

ENGINEERING.

The Baku-Batoum petroleum pipe line has had to be renewed for some 50 miles, between Adschikabul and Jelissawetpol, where it passes through salt-carrying districts. The corrosion there is more rapid than over the rest of the route, so that excessive leakage has been caused.

Visitors to Admiral Seymour's flagship, the "Inflexible," which is the only vessel of the "Dreadnought" type at the Hudson-Fulton Celebration, will be interested to learn that the new "Dreadnought" cruisers, according to the British press, are to be much larger and more powerful. They will have a length of 600 feet as against 560 feet, a total horse-power of 60,000 as against 50,000, and twelve 12-inch guns in place of the eight 12-inch carried by the "Inflexible."

There is a certain amount of sentimental interest attaching to the fate of a transatlantic record breaker, and it is therefore gratifying to learn that the Cunard Company have arranged to accept \$500,000 in settlement of the insurance on the recently burned "Lucania," and reconstruct this famous boat, making her thoroughly up to date in the matter of accommodations, etc. The "Lucania" was the first vessel to cross the Atlantic at an average speed of 22 knots.

It is gratifying to note that the large sea-going torpedo boats which are being built for the navy are making, on trial, speeds which are greatly in excess of the contract requirement. The "Flusser," built by the Bath Iron Works, recently made between 32 and 33 knots on trial, and now a sister vessel, the "Smith," built by William Cramp & Sons, has made 32 knots on trial. Because of their large displacement of 700 tons, these high speeds on trial mean much more than the high speeds achieved with our earlier boats, which have never approached in average day by day service the record made on their trial trips.

At the naval depot at Horton, Norway, the Norwegian government is refitting Nansen's old Arctic vessel, the "Fram," for another trip to the Arctic. A new gasoline engine capable of driving the vessel at four or five miles an hour is being installed, and a thorough overhaul is taking place. In a recent letter to the Norwegian consul at San Francisco, Capt. Amundsen states that he expects to leave San Francisco next June for the Behring Sea, where he will allow his vessel to be frozen into the ice and be carried by way of the Pole toward the northern part of Greenland. The "Fram" is about three times the size of the "Gjøa," now in the Golden Gate Park, San Francisco, in which Amundsen recently made his famous north-west passage.

Notice was recently given to the Treasury Department at Washington by the Pennsylvania Railroad Company that it proposes to operate its trains into the new station on the first day of December. In the great terminal between Seventh and Eighth Avenues and 31st and 33rd Streets there are sixteen miles of track, including twenty-one standing stations. Two tunnels connect the station with New Jersey, and four with Long Island. Started in 1902, work has been carried on continuously ever since, and when the scheme is fully completed it will have cost over \$90,000,000.

It will be remembered that at the opening of the Alaska-Yukon Exposition at Seattle, the Great Northern Railway put on a 60-hour train from Chicago to Puget Sound. With the completion of the new Milwaukee, Chicago & St. Paul extension, the Maintenance of Way Department will bend their efforts to bringing the new track into such high-class condition as to permit of the running of high-speed through expresses from Chicago to the coast. The Milwaukee managers expect that next spring they will be in a position to offer a 54-hour schedule from Chicago to Seattle. This, coupled with the 18-hour service from New York to Chicago, will bring the time between New York and the coast down to three days.

The greatest possible interest attaches to the announcement that Mr. George Westinghouse, Rear Admiral Melville, and Mr. John MacAlpine have devised and built a reduction gear for interpolation between the steam turbine shaft and the propeller shaft for turbine-driven marine engines. The necessity for reducing the economical speed of the turbine to the economical speed of the propeller has long been manifest, and as we stated editorially last week, considerable effort has been directed to this problem. The helical spur gear has been in use for many years on the De Laval turbines, but in the present device, by an ingenious construction of an automatically adjustable bearing, it has become possible to apply this gear so as to transmit 6,000 horse-power, at 1,500 revolutions of the pinion per minute, at a reduction ratio of 5 to 1. It is claimed by Mr. Westinghouse that using this reduction gear, and with an inconsiderable loss from friction, it would be possible to apply the 70,000 horse-power of the "Mauretania" to three propellers with a reduction of 50 per cent both in the weight of the turbine and in the length of the engine room.

AERONAUTICS.

Orville Wright, on September 30th, made another record for height while flying before the Empress of Germany and other members of the royal family at Potsdam. On this occasion, according to cable reports, he reached a height of 275 meters (902 feet). This is over 50 feet higher than his previous record made only a week before.

In connection with Berlin's aviation week, Hubert Latham made some excellent and startling flights recently. On the 25th ultimo he made a 20-minute flight above Tempelhofer field. The flight was terminated because of heavy rain. Two days later he made the most daring flight up to date, when in 24 minutes he flew from Tempelhofer field across Berlin to Johannisthal, where the aviation meeting was being conducted. The flight was made at a height of about 300 feet, the distance of 11¼ miles plus two circuits of the field (3.1 miles) upon his arrival being covered in 24 minutes.

Besides the exhibition of Curtiss's 60-horse-power biplane in Wanamaker's store in New York last week, another of these machines fitted with a 30-horse-power 4-cylinder motor was exhibited at the aeronautic show in Madison Square Garden. There were also two other similar biplanes, but one of which was fitted with a motor, however, and had made a short flight. The Braunier & Smith biplane resembled both the Wright and the Curtiss. It had the twin vertical rudders of the former and the single-surface horizontal rudder of the latter. C. & A. Witterman exhibited a strong, well-built biplane glider that attracted considerable attention. Several other gliders were shown, as well as numerous models, samples of balloon and aeroplane cloth, aeroplane parts, etc.

On October 1st, at the Berlin aviation meeting, Rougier, with a Voisin biplane, made an excellent endurance flight in which he remained aloft 2 hours, 41 minutes and 50 seconds. Making 52 circuits of the field, he covered an official measured distance of 130 kilometers (80¾ miles) at an average speed of 30 miles an hour. Probably he actually covered over 90 miles in view of the many turns. The flight was only terminated because of approaching darkness. While Rougier's official record does not beat Farman's, it is encouraging as showing that a gasoline motor can be made to run for a long time on an aeroplane as well as on an automobile. The same day Farman flew 1 hour and 32 minutes, covering 82½ kilometers (51.23 miles) at an average speed of 33.41 miles an hour. Baron de Caters flew 18.6 miles in 34 minutes.

Just after we had gone to press with our last issue, which contained an article upon aeronautic accidents, the worst disaster of modern times occurred in France. Owing to the breaking of a propeller blade (which was projected clear through the balloon envelope) the new military dirigible "République" was almost instantly deflated, causing it to fall to the ground from a height of 500 feet. The four officers who formed the crew were all killed almost instantly. This disaster gives a strong argument in favor of the rigid-frame, compartment dirigible of Count Zeppelin, which, it will be remembered, successfully went through a similar accident a few weeks ago. In this connection it is interesting to note that Wilbur R. Kimball had on exhibition at the preliminary aeronautic show last week in Madison Square Garden, New York, a model of a non-rigid dirigible which had a ring of small propellers completely surrounding it. He argues that small light wood propellers can be run at high speed without danger of breakage, while a greater thrust per horse-power is also attainable.

Owing to rainy and windy weather, the aeroplane flights of Wilbur Wright and Glenn Curtiss from Governor's Island up the Hudson River to Grant's Tomb and back did not take place last week as scheduled. Up to Saturday noon the only flights that had been made were a short half-mile jump by Curtiss shortly after 7 A. M. last Wednesday, and three practice flights by Wilbur Wright the same day. Two of these were made at 8:56 and 10:16 A. M., and were of 5 minutes 27 seconds and 6 minutes 33 seconds duration respectively. They were made in a strong westerly wind of about 20 miles an hour velocity. The first one consisted of the circling several times of the island, the machine flying most of the time at a height of 50 feet above the water. The second flight was much more sensational, for after circling Governor's Island as before, Mr. Wright flew over to Bedloe's Island and around Bartholdi's famous Statue of Liberty. After making all his great records in France, it was particularly fitting that Wilbur Wright, in his first great public flight in America, should pay a visit to France's gift to her sister republic. These two flights, as well as the third one of 2 minutes 41 seconds duration, which was made at 5:25 P. M. in what was, if anything, an even stronger breeze, gave an excellent demonstration of Wright's ability to fly in a strong wind. It is probable that as soon as a reasonably calm day occurs he will make a record flight that will remain unbeaten for some time.

SCIENCE.

The United States Department of Agriculture is investigating the various methods of preserving eggs, for the purpose of determining which method is most efficacious and works least injury to the eggs. It has been discovered that the amount of moisture in the air surrounding the egg is an important factor in egg preservation, for which reason the Department is conducting experiments to devise a means for regulating the amount of air supplied to eggs kept in cold storage.

Col. Kozloff's Mongolian expedition, equipped by the Russian Geographical Society, has returned after twenty months of exploration in the region of the Andos Mountain range in Tibet. The chief discovery made was of the ancient city of Kharakhoto, called by the Chinese Siansin, which the Manchurians destroyed more than 500 years ago. The explorers found a great quantity of relics used in Buddha worship, a metal figure of Buddha perfectly preserved, and perfectly preserved manuscripts on canvas and silk in the Chinese, Manchurian, and Tibetan languages.

F. Fritz has discovered that the domestic cat possesses a peculiar organ of sense, consisting of a few long and stiff bristles, or feelers, which spring from a region of the skin richly furnished with nerves in the vicinity of the wrist joint of the fore leg. These organs, called "carpal vibrissæ," had previously been found in numerous animals, including rodents, edentata, carnivora, the lower quadrumana, and *Hyrax*. They are found chiefly in animals which hold their food with their forepaws, or which crawl and climb. Thus, they are wanting in the ungulata, with the exception of *Hyrax*, and also in the apes and monkeys, which possess, in their fingers and palms, much more delicate tactile and prehensile organs. It is remarkable that they are also wanting in the dog, in which animal Fritz has sought them in vain.

The Académie des Sciences recently awarded a number of prizes for scientific work. In mechanics, M. Lecornu, professor at the Polytechnic College, received the Montyon prize, \$140; M. de Sparre the Poncelet prize, \$400; M. Boulanger the Boileau prize of \$260. In astronomy, the Lalande prize of \$108 was awarded to M. Borelly, of Marseilles. For navigation the grand prize of the marine, \$1,200, was divided among Messrs. Colin, Jeance, Marbec, Doyère, Lecocq, Tissot, and Fromaget. The Plumey prize of \$800 was awarded to Messrs. Routier and Caralp. In mineralogy and geology, the Raulin prize of \$30 was given to M. Leon Bertrand, and the Labbé prize of \$200 to G. Rolland. Prof. Mercadier of the Polytechnic College received the Pierson-Perrin prize of \$10,000. The Delesse geological prize of \$280 was awarded to Prof. Glangeaud, of Clermont. In medicine, a number of prizes were awarded, among which was the sum of \$800 given by the academy itself to Dr. Haffkine for his work on vaccination for cholera and bubonic pest. The academy also distributed the second annuity of \$5,000 coming from the Bonaparte fund among different workers in the scientific field.

A letter has been received at Harvard College Observatory from Prof. G. C. Comstock, Director of the Washburn Observatory, giving the following "finding ephemeris of Halley's comet," derived by him:

"Perihelion Passage, April 18th."

Paris M. T.	D.	R. A.	H. M.	Dec.	M.	Mag.
1909.						
September	22.5	6	19.3	+17	7	15.1
"	27.5	6	18.8	17	5	
October	2.5	6	17.8	17	3	14.8
"	7.5	6	16.0	17	1	
"	12.5	6	13.4	16	59	14.5
"	17.5	6	9.8	16	58	
"	22.5	6	4.9	16	56	14.1
"	27.5	5	58.9	16	54	
November	1.5	5	51.3	16	52	13.8
"	6.5	5	42.1	16	50	
"	11.5	5	30.8	+16	47	13.4

"The above ephemeris is derived from that of Holtschek, Astro. Nach. 4330, by interpolating the time of perihelion passage so as to satisfy observations made by Burnham and Barnard, September 15th and September 17th respectively."

A letter has been received at this observatory from Prof. E. B. Frost, director of the Yerkes Observatory, stating that Halley's comet was observed visually by Prof. E. E. Barnard on September 24 d. 20 h. 22 m. 21 s. G. M. T. in

App. R. A. 6 h. 18 m. 56.72 s.

App. Dec. +17 deg. 6 m. 11.2 s.

Comet followed comp. star 0 m. 19.03 s. by 8 direct measures.

Comet north of comp. star 0 m. 39.4 s. by 9 direct measures.

The comparison star was Berlin A. G. 2122.

"The comet was considerably brighter than on the 17th; estimated as 15th mag; measured diameter 11 s.; indefinite condensation almost amounting to a small nucleus; no definite boundary."