A RECORD CROSS-COUNTRY MOTOR-BOAT TRIP.

BY OUR SPECIAL CORRESPONDENT.

A river trip of 450 miles made in one day between dawn and dark would certainly be a record-breaking performance. Such a trip could hardly be made with the usual type of high-speed motor boat, as neither the engine nor the hull would be likely to stand 15 hours continuous running at a 30-mile clip. The annual French endurance race from Paris to the sea, in which a number of the fastest racers usually compete, is generally run in stages, so that it lasts several days and consists of a few spurts of several hours each. When these facts are considered, one can appreciate the bold undertaking of the Dean brothers, of Cincinnati, O., when they attempted to run their fast boat "Br'er Fox II." from Pittsburg to Cincinnati in one day. This boat had previously made the 1,554-mile trip from St. Louis to New Orleans at a speed of 29.8 miles an hour, and altogether had traveled over 3,000 miles at a speed of nearly 30 miles an hour.

The start was planned for Sunday, July 10th last; but on account of low water in the Ohio River, it was necessarily postponed. A demonstration was given the Scientific American representative of the speed of the boat, however, in a round trip to McKeesport, Pa., a town 20 miles distant. The running time was 39 minutes one way and 41 the other, which was against a slight current. This was an average of over 30 miles an hour. Fortunately, within the next three days there was some rain, and the water rose enough in the river to make possible the undertaking of the trip, although only with the running of considerable risk, as the following account shows: The start was made from the landing of the Pittsburg Launch Club on Wednesday evening, July 14th, at 7:09:25, with the intention of running through the six dams to Rochester, Pa., that night, in order to make an early start through the open river on Thursday morning, thus avoiding the loss of time in locking through these six locks. A storm came up after passing through dam No. 1, and the boat was forced to tie up for the night. Another start was made early Thursday morning, and dam No. 6, at Rochester, was reached at 9:25:10, the actual running time through the pools being at the rate of 25 miles per hour.

Below the pools the water was found to be so shallow that it was necessary to cut out four of the eight cylinders in order to reduce the speed of the engine to 500 R. P. M., or approximately half speed. Below Wellsville, O., the propeller struck the bottom of the river and was bent. It was decided to continue with the disabled propeller until deeper water was reached, as the extra propeller carried on the boat had been damaged on the trip up the river to Pittsburg. It was impossible to make any speed until Bellaire, O., a distance of 95 miles, was reached, although the engine performance was perfect. The boat grounded several times, causing a loss of considerable time, but fortunately little damage was done.

Rear view of "Br'er Fox II." traveling at high speed.

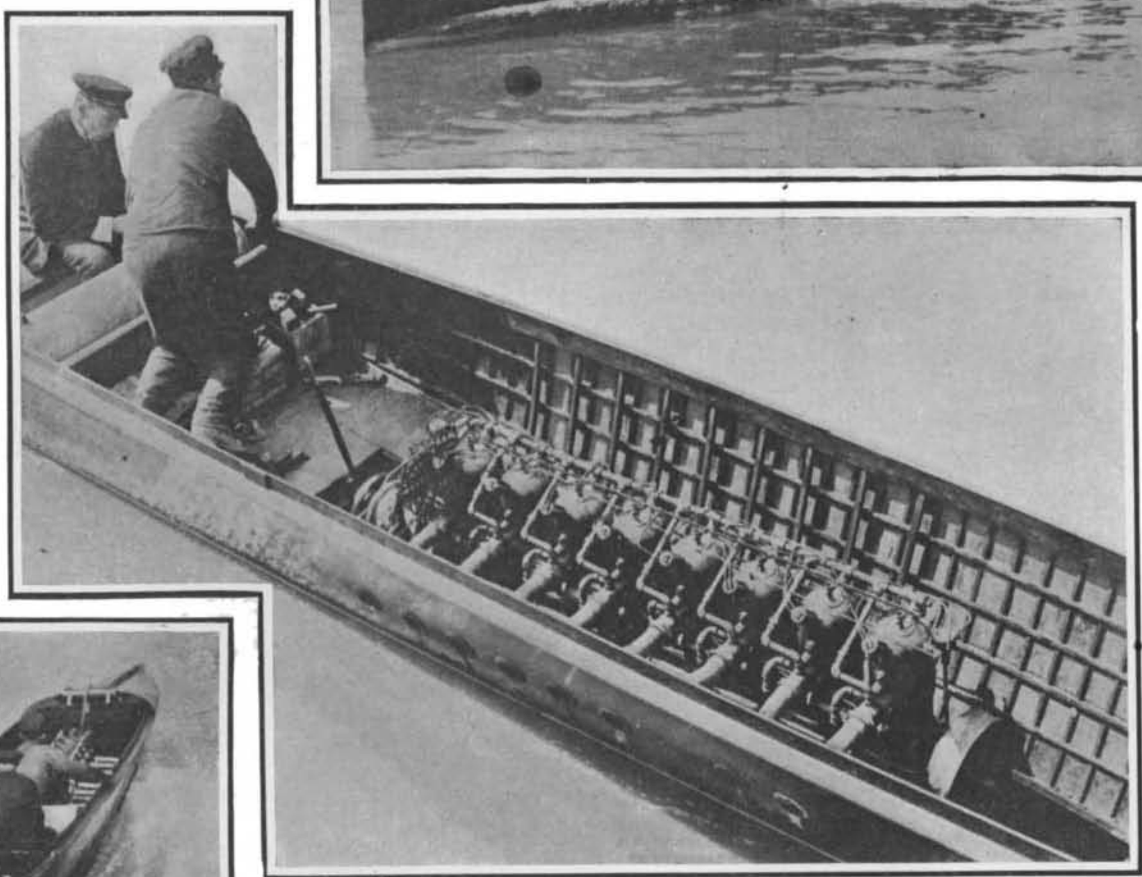
All eight cylinders were set working at Bellaire, but four were cut out again after going about two miles, and but four cylinders were used to Marietta, a distance of 171 miles. Sistersville, W. Va., was reached on Thursday evening at 6:49. The night was spent here, and a supply of gasoline and cylinder oil was taken aboard. Leaving Sistersville at 6:37:10 on Friday morning, a quick run was made to Petticoat Bar, 9 miles down the river. The propeller struck the bar while the boat was running nearly at full speed. Two blades were stripped from the wheel, and the boat was paddled to the bank, where the other propeller was put on. The shaft was bent slightly just in front of the propeller. The accident happened at 7 A. M., when all eight cylinders had been put on for a short time, as there appeared to be about three feet of water. The start was made from Petticoat Bar at 8:43:40, the engine running on four cylinders; and no further changes were made until Marietta was reached at 10:22:05, where there was considerably more water, owing to the Muskingum River flowing into the Ohio at that point.

Full speed was maintained until near Ravenswood, 218½ miles from Pittsburg, where a stop was made to replace the batteries. The boat is equipped with a magneto, but this had been disabled in the storm on Wednesday night, and was out of commission. From Ravenswood to Ironton, 106½ miles, the engine was run at full speed continuously, and not a single adjustment of any kind was made. Had it been possible to run at this rate of speed with the same amount of water down from Pittsburg, there is no doubt whatever that the run could have been made from that city to Cincinnati in one day. The performance of the engine on such high speed for such a distance is nothing short of remarkable, and is a triumph for the manufacturer of the two-cycle engine. No part of the engine heated up at any time, and not an explosion was missed. Vanceburg, Ky., was reached at 7:12 Friday evening. The boat was tied up for the night, and a supply of gasoline and cylinder oil was taken on. A fresh start was made at 7:22 on Saturday morning, and the run to Maysville, Ky., was made without stopping or slowing down the engine. The landing at Maysville was reached at 8:38:50, thus making the 30½ miles between those cities in 1:16:50, and this with a bent propeller and shaft. Such a performance by a badly disabled boat is truly remarkable, and particularly when it is taken into consideration that while the "Br'er Fox II." is designed to carry a crew of but two, she carried a crew of four on this trip, and 85 gallons of gasoline instead of the 30 gallons which are generally carried.

At Maysville a telegram was received from Cincinnati asking that the boat's arrival be planned and timed for one o'clock, as the launch clubs of that city had planned a reception at that hour. The boat was accordingly held at Maysville until 10:49, when the start was made for Cincinnati, 60 miles distant. The engine was then run without change of speed or adjustment until the Ohio River Launch Club was reached, where ten minutes were lost in taking on an extra can of gasoline, the supply having run short. Cincinnati was reached at 1:15:45, where the boat and occupants received a rousing reception from a large crowd. The run from Maysville to Cincinnati was made at the rate of 26.54 miles per hour, the fastest long run on the trip.

The actual running time for the trip from Pittsburg to Cincinnati was 21 hours, 35 minutes, and 25 seconds, which is a new record by water between these cities. This was at an average rate per hour of 21.25 miles, a most notable performance for a disabled boat in low water, where two-fifths of the entire distance was made under half power. At least ten per cent additional distance was covered on this trip, due to the necessity of crossing and recrossing the river in order to keep in the channel, maneuvering which would have been unnecessary had there been a sufficient stage of water to permit running straight ahead and cutting the bends and curves in the river. The crew on this trip was composed of M. B. Dean, captain; William Stevenson, engineer; James Rowley, pilot; and George D. Steele, representing the Scientific American. It is the intention of Mr. Dean, who is one of the owners of the "Br'er Fox II.," to make another attempt at a one-day trip from Pittsburg to Cincinnati this fall, when there will be a better stage of water in the Ohio River. With proper conditions, there is but little doubt of his accomplishing the remarkable feat. The second attempt will probably be made with another type of boat, as the Fox Company is installing its 8-cylinder motor in a hydroplane craft that it is thought will prove very speedy.

Side view of "Br'er Fox II." under way.



The 8-cylinder 2-cycle motor.

A RECORD MOTOR-BOAT TRIP FROM PITTSBURG TO CINCINNATI.

The "Br'er Fox II." was planned and assembled by Mr. A. G. Dean, one of her owners and also one of the officers of the Fox Reversible Gasoline Engine Company, of Newport, Ky. She is 40 feet in length, 4¼ feet beam, and draws about 26 inches of water. The hull is of rib and carvel construction, planked all over with ¼-inch white pine, and weighs, without engine and equipment, about 625 pounds. She is built on racing lines, and was designed and constructed by Wright brothers, of Newport, Ky.

The power equipment consists of a Fox motor rated at 56 to 65 horse-power. This engine is unique in that it has eight cylinders of the two-cycle type arranged in line above an 8-throw crankshaft. In appearance the motor is similar to the usual two-cycle engine, excepting that the cylinders are set farther apart to permit the use of wider bearings. The cylinders are all 5-inch bore by 5-inch stroke, and the base is a solid one-piece aluminium casting. The crankshaft is cut from a solid steel billet, and the throws are set to fire the cylinders 1, 5, 2, 6, 3, 7, 4, 8. At a speed of 800 R. P. M. this gives 6,400 piston oscillations per minute, and results in wonderfully steady and efficient power.

The one special feature of this motor is the design and location of an auxiliary fourth port, which is now being patented. Through this port air is drawn into the explosion chamber slightly in advance of the incoming charge of gas, and this injection of air accomplishes the double purpose of expelling the burned gas without waste of fuel, and leaving pure air in the explosion chamber instead of vitiated gas.

These fourth ports can all be operated together by means of a lever, and when opened, result in a marked increase in both power and speed. High-tension ignition by means of two distributors and two coils is employed. Lubrication is effectually accomplished by a force-feed system into the journals and by a spray taken by the incoming gas to the wrist-pins, connecting rods, and pistons. A clutch of the self-locking type is used, but no reversing gear is required, since the motor is readily reversible.

As is customary with boats of this type, the exhausts are open, and extend several feet above the sides of the boat. These exhausts are 2½ inches in diameter.

The motor drives a 22-inch diameter, 44-inch pitch wheel at from 750 to 800 R. P. M. with ease, and in short test runs has turned this wheel at from 810 to 825 R. P. M. in the Pittsburg pools, giving a speed in excess of 30 miles per hour in the slight current of those pools. On the run from Pittsburg down the Ohio to Cincinnati, the engine kept up a steady speed of from 750 to 775 R. P. M. without forcing, and maintained this speed for hours at a time without perceptible heating. This speed could be maintained easily for an entire day, or even more, were the stage of water sufficient to permit the boat to run at such speed in safety.

In the run to Cincinnati, four gasoline tanks were carried, two rear tubular tanks in the stern each having a capacity of 15 gallons; one 20-gallon tank under the seat; one 30-gallon tank in front of the seat; and one 5-gallon gravity feed tank directly over the 30-gallon tank, making a total capacity of 85 gallons for long runs. The tanks all feed into the 5-gallon gravity tank, a hand pressure pump forcing the contents of the lower ones to this gravity tank. Besides an individual carbureter for each cylinder, the transfer pipes of each pair of cylinders are connected to a second carbureter, so that there are no less than 12 carbureters used on the engine.

Based on rated power, the motor in the "Br'er Fox II." consumes approximately 1.4 pints of gasoline per horse-power hour, but the engine unquestionably delivers more than its rating, so that on actual wheel performance turning a 22-inch diameter, 44-inch pitch wheel 800 R. P. M., it is very close to a pint per horse-power hour.

The boat has a capacity of 14 gallons of cylinder oil in tanks. She is designed to carry two men averaging about 155 pounds each and 30 gallons, or about 240 pounds, of gasoline. On the trip from Pittsburg to Cincinnati she carried four men, whose combined weight was 670 pounds, and 85 gallons of gasoline, weighing approximately 600 pounds, or a total of 1,270 pounds, against 550 pounds, which is her estimated capacity when speeding.

The Current Supplement.

The opening article of the current Supplement, No. 1755, is devoted to a discussion of the wonderful Frankfort Aeronautical Exposition, which has been opened with such success in Germany. Excellent views of the exhibits accompany the text. Mr. E. F. Lake's exhaustive and instructive article on the oxhydric process of cutting metals is continued. Mr. Newton Wright explains how the size of gas and oil engine cylinders may be determined. It is a curious fact that many of the marbles employed by the Romans, Greeks, and even Egyptians, are those most highly valued by the architects and builders at the present time. Marbles and other decorative stones from the identical localities which were sought by the ancients with so much care are now to be seen in most fine modern buildings in London and other cities. This whole subject of ancient marbles and ancient marble quarries constitutes the subject of an article by Mary W. Porter. O. Bechstein contributes a wonderfully instructive article on kieselgur and its uses. The experimental evidence in support of the atomic hypothesis is set forth by R. Ehrenfeld. Maria Parloa's monograph on canning and preserving fruit is continued. Interesting electrical notes are those entitled "How to Join Electric Wires," and "The Egner-Holmstrom Telephone Apparatus." It is sometimes necessary when designing buildings or other works to construct models in order to explain intricate points more clearly than can be shown in drawings. How this is done, Mr. Stanley C. Bailey explains. Improved deep-sea sounding apparatus is described by Capt. E. Moll. A report of the Sixth Conference of the International Commission of Meteorology is published. A calendar good from 1753 to 1952 is not the least interesting feature of this issue.

From the returns compiled by Lloyd's Register of Shipping, it appears that, excluding warships, there were 308 vessels of 745,705 tons gross under construction in the United Kingdom at the close of the quarter ended June 30th, 1909.

Correspondence.

THE NUMBER OF OUR ANCESTORS.

To the Editor of the Scientific American:

The difficulty that some of your correspondents have with the ancestral puzzle is in disregarding the marriage and intermarriage of distant relatives. Thus if one of B's grandparents on his mother's side was cousin to one of his grandparents on his father's side, B would have only 14 great-great-grandparents. The one divergent series would be extinguished and the number of his ancestors in any one generation would be $2^n - 2^{n-4}$. If, instead, two of his eight great-grandparents were cousins the formula would be for any generation $2^n - 2^{n-5}$. If there were two sets of cousins among his great-grandparents the formula would be $2^n - 2\,(2^{n-5})$, etc.

When we consider that our ancestors for hundreds and thousands of years lived in small and more or less isolated villages and communities and that families of as many as ten or twelve children were not uncommon, we can see that could we trace all lines of descent of any one person we would find them constantly running into each other and merging into common ancestors. Thus in the fifteenth generation we might trace descent from two parents through any one or through all of their twelve children. And if the blood of these children had commingled at other times in the line of descent, as it must at least in an isolated community, two persons in the fifteenth generation might represent a hundred or even several thousand of B's theoretical ancestors.

Nora Springs, Iowa. W. A. Eckles.

THUNDERSTORMS.

To the Editor of the Scientific American:

The explanation of thunderstorms ordinarily given is that clouds are formed of minute particles of moisture, each having an electric charge on its surface. These particles agglomerate in drops of rain, and their electric charges spread over the surface of the drops with a resulting greater electric density, because the surface of a drop is much less in extent than the aggregate of the surfaces of all the particles of which it is made; the increase in surface being proportional to the square of the diameter, when the increase in volume is proportional to the cube of the diameter. For instance, the electric potential (depending on the electric density on its surface) of a drop of rain ⅛ of an inch in diameter will be 125 volts, if it is formed of particles 1/1,000 inch in diameter whose potential is one volt.

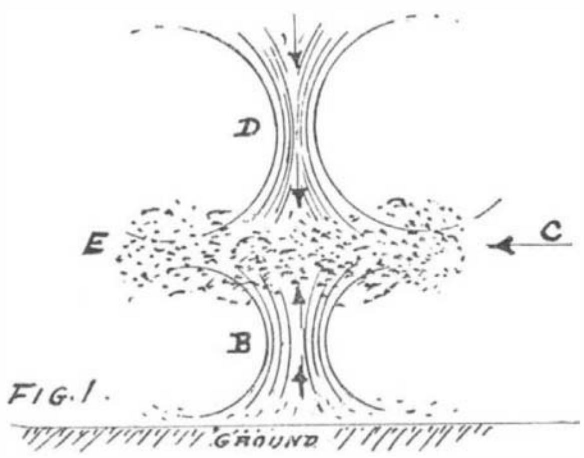


FIG. 1.

The drops of rain in a cloud being separated by air acting as a dielectric, electrify each other by influence; the resulting influence at the center of the cloud being an enormous electrostatic strain, which is relieved by lightning.

This simple explanation is that generally given in the lecture room, but is not sufficient to explain the thunderstorms without rain frequent on the Western plains in hot dry weather. The writer has observed many in northwest Texas. One day at noon I was resting in my house, when I was startled by a sudden clap of thunder, followed by others. I had not seen a sign of a cloud a few minutes before when coming home. Stepping out doors, I saw toward the zenith a very thin yellowish cloud somewhat broken, from which emerged the thundering. No lightning could be seen, the glare of the sun through that misty cloud being too intense. From its rapid motion and the distinctness of the claps of thunder, I judged that it could not be very high. This phenomenon lasted about three minutes and vanished.

The appearance of that cloud was unusual for a dry thunderstorm. Ordinarily, in such occurrences there are several scattered small white clouds, embryo cumuli in shape but diaphane, they look "dry," and do not cast any appreciable shadow on the ground. They appear and vanish with more or less sharp thunders, seemingly at a high elevation. No lightning can be seen because of the sunshine through them. These electric discharges begin about noon, to last until about two hours before sunset. During the day there are occasional flushes of breeze, but no continuous wind in a certain direction.

This condition of weather may last without rain for two or three weeks, and is generally followed by a stubborn drought, with a smoky appearance of the sky and very little or no dew in the morning. The absence of rain, the small size of the clouds, and their diaphane, evanescent appearance, indicate that other agencies besides those mentioned in the lecture room are active for the presence of electric potentials widely differing in a dry thunderstorm.

Observations have shown that the electric potential of the air increases with the distance from the ground. Now suppose that a portion of the upper atmosphere be brought near a portion of the nether atmosphere within a medium like mist, where electrification by influence can take place; the requisites for an electric discharge are present, and apply to dry thunderstorms. They occur when atmospheric conditions are favorable for causing local ascending currents of warm air with a small quantity of aqueous vapor to an elevation where they meet a cold current, whose cooling effects contract the hot air and condense the vapor it contains, creating a vacuum that sucks the air from the highly electrified upper atmosphere, as shown in Fig. 1, where *B* is a warm ascending current, *C* is the initial cooling current (which has disappeared), *D* is the descending current, and *E* the cloud formed by the condensation of the vapor in the ascending current *B*.

From the absence of rumbling thunder the electric discharges seem to be confined within each separate cloud, and originate mainly from differences of potential brought from different strata in the atmosphere.

The ordinary thunderstorms with rain happen also when atmospheric conditions cause ascending currents of warm air containing aqueous vapor. There is low barometer and a preceding period of calm high temperature; the clouds are cumuli and pile very high up, especially for hailstorms.

When rain is brought by a wind that has been blowing for a few hours or days in the same direction, the clouds are of the nimbus class; they overcast the whole sky, and though the drops of rain may be large, there is no appreciable thunder and lightning, the electric potential being too uniformly distributed throughout the cloud.

Pittsfield, Mass. Henry Getaz.

THE EFFECT OF POLAR CURRENTS ON GULF STREAM PLANKTON.

To the Editor of the Scientific American:

It was announced some time ago that very interesting communications were to be published shortly from the pen of Prof. Frithjof Nansen and assistants upon the most recent results of the investigations which have been carried on for a series of years with a view to ascertaining the influence which the water in the polar currents has upon the water in the Gulf Stream in the way of creating very favorable conditions of existence in the latter for plankton and higher marine life.

The results may be shortly summed up thus: From the investigations carried on during the "Fram's" voyage across the north polar basin it has been proved conclusively that in the polar water which is protected by a thick layer of ice from the influence of light, accumulate matters which have a fertilizing effect upon the vegetable life in the open sea and which in the cold, dark polar water are not used. The polar basin is like a large tract of fallow land in which fertilizing matters accumulate without being used.

The warm water in the Gulf Stream, on the contrary, when reaching the northern part of the Atlantic is desert water, so to say. It has been used up and contains only scanty means of subsistence for any animal life.

The more polar water that sets in and mixes with the warm water in the Gulf Stream, the more luxuriant seems to be the growth of plankton and higher marine life. It is the cause of colder summers in northern Europe, but the fisheries seem to be better in proportion.

The results of these investigations, of which only a short summary is just published in the press, will be issued in book form, and seem to open up prospects of our being able to foretell good or poor fisheries and to explain many interesting phenomena which seem to be dependent upon the temperature in the northern part of the Gulf Stream.

Christiania, Norway. J. A. Mörch.

Rubber Substitute.—According to a foreign patented process, a substance resembling rubber or gutta percha is produced by mixing gelatine, bichromate of potash, and glycerine, and molding the mass obtained. The components are used in an anhydrous state to retard the working of the bichromate of potash on the gelatine; by heating, the chemical effect may be increased or reduced.