AERONAUTICAL NOTES.

THE AERONAUTIC SOCIETY AEROPLANE.

It was announced on March 3rd at a meeting of the Aeronautic Society by Lee S. Burridge, the president, that he had concluded a contract for the purchase of a $5,000 aeroplane for the Society's first public exhibition this year at Morris Park.

The contract is with Glenn H. Curtiss, of Hammondsport, N. Y., member of Dr. A. Graham Bell's well-known Aerial Experiment Association, who, in the Association's aeroplane, the "June Bug," built at his factory, has made many successful flights at Hammondsport, chief of which were those of July 4th last, when he won for the first time the SCIENTIFIC AMERICAN trophy.

Arrangements have also been made with Mr. Curtiss for him to give public demonstrations of flight for the Society at Morris Park. The Society is converting the old race-track into a first-class aerodrome. The grandstand will accommodate thousands of spectators who will undoubtedly gather there to see Curtiss fly, and to witness the aeroplane races which will take place.

The Aeronautic Society is thus the first aeronautical body in America to purchase an aeroplane.

The first public flights by Mr. Curtiss in New York city are to be made at Morris Park early in the month of May.

In describing the new machine, Mr. Curtiss states that it will be in many ways different from the aeroplanes made for the Aerial Experiment Association. The main surfaces, of about 30 by 4 feet, will be parallel and not arched as in the "June Bug." It will have front and rear rudders controlled entirely by the aviator. The transverse stability will be maintained automatically by a new device. There will be many features that are novel, although not untried. The weight will be about 600 pounds, which is much lighter than the average of the machines now flying. The aeroplane will be capable of lifting 200 pounds. The engine will be a 4-cylinder, water-cooled motor of 25 horse-power, which experience has taught is sufficient. The propeller, of 5½ feet diameter and the same pitch, will be mounted upon the engine crankshaft at the rear. The frame of the aeroplane will be of spruce wood and the surfaces of rubber-impregnated silk.

The aeroplane will be mounted upon a 3-wheeled chassis, and it can be started either by running along on the ground under its own power or by being jerked suddenly forward by a falling weight, as is the Wright machine. It will have a speed of over 40 miles an hour, and Mr. Curtiss expects to make several new records with it.

A NEW AERONAUTIC MANUFACTURING COMPANY.

Immediately following the news of the purchase of an aeroplane by the Aeronautic Society came the announcement last week of the formation of a $300,000 company organized by Mr. C. F. Bishop, the president of the Aero Club of America, for the manufacture of aeroplanes and dirigibles. A. M. Herring, the aeroplane inventor who is under contract to supply the government with a 2-man machine by next June, has a large interest in the new company, to which he will assign his American patents upon automatic stability devices, etc., when they issue. G. H. Curtiss is also a principal stockholder, and for the present the aeroplanes and motors will be built at his plant at Hammondsport, N. Y. The aeroplanes to be produced are to have all the improvements devised by Herring and Curtiss, and they are to sell at $7,500 each. It is also proposed to build gliders for $600. Capt. T. A. Baldwin will attend to the manufacture of dirigible balloons, several of which will be constructed shortly. The co-operation of the leading experimenters in both lighter-than-air and heavier-than-air apparatus should do much toward furthering a rapid development of aeronautics in America.

An Important Reduction of Magnetic Observations.

The variation of the magnetic needle with time and place is a matter of such vital interest to the navigator and the land surveyor, not to mention the scientific investigator, that the study and publication of data bearing on this phenomenon regularly must be undertaken under government or other auspices that will insure accuracy and completeness. The navigator must have information which will enable him to correct the courses as indicated by his compass, and the surveyor in running the lines of a piece of land as given in an old deed or other description must be able to allow for the change in direction of the old compass bearings. Therefore much practical importance attaches to the work of the Division of Terrestrial Magnetism of the United States Coast and Geodetic Survey, and this among persons interested has been heightened by the recent publication of "United States Magnetic Tables and Magnetic Charts for 1905." In past years it has been the custom of the Coast Survey to prepare magnetic charts for some period in advance of the date of issue, but the greater attention recently paid to magnetic studies makes it evident that the secular changes on which such charts are prepared are none too well understood in detail. Accordingly it was decided to prepare tables and charts for the year 1905 corrected to that date with all possible precision, and in the light of observations rather than the estimates. The work involved in this volume was under the direction of Dr. L. A. Bauer, who in the fall of 1906 resigned from the Survey to become director of the Department of Terrestrial Magnetism of the Carnegie Institution, and the great development into a harmonious and comprehensive plan under which magnetic research has been and is being carried on by these two agencies is in large measure due to his efforts.

Terrestrial magnetism aside from its practical application, represents an interesting aspect of modern science. Ordinarily we conceive of the processes of nature as involving long periods of time, as in the formation of continents or in the evolution of animal forms, or at the other extreme some sudden cataclysm as an earthquake, so that when a series of natural phenomena involving a swift and ceaseless change in so short a period as five or ten years is occurring, as in the earth's magnetism, it is indeed difficult to realize and understand it. In fact the problem becomes more difficult in the development of present-day science. In the early part of the nineteenth century a famous scientist remarked that once discovered the laws of nature were simple, but to-day that statement hardly can hold where a wealth of data obtained by observation and experiment often shows conclusively that the laws of nature are complex to an extreme. Thus in looking at charts of equal magnetic declination, inclination and intensity it will be noted that the lines showing these quantities are very irregular and are not the smooth flowing curves by which the distribution of the earth's magnetic force on land once was indicated.

Local and other conditions, shown by a number of observations, are such that to-day the irregular curves are the normal ones, and those that are regular either must be dismissed as conventional drawings or considered as based on an inadequacy of observation. The work recently published gives tables of the observed magnetic elements at many points in the United States as far as available and their values reduced to the date January 1, 1905, from observations made at over 3,300 stations, over two-thirds of which were occupied by the Survey from 1899 to 1906.

These stations averaged about 31 miles apart with an average of one for every 973 square miles. The observations were made on a common system and instrumental errors so far as possible were eliminated. In addition observations were made at sea from the vessels of the Survey. The charts accompanying the tables show declination, inclination, horizontal intensity, vertical intensity, total intensity, magnetic meridians, and secular motion and horizontal intensity secular variation curves.

The Current Supplement.

The current SUPPLEMENT, No. 1732, opens with a strikingly illustrated article on three bird habitat groups which have recently been mounted in the American Museum of Natural History. One group shows the duck hawk and its nest on the Hudson Palisades. Another group illustrates bird life in the New Jersey Hackensack Meadows in August; and the third shows part of a colony of white egrets of South Carolina. Other articles that deserve to be mentioned are those entitled "New Process for the Impregnation of Timber," "Vacuum Distillation," "A Model Atom," "Chemical Effects of Magnetism," "Limit to the Number of Marine Organisms." Dr. H. Decker writes instructively on the subject "Man as a Machine." An estimate is made of the available coal supply of the United States. Percy Longmuir contributes an article on Alloys. Hudson Maxim's imaginative article on the "Warfare of the Future" is concluded. Somewhat allied is the article on military tactics and the dirigible airship. Prof. Reginald Fessenden contributes by far the most important article in the SUPPLEMENT, namely, that on wireless telephony, in which he traces its history and present status. G. K. Gilbert's admirable study of Earthquake Forecasts is concluded. The usual Engineering, Science, and Trade Notes are also given.

A Chance for Rubber Heel Inventors.

The inventor of a well-known, widely-advertised rubber heel for shoes has expressed a desire to examine patents covering rubber heels, or even mere ideas. Inasmuch as many readers of this journal are inventors of rubber heels, it will give the Editor pleasure to place them in communication with this manufacturer. Inquirers should send in printed copies of their patents to be forwarded, if their ideas are patented.

THE M'CALL'S FERRY HYDRO-ELECTRIC POWER PLANT.

BY WILLIAM ALLEN.

A most notable hydro-electric engineering project is being carried out on he Susquehanna River. It is an interesting fact that this water course, although one of the most important in the United States, has been literally running to waste. Although the river drains an area of nearly 30,000 square miles and is 350 miles in length, as yet the power developed from it has been so small as to be insignificant in comparison with what can be obtained by the plant we have referred to.

In a distance of 60 miles examined by engineers, it is estimated that this river would afford over 400,000 electrical horse-power, were a series of dams and generating stations installed where sites are available. The McCall's Ferry dam, as it is termed, has been built on this section at a site where it is calculated fully 150,000 horse-power can be developed. While the river is very wide at this point, an island dividing it into two channels enabled the builders to construct a barrier where the volume of water and the current at flood height might otherwise have rendered the project impossible. As it is, plans had to be made with a view to resisting the force of the ice fields which come down the river with the spring freshets, also to provide for the great difference between the height of the river at high water and at low water, which at times is no less than 30 feet. The total width of the Susquehanna at McCall's Ferry is nearly 3,000 feet, consequently a barrier of these dimensions had to be erected. As the photographs show, the dam is an imposing structure. In height it ranges from 60 feet to 100 feet, while its width at the bottom is no less than 68 feet, tapering to the crest in a parabolic curve. An idea of the amount of material in the work is given when it is stated that nearly 400,000 cubic yards of concrete were set before it was completed. As the illustrations show, it is of the ogee type, designed especially to withstand the ice packs, also the debris which is brought down on flood currents in addition to the great volume of water.

For a distance of 2,650 feet the McCall is a dam of the weir type. Consequently, it is believed that the annual flood will carry the floating matter over it without doing damage, since the river reaches such a height in flood time that the depth of water on the crest of the dam will at times be fully 15 feet. The sides of the barrier, however, have been constructed of a special thickness, and are considerably higher than the weir section, being built at such an angle that they do not offer direct resistance to the water course. In fact, the engineers have taken advantage of curves and angles wherever possible, so as to divert the force of the flood current.

The building of the main dam and the power canal necessitated much preliminary work, owing to the difficulties of placing a barrier across this water course. It was necessary for the false work to be of the most substantial character, and one of the first steps was the construction of another massive viaduct nearly across the river. This outlay alone was $200,000, because the bridge was 2,000 feet in length with a width of 50 feet, on which were laid four railway tracks. The work was necessary in order to furnish a site for the concrete and other supplies and for the mechanical conveyors which transferred the material into the bridge forms. Although the viaduct was in itself a structure which might be considered permanent, it was only built for the purpose of facilitating the construction of the dam in lieu of wooden and other false work, and was later destroyed.

It was necessary to build a cofferdam of unusual strength to meet the emergency. Work was begun upon this from the east side of the river, and the water diverted from a section of the channel about three-fourths of a mile in width. Here the permanent structure was taken up, the barrier being formed in piers with a space of about 50 feet between each. After this section was completed, a second cofferdam was built from the west side, and the operation was repeated. Thus the dam in sections extended across the river, but owing to the method of construction, the spaces between the piers, left to allow the water to flow through during the work, are easily being closed, as operations can be carried on without hindrance from the rise and fall of the river. The plan of building the cofferdam was to construct huge timber cribs, 16 feet by 35 feet, their bottoms being modeled to fit the river bed, which were floated down by means of heavy cables and then sunk in position 10 feet apart. The spaces between the cribs were then closed with stop-logs, and the whole upper face of the dam sheathed with planks and with dirt. Dump cars pulled by small engines, which ran out over the cribs, brought the dirt from the island.

For the mixing of the concrete to be used in building the main dam and power house, the company erected a large plant. Eight Smith mixers with a capacity of 2,000 cubic yards a day were in a