opened to new lines of invention, but whatever work there may be, must be done along legitimate ways and to fill legitimate wants.

In the decided course which he has taken the Commissioner has had the full sympathy of the public. He has done a great service to the patent interests of this country, a service whose effect will be widespread and permanent.

NEW EASTWARD RECORD FOR THE LINER KAISER WILHELM.

In our last issue we recorded the fact that the westward ocean record from Southampton to New York had been reduced to 5 days 22 hours and 35 minutes, by the new North German Lloyd boat Kaiser Wilhelm der Grosse. In this number we are able to announce that this fine ship captured another record, that from New York to Southampton, on her return trip across the Atlantic. The run from Sandy Hook to the Eddystone lighthouse, fourteen miles south-southwest of Plymouth breakwater, was made in 5 days 15 hours and 10 minutes. If we allow 6 hours for the run from Plymouth to the Needles, it is fair to assume that, if the Kaiser Wilhelm had not called at Plymouth, she would have made the whole distance in about 5 days 21 hours, which is about 13 hours less than the record trip of the St. Louis.

An analysis of the run shows that it was in every way a splendid performance. On five consecutive days the ship covered over 500 knots per day, something that has never before been accomplished on the eastward passage, on which the nautical days are less than twenty-four hours long. The daily runs were as follows in knots: 367, 504, 500, 507, 510, 519, and 55 knots up to the hour, 2:25 P. M., at which she reached the Eddystone lighthouse. The run from the lighthouse to Plymouth consumed one hour, and by 10 o'clock on Wednesday night the mails which had left New York on the previous Thursday were landed in London. The average hourly speed for the whole trip was 21·91 knots, which, considering that stormy weather and head winds were encountered, was a better performance than the 22·01 average of the Lucania, made in fair weather.

In this connection it should be mentioned that the carriage of the mails from New York to London is made by the fastest boat and the fastest long distance train in the world. When it was decided to make Plymouth the first port of call for the North German Lloyd boats the Great Western Railway inaugurated a special tidal train to meet them. This train is made up as soon as the boat is signaled and runs without a stop from Plymouth to London—194 miles—at the rate of 53⅓ miles per hour. The train is not a mere racing outfit, such as used to be sent to Scotland on the northern lines during the famous competition a few years ago, but is a regularly scheduled train, weighing over 200 tons and carrying a full load of mail, baggage and passengers. The speed, comfort and safety of this combined rail and steamer journey is an eloquent tribute to the engineering genius of these latter years of the nineteenth century.

OPENING OF THE PNEUMATIC POSTAL TUBE SERVICE IN NEW YORK CITY.

Shortly after noon on the 7th instant the first section of the pneumatic postal tube service, which is now being installed in this city, was opened for regular service in the presence of the invited guests of the Tubular Dispatch Company, who are putting in the plant. The completed section runs from the General Post Office through Beekman, William and Stone Streets to the station at the Produce Exchange, a distance of 3,750 feet. There are two tubes, each 8⅛ inches in diameter, the bends being made of brass and the straight sections of cast iron. The interior surface is smoothly finished off to assist the passage of the carriers. At each station there is a transmitter and a receiver of an improved design, specially constructed for this plant. The air-compressing plant is located at the General Post Office, and a pressure of 6 pounds to the square inch is employed for the present, though the pressure, and consequently the speed, may be increased if desired. The carriers consist of sheet steel cylinders, 24 inches long and weighing about 12 pounds. Each of these can hold about 600 letters, and it is estimated that about 250,000 letters per hour can be carried in each direction when the operators are fully accustomed to the work. When a carrier has been loaded, it is placed in a charging tray and pushed into a section of tube, a little longer than itself, which is then swung over into the line of the main tubing. The air carries it to its destination, where it automatically operates a cushioning device, which reduces its speed just before it falls into the receiving tray.

The ceremony of inaugurating the service was performed by Dr. Chauncey M. Depew, who, acting under the direction of Mr. John E. Milholland, the president of the Tubular Dispatch Company, placed in the carrier a Bible wrapped in the stars and stripes, a copy of the President's inaugural address and other documents. The lever was pulled at 12:16:20 P. M., and at 12:17:50 P. M. it reached the Produce Exchange, 3,750 feet distant. Here it was opened and inclosures were made, the carrier finally arriving at the Post Office at 12:21 P. M., or 4 minutes and 40 seconds from the time it was sent away.

An experiment was recently made to determine the time taken to send a message over practically the same route as that covered by the postal tubes, by various systems of communication. The test showed that the round trip occupied thirty-three minutes by a messenger boy, thirty-three minutes by a wagon, fifty-six minutes by telegram, and three hours and ten minutes by mail one way.

Dr. Depew, in a characteristic speech, insisted upon the fact that every device that assisted in the development of speed was a direct contribution to the advancement and prosperity of the world. He stated that though the pneumatic delivery system had received its first application on a large scale in London and Paris, it would probably be the New World that would extend the system and show the wide range of its possibilities. He is satisfied that the installation of a complete network of tubes, answering in its scope to the telephone of to-day, would effect a revolution in the business methods of the retail tradesmen, placing them in hourly touch with the wholesale houses, in some cases practically increasing their capital 300 per cent. Second Assistant Postmaster-General Shallenberger designated the postal tube system as the most important commercial enterprise of the past twenty-five years. He stated that, when the system has been completely extended in the metropolis, it will be possible for the Post Office to deliver messages to the limits of Greater New York in less time than by telegram. Moreover, the system makes it possible to expedite the transmission of letters from the outskirts of New York to the outskirts of Chicago, St. Louis or other large cities by from twenty-four to twenty-six hours. The business men of New York and Philadelphia will be able to send a letter and receive an answer between these two cities within the limits of the business hours of one day.

We hope to give an illustrated description of the new plant in an early issue.

THE AMERICAN INSTITUTE FAIR, NEW YORK.

The American Institute, which is now holding its annual fair at the Madison Square Garden, is one of the historical institutions of New York City. For many years the record of its proceedings was largely a record of the progress of the country in the industrial arts, and the winning of its medals was one of the most coveted distinctions in the industrial world. The list of early prize winners contains such names as those of Samuel Colt, Richard M. Hoe, Samuel F. B. Morse, George Steers, and many others only less renowned in the world of art and science. The annual fairs attained a popularity which extended far beyond the limits of New York City, and they came to be looked upon as positive landmarks in the onward march of invention.

From various untoward causes the fortunes of the Institute, after many decades of unbroken success, began to decline, until, in 1892, the annual fair was discontinued. Last year, mainly through the efforts of Mr. Charles Chamberlain, Director of the Institute, the fair was revived again, and a fairly successful exhibition was held during the month of October in Madison Square Garden. This year, under the superintendence of Mr. Alfred Chasseaud, a successful effort has been made to extend the scope of the undertaking, and certain new features, notably a fine art exhibit and an exhibit of fruit and flowers, have been added. Altogether the display, as seen from the gallery of the building, is a marked advance upon that of last year, and gives reason to believe that this commendable institution is rapidly regaining its old time prestige and usefulness.

Near the Madison Avenue entrance to the hall is an exhibit of architectural ironwork by William R. Pitt, of New York, which deserves special mention, both for the durability, the fine finish and the artistic appearance of the material. Some of the designs in composite cast and wrought iron are extremely handsome, and the composite gates, guards and rail and stair work have the finish and beauty of hammered ironwork.

The A. A. Griffing Iron Company are again conspicuous exhibitors at the fair. They show one Bundy hot water heater and one steam heater of the same name, one steam and one hot water La Villa heater, the former with an automatic draught regulator in place. The regulation is effected by means of a diaphragm in a closed drum, upon which the steam acts if the pressure exceeds a certain point. The diaphragm acts by means of levers upon the damper, closing the draught. At the same time it blows a whistle to attract the notice of the attendant. The exhibit also includes a line of Bundy gravity pumps, feed water heaters, steam traps and steam and oil separators.

The grinding of spectacle lenses is illustrated at the stand of Mr. L. Alexander, of New York, who has a large model at work. On the lowest platform of the model are several blocks of crown glass from which the slabs are cut by means of a reciprocating band of steel, the operation being similar to that of sawing marble slabs. The small slabs are then roughly chipped into circular shape and placed upon the "moulds," which are rotating disks of bronze whose surface is curved to the desired shape of the lens. As the mould rotates, the lens is held stationary and ground with emery to the proper curvature. It is then polished. It takes five hours to grind a lens. The moulds wear rapidly and have to be periodically trued in a special lathe. The spherical lenses are ground from three inches to one hundred and forty-four inches, and the work is done on a variation of three millimeters. The surface of lenses which are used to correct long and short sight is spherical. Up to within the last dozen years this was the only correction that was extensively practiced; but of late years the optician has placed within reach of the general public glasses which correct "astigmatism," a defect due to an oval form of the cornea. This correction is made with a glass which is part of the shell of a cylinder. There is also a prismatic lens for the correction of the defect known as "cross eyed." In some cases the eyesight is affected with all three defects, and a complicated composite glass is used which includes the three forms of lens.

Dana, of New York, has a stand with a collection of the best work of his studio, and on the northern side of the hall is an exhibit of photographic work which is of special interest. We refer to the photographs in color by Edward Bierstadt, of Reade Street, New York. Many beautiful specimens are shown, and they include a variety of subjects. One is struck with the extreme brilliancy of the coloring in the landscapes. So bright are they, indeed, as to give an appearance of overdone artificial coloring. A most interesting case is that which shows the process in detail. The first picture is from a negative taken through a violet blue screen and printed in yellow. Then follows one from a negative made through a green screen and printed in red. No. 3 shows the result from a negative taken through a red screen and printed in blue, and No. 4 shows the effect of photographing through a yellow screen and printing in neutral tint. The combined result is a remarkably exact and clear reproduction of the original painting. It is in the reproduction of paintings, indeed, that the new process is most successful, the results being very fine. In this exhibit may be seen the first photographic portrait ever made. It is a portrait of Miss Draper, of New York, taken by her brother, Prof. Draper, of this city, in 1840.

The readiness with which electricity lends itself to automatic appliances has been noted by an ingenious inventor, who has used it to good effect in an electrical rat trap. The device exhibited at the Fair consists of a narrow passageway of wire netting, in the middle of which is a swinging door containing the bait. When the trap is set, this door is closed. As the rat approaches, it steps on a contact maker which swings the door out of the way, and, as the victim passes on, another contact mechanism causes the door to shut behind him.

The Micrometer Balance Scale Company has an exhibit of scales on which the weight may be determined quickly and with great exactness. The weight end of the scale is provided with a quick acting horizontal screw, upon which is a weighted cylinder. The weight (corresponding to the position of the cylinder) is read off on a horizontal scale in pounds and the ounces are read off on the periphery of the cylinder weight. The scales are shown in many varieties, from the ordinary counter scales of the grocer's store to the fine prescription balances of the druggist.

In these days, when special attention is directed to questions of hygiene, the very complete exhibit of Knight asbestos filters should command attention. The filters are shown in a variety of sizes, from the small concern, suitable to the cottage or small city flat, up to the largest sizes for hotel use. As the filter is a device which is intended to remove only those impurities which are in suspension in the water, it is evident that its efficiency will be directly proportional to the small size of the interstices—the fineness of the mesh, as it were—in the filtering medium. If an impurity is to be removed, the interstices must be smaller than the particles of which the impurity is made up. The Knight asbestos filter makes use of a strainer made of layers of asbestos, the fiber of which has been finely separated, giving it a soft, woolly texture. A pile of this material several feet in thickness is compressed to a thickness of half an inch, and it is then cut into the sizes and shapes required. The simplest form of filter consists of a metallic bucket-shaped vessel with a fine gauze bottom. The asbestos pad is laid upon the gauze and a second wire screen is placed upon the asbestos and pressed down upon it with a thumbscrew. The exhibitor made experiments in which the water put into the filter was dyed a deep color with washing blue, and after filtration came away colorless. Starch was also removed. An examination of Thames water by Professor Attfield, of London, showed that the microbes which it contained were entirely removed by the asbestos pads. We shall give a further notice of the fair in our next issue.

LONDON omnibuses carried 83,277,814 passengers during the first half of 1897 and traveled 12,743,242 miles.