3.6 lbs.
Normal starting current ...	100 amperes (12-volt battery)
Cranking current	90-150 amperes
Maximum torque available on engine crankshaft	1,300 lbs. ft.
Normal cranking speed... ...	40 to 50 r.p.m.
Weight of 6-cell storage battery rated at 24 ampere hours ...	25 to 35 lbs.

Both articles are illustrated, and show the method of mounting. ("Aviation," February 1, and "Aerial Age Weekly," February 10, 1919.)

Miessner Airfone.

This is a device for the intercommunication between pilot and student or pilot and observer. It is claimed that its use would halve the time taken for training cadets, and the claim is supported by the evidence of army officers.

The airfone is entirely an acoustic instrument, it being a speaking tube designed for use on an aeroplane in full power flight. Electric telephones on the microphone principle do not give such satisfactory results. Not only has the airfone been tested under flying conditions on training planes, but it has given entire satisfaction on planes mounting 400 h.p. Liberty motors while in flight and making loops, nose-dives, tail-spins, etc. Moreover, no difficulty was experienced in making a conversation by talking into the transmitters placed only two feet from the exhausts of a 12-cylinder Liberty motor mounted on a test stand and in the full propeller slipstream.

The airfone has been designed after a close and detailed study of aircraft noise conditions. It consists essentially of a flexible speaking tube provided with a mouthpiece and a neck band, and a helmet to which two earpieces are attached, suitable communications between speaking tube and earpieces being provided. In practice the instrument has been found to fulfil the requisite conditions that:—

(1) The aeroplane noises are prevented from reaching the ears directly through or around the earpieces;

(2) The highest ratio of intensity of voice sounds to aeroplane noises reaching the ears is obtained; and the acoustic characteristics are such as to permit of good articulation.

The earpieces consist of pneumatic cushions or rings which surround the ear and maintain an airtight contact with the head with but small pressure.

There is a certain optimum tube diameter, and the tube length must not be equal to $\frac{1}{4}$, $\frac{3}{4}$, $\frac{5}{4}$, etc., of the wave length of the motor and exhaust sounds.

A combination radio and airfone apparatus has been designed for use on aircraft equipped with radio reception apparatus. The wireless and airfone communications may be received separately or together as desired by the wireless operator. ("Aerial Age Weekly," February 10, 1919.)

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Aircraft Instruments for Blind Flying.

The article deals with instruments to enable a pilot to maintain his proper attitude when flying in clouds, fog, or darkness.

Longitudinally the airspeed indicator, used in conjunction with the tachometer, indicates the correct attitude. Laterally the banking indicator and lateral clinometer serve to show only divergence from a stable lateral position, and the compass will only indicate accurately when the machine is flying on a straight course. A turn indicator is then described which would show instantly and accurately any divergence from a straight course or from a lateral horizontal position.

The mechanism is simple. A small gyro is driven on a lateral axis at a speed of about 5,000 r.p.m. by suction obtained from a Venturi tube. The frame holding the gyro bearings is hung on a fore and aft axis, but its rotation about this axis is restrained by light centralising springs. When the machine starts to turn about a vertical axis the gyro precesses, and this precession, many times greater than the turning motion of the aeroplane, is indicated on the dial of the instrument. Thus, if the machine can be kept on a straight course the compass can be used to indicate the direction. The turn indicator described weighs 1.75 lbs. ("Aviation," February 1, 1919.)

Value of Plywood in Aeroplane Fuselage Construction.

Lieut. Stefano d'Amica, of the Italian Aviation Mission, in this article states that the wired truss form of fuselage is giving way to the plywood covered fuselage, and that in its most common form the fuselage is made of four longerons tied together by means of diaphragms and then covered by plywood. The shearing stresses are taken care of by stiffening the outside covering with ribs of wood.

The abandoning of the truss construction was desirable during the war because of the ever-increasing scarcity of metal fittings as well as on account of the excessive cost and the shortage of labour. The result has been that, although the fuselage has forfeited a little the advantage in weight, the machine has gained in life and efficiency.

Up to the present the increase of weight due to plywood construction has precluded its use in large machines. It may be foreseen, however, that in the very near future this disadvantage will be overcome.

Taking the case of the ordinary tapering fuselage of rectangular section, the method of making stress calculations is given, assuming the maximum loading as occurring when the machine is landing, and the force at the tail skid at that time as twice the static load, when the machine is resting on the ground. Combined with the moment at any section due to this load, is that due to the weight of the overhanging part of the fuselage, and to the wind force on the fin and rudder. No mention is made of the large downward force on the tail which comes into action during a steep dive and especially on beginning to flatten out; also, the inclusion of the rudder force with the other forces on landing hardly appears to be logical.

Tests have been made which show that in making the strength calculations the sectional area of the longerons may be considered as increased by an amount equal to 20 times the thickness of the plywood to allow for the additional strength due to the plywood.

In calculating the shearing stresses, it may be considered that one half of the reaction will be taken care of by the plywood acting in tension and the other half by the diagonal bracing, at the sides, which stiffens the structure.

Recently tests have been conducted on fuselages made of wood, in which the longitudinal longerons running the full length of the fuselage have been eliminated as well as the stiffening ribs. These tests have already given good results and it seems as though they will lead to a practical result which would bring a great advantage in weight. ("Aerial Age Weekly," February 17, 1919.)

Selecting Aerofoil Sections for Speed Range.

Two charts are given which serve as a rough and ready means of choosing the best aerofoil for speed range, and incidentally of estimating approximately the performance of a given machine. They are not claimed to be strictly accurate, but are, however, based on a study of current practice in the tests of numerous machines.

The first diagram consists of curves giving the low speed at sea level plotted against surface loading for a number of U.S.A. aerofoils and R.A.F.15.

On the second chart three sets of curves are plotted:—

(*a*) Speed range as a percentage of low speed plotted against h.p. weight in lbs.

(*b*) Air speed required for sustentation (percentage of minimum speed) plotted against percentage of lift coefficient.

(*c*) L/D plotted against percentage of maximum lift coefficient for the same aerofoils.

All curves have been corrected for scale effect, 17 per cent. stagger, gap chord 1.06, aspect ratio 7 and rounded wing tips. Angles of incidence are also indicated.

It has been assumed that the machine is a good single engine biplane tractor with full equipment, and air density, h.p., etc., are taken at sea level.

The charts are exceedingly simple to use. Suppose an engine given, and the total weight of machine and total area of main planes. To find the aerofoil that will give the best speed range, proceed as follows:—By means of (*a*) find the point corresponding to the given wing loading and h.p./weight. This gives on curve (*b*) the air speed for sustentation, and the best value of L/D found on curve (*c*) for the value of lift coefficient corresponding with this air speed gives the aerofoil that will give the maximum speed range. The low speed at sea level can be found from chart I. and hence minimum and maximum speeds are known.

Several examples are worked out and a method of estimating the permissible limit for parasitic resistance is given. ("Aviation," February 1, 1919.)

Air Transport Company for Vienna.

A company has just been floated in Vienna for postal, passenger and goods transit by air. The concern bears the title of "Luftverkehrsstadien-Gesellschaft m.b.H." (Aerial Transport Promotion Co., Ltd.). The objects of the company, as set forth in the Vienna Commercial Register, are: To organise aerial transport of all kinds, especially the conveyance of mail, passengers and goods by air, and all business and undertakings connected therewith; also the conduct of negotiations with the Government, public bodies and third parties, the conclusion of agreements with them and the transfer of such agreements to the Aerial Transport Company to be founded in conjunction with the present company. The share capital is to be Kr.300,000, of which Kr.90,000 have been paid up.

This announcement is somewhat surprising in view of the failure hitherto of aerial traffic in Austria. But the objects of the present undertaking should not be compared with previous organisations, which are said to have been most unsatisfactory. The present company's intention is just to study ways and means to the desired end. It is hoped that German undertakings will also be stimulated by the step now taken in Austria. The Schutte-Lanz Co. have already established an "Aerial Navigation Bureau," although its operations seem to be confined at present to the hiring out of aircraft. ("Der Motorwagen," February 28, 1919.)

Cost of Aeroplane Operation.

The total costs of operation of the army aeroplanes which took part in the pioneer flight from San Diego to Washington are estimated at $8,827.5, or an average of $2 a mile for four aeroplanes and eight men. Comparison with the results given out by the Post Office, which does not include depreciation but does add salaries, shows that Ct.50 a mile for a two-seater is a general figure that can be used with safety.

The four coast-to-coast aeroplanes cost $12,000 each, a total of $48,000. Between San Diego and New York City four propellers had to be replaced, and there were other repairs which came to an estimated total of $1,500. Each aeroplane consumed 15 gallons of gasolene an hour, or a total of 3,300 gallons. This fuel cost an average of nearly Ct.50 a gallon, or a total of $1,645. One-half gallon of oil was consumed each hour, a total of 110 gallons, costing $82.50. It is estimated that each engine depreciated in value one-fifth, and each aeroplane less than one-tenth. Thus the depreciation on engines may be estimated at $480, and on the aeroplane at $4,000. ("Air Service Journal," February 8, 1919.)

Chicago-New York Airship Line.

It is announced by the Manufacturers' Aircraft Association that one of its members is investigating the feasibility of establishing a passenger service between New York and Chicago by means of rigid airships of medium size.

The airships proposed for this service are to have accommodation for twenty-five passengers in addition to a crew of ten, and to develop a speed of 70 m.p.h., which should enable the trip from New York to Chicago to be made in less than twelve hours, or fully 50 per cent. less than the time required with existing rail facilities.

The fare contemplated is $520, an amount which, although it may be warranted by the great initial outlay, would hardly tend to popularise commercial aeronautics. In order to reduce fares and thus make aerial transit popular, a State subsidy is advocated, until such time as aerial services can pay their way without at the same time charging very high fares. ("Air Service Journal," February 8, 1919.)

Organisation of Aerial Ports.

This article has been taken from "Rivista dei Transporti Aerei." Many suggestions are put forward for the arrangements of aerial ports. They should be situated in pleasant, sheltered places, with extensive arrival and departure areas, distinctly marked so as to be visible from a great distance. Tracks must also be made close to hangars, offices, etc., for use in loading and bringing in supplies, etc. Signals are discussed for landing both by day and night. With regard to the latter, care must be taken that the signal must not be a stumbling block—it ought to be a point to be touched and not avoided. One method of doing this is described whereby lamps are placed in cavities in the ground and covered over with strong glass plate flush with the ground. The lights can be controlled from a central post.

Remarks are made as to towing the machines, fuel accommodation, and the arrangement of the hangars according to the functions of the machines housed in them, and strict management of the port exactly as in the case of a sea or river port is advocated. ("Aviation," February 1, 1919.)

New York Police Volunteer Aero Squadron.

Plans to organise an aero squadron to be part of the New York Police Department have been made public. The project has been well received and will no doubt be carried through. The aero squadron of the U.S.A. provides twenty officers, including the executive, technical, medical, etc., and twelve pilots; also 154 N.C.O.s and men. It is proposed that the Police Aero Squadron shall always conform to the requirements of the U.S. Army. It is suggested that other progressive cities should form police aviation units, the smaller cities organising aero companies of which three make up a squadron. These units so organised would be of potential military value. ("Aerial Age Weekly," February 3, 1919.)

Activities of the Bureau of Standards.

For the work of the Bureau of Standards during the fiscal year, 1919-20, estimates for appropriations have been submitted amounting to the value of $2,098,760. The activities of the Bureau will be considerably extended, and will include the erection of a building for an airplane engine research laboratory, housing four dynamometers, a refrigeration plant, two altitude laboratories, and the necessary equipment for running altitude tests of airplane engines corresponding to heights up to 40,000 feet.

A unique feature of the airplane research programme is the development of a system of free flight tests made in normal flying as actually practised by army aviators, and several special autographic instruments are being developed for use in this connection.

The Bureau's aeronautical instrument laboratory will devote special attention to such instruments, of which three kinds have already been designed, in addition to investigations on other instruments for aerial navigation, etc. ("Air Service Journal," February 1, 1919.)

Exhibits of the Curtiss Aeroplane and Motor Corporation.

This article describes the different models the Curtiss Engineering Corporation exhibited at the Aeronautical Exposition. Illustrations are given of Model H.A. Hydro-Aeroplane, M.F. flying boat and 18-B biplane.

Curtiss Model M.F. Fying Boat.

This is a development of the well-known "F" type, being one of the smallest made by the Curtiss Company. The maximum and minimum speeds are 69 and 45 m.p.h., and rate of climb 5,000 ft. in 27 min. The machine is of the "pusher" type, fitted with 100 h.p. Curtiss OXX 8-cylinder "V" motor which will give a range of 325 miles at economic speed with two passengers.

The wing span is 49 ft. 9⅜ in., length 28 ft. $10^3/_{16}$ in., height 11 ft. 9⅜ in., weight 1,796 lbs. empty, and will carry a load of 636 lbs. One of its chief features is ease of manipulation.

Curtiss Model 18-B Biplane.

A development of the combat type of machine designed for the U.S. Navy, and is the same machine that, equipped with triplane wings, secured the world's speed record.

The body is elliptical in section and well streamlined, the machine being built for speed and equipped with a 400 h.p. Curtiss K-12 motor, which is said to be lighter than any other 400 h.p. motor.

The length is 23 ft. $3^3/_{16}$ in., and height 9 ft. 10⅜ in. It weighs 1,825 lbs., and will carry 1,076 lbs.

Curtiss Model J.N.-4D-2 Biplane.

A tractor machine used for training, for which purpose it has dual control and carries two passengers "tandem."

The power unit is an 8-cylinder "V" type 90 h.p. Curtiss OX5, having an economical consumption of ½ lb. of petrol per h.p. hour.

Below are given the principal particulars:—

Horizontal speed	75 m.p.h.
Minimum speed	43 m.p.h.
Rate of climb	5,000 ft. in 10 min.
Wing span (upper)	43 ft. 7⅜ in.
,, ,, (lower)	33 ft. 11¼ in.
Wing chord	59½ in.
Length over all	27 ft. 4 in.
Height	9 ft. 10⅝ in.
Weight	1,580 lbs.
Useful load	550 lbs.
Range	250 miles

Curtiss Model H.A. Hydro-Aeroplane.

The machine is designed for speed and has great weight-carrying capacity, the useful load being 1,012 lbs. and weight, empty, 2,638 lbs. Both wing spans are 36 ft. and 72 in. chord. It is equipped with two Liberty 12 motors, is capable of a maximum speed of 130 m.p.h., a minimum of 62 m.p.h., and will climb 8,500 ft. in ten minutes.

Curtiss Model H-16-A Flying Boat.

The H-16-A is a twin-engined machine designed to carry 11 passengers. Its total carrying capacity is 3,000 lbs., over 1,000 of which may be left free for passengers exclusive of crew. It will travel at 95 m.p.h., and has a range of 675 miles.

Curtiss K-6 and K-12.

These engines are of the "V" type, water-cooled and remarkably light construction. The K-12 weighs 700 lbs. nett, giving a dead weight per rated horse-power of 1.86 lbs. The consumptions of petrol and oil are 0.55 lbs. and 0.03 lbs. respectively. It has forced lubrication and dual ignition. Some principal dimensions are given below:—

Bore	$4\frac{1}{2}$ in.
Stroke	6 in.
Over all length	$68^5/_{16}$ in.
,, width	$27\frac{7}{8}$ in.
,, depth	$40\frac{1}{8}$ in.
Width at bed	$15\frac{3}{4}$ in.
Height from bed	$24^3/_{16}$ in.
Depth from bed	$15^{15}/_{16}$ in.

Curtiss OX-5.

An 8-cylinder "V" type engine developing 90 h.p. at 1,400 r.p.m. Bore 4 in. and stroke 5 in.; fitted with two magnetos and forced lubrication. Nett weight 375 lbs. and weight per rated h.p. 4.17 lbs. Consumption 0.60 lb. of petrol and 0.03 lb. of oil per b.h.p. hour. Dimensions over all $68^5/_{16}$ in. long, $27\frac{7}{8}$ in. wide, $40\frac{1}{8}$ in. deep. Width at bed $15\frac{3}{4}$ in., height from bed $24^3/_{16}$ in., depth $15^5/_{16}$ in. ("Air Service Journal," March 8, 1919.)

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