

ling fact, we are brought face to face with the question as to whether it is consistent with the dignity, and conducive to the best commercial interests of the country, that we should be indebted to foreign nations for the transportation of the products of our fields and factories, and that we should be paying out this great sum of money to foreign firms, when it might just as well form part of the legitimate annual profits of American industry. There are some Americans, it is true, who frankly assert that they are content to let matters remain as they are; but we must not forget that their attitude means the indefinite postponement of any revival of American deep-sea shipping, and that we, who before the days of our civil war were the greatest deep-sea carrying nation in the world, must be content, in spite of our ever-increasing wealth and importance, to continue to hold an inferior position.

The resuscitation of our merchant marine has an important bearing on our position as a naval power. An adequate merchant marine is necessary to any naval country that is to be in a position to transport its troops with speed and safety to a distant center of operations. We all remember the difficulty which we experienced in carrying troops to Cuba, Porto Rico and the Philippines during the late war; and now that we have extensive foreign possessions, the value of an adequate auxiliary navy has increased enormously. A consideration of the problems of transportation which would suddenly confront us were the Philippines, for instance, made the object of attack by a foreign power, should prove to us the wisdom of subsidizing fast and well-built merchant ships which, in the time of war, could be quickly armed and utilized as consorts to the slower transports, in which troops and munitions of war would be carried.

Lastly, it should be borne in mind that since practically the whole of our foreign trade is carried in foreign bottoms, a war between any of the maritime nations would result in a paralysis of deep-sea commerce and a temporary extinction of our export trade. On the other hand, if we possessed our own merchant fleet, we could view such a struggle in its effect upon our carrying trade with comparative equanimity.

THE SUPPOSED DANGERS OF ELECTRIC TRACTION.

The letter from Mr. George Westinghouse, which recently appeared in one or two papers, calling attention to certain dangers incident to electric traction, has naturally attracted widespread attention. It has, moreover, aroused a considerable amount of apprehension in view of the fact that electric traction seems destined to become adopted for all forms of railroad travel, short of that now carried on over the long-distance trunk lines of the country. This apprehension, while it is proportionate to the great reputation of Mr. Westinghouse, is out of all proportion to the actual facts of the case, for we feel satisfied that the dangers hinted at are neither so many nor so great as the letter of this distinguished engineer might lead the general public to suppose. Mr. Westinghouse believes that not only would the recent tunnel accident have been as likely to occur had electric traction instead of steam traction been employed, but that in an electrically-operated train the risk of accident would be increased rather than diminished, and this in spite of the fact that no injury from escaping steam would be possible. He suggests that in a train of combustible cars, electrically-equipped throughout, there might be an accident so serious as to start "an agitation having for its purpose the abolition of the use of electricity altogether or at least to compel the railway companies to abandon the use of combustible cars fitted with electric motors."

We are satisfied that Mr. Westinghouse's letter is in danger of conveying a stronger impression than the writer ever intended, and that the object of the letter was to utter a warning against careless and slipshod work in the equipment and operation of electric roads, rather than to condemn the whole system of electric traction as such on the ground of its inherent dangers. This we gather to be the opinion of Mr. L. B. Stillwell, the eminent electrical engineer who is responsible for the equipment of the two most important electrical roads now under construction, namely, the Manhattan Elevated system and the New York Rapid Transit Subway. In the course of an interview by a representative of the SCIENTIFIC AMERICAN with Mr. Stillwell, who may justly be regarded as the leading authority on this subject in the United States, the subject was very thoroughly discussed. His views on Mr. Westinghouse's letter and the safety of electric traction summed up concisely, are as follows: With reasonable care in installation and subsequent systematic inspection, there are fewer risks in the operation of an elevated or underground railway by electricity than with steam. When trolley cars occasionally catch fire, it will be found it is invariably due either to poor wiring, carelessness in placing resistance boxes in contact with unprotected woodwork, or to similar causes. A trolley car, electrically equipped with the same care that is insisted upon in the building of a steam locomotive, would be

almost absolutely safe from accidents of this kind. As to the suggested danger of a fire resulting from collision, Mr. Stillwell affirms that he has never heard of a single instance of such an occurrence in the case of an electrically-propelled car or train. Such a result might follow collision, but the fire risk would be far less than where a steam locomotive was used. For when steam trains collide there are three distinct sources of danger: (1) the momentum of the train, (2) fire from the engine or the oil or gas lamps, (3) danger of scalding from the steam-heating pipes, or directly from the locomotive; whereas in a collision of an electric train, while the momentum may cause wreck and loss of life, the fire risk is greatly reduced, and the steam risk entirely eliminated.

The fire risk is reduced because it is an easy matter to absolutely and instantly cut off the current from the wiring in the wreck by means of automatic circuit-breaking devices of types that have been proved reliable by years of experience. The burning up of an electrical train in a tunnel at Liverpool was apparently due to the use of open or exposed fuses, which would not be used on an up-to-date equipment. With the use of automatic circuit-breakers, located in iron fireproof compartments, or of any of the properly inclosed fuses of which there are several types on the market, the risk of fire is so small as to be practically eliminated.

In the desire to attain constantly increasing speeds of operation, engineers should be governed by a due measure of conservatism, and by every reasonable precaution that can guarantee the safety of the traveling public. In the craze for high speed, engineers are sometimes in danger of losing sight of certain very practical issues in railway operation; but so long as due regard is given to measures of safety which have been proved by long experience in the operation of high-speed railways to be necessary, the conditions of high-speed electric traction are such, and the art of electrical equipment is so well advanced, that this form of travel could be made as safe as, and indeed much safer than, steam railroad travel.

In the case of an electric train wreck, the risk of fire by short-circuiting is not comparable with the risk of fire when a steam locomotive carries nearly a ton of incandescent coals into the splintered wreck of a passenger car. For in the former case the current is almost certain to be automatically cut off before the woodwork can be ignited. Moreover, in the case of the Manhattan Elevated Railroads, the third rail is divided into sections, each of which is supplied through an automatic circuit-breaker in the sub-station. With assurance thus made doubly sure, the chance of ignition of the woodwork after a smash-up is extremely remote. Applying the above considerations to the tunnel accident, while it cannot be assumed that, had the trains been electrically equipped, there would have been no accident, it is perfectly certain that had there been an accident it could not have been due to the inability of the engineer to see the signal because of smoke in the tunnel. Again, the total weight of the Harlem River train, had it been equipped with motors equal in power to the steam locomotive, would have been considerably less, and the momentum as it struck the New Haven train correspondingly smaller. While the forward cars of the Harlem train might have suffered more in the absence of the engine, it is certain that the passengers in the last car of the New Haven train would not have been killed and maimed as they were; for in an electrically-equipped train there would have been no scalding to death of passengers, and no delay in the work of rescue due to the rush of steam that drove the rescue party back and hindered their work. Finally, Mr. Stillwell combats the idea that the fires which occur now and then on trolley cars are due to collision and wreckage. They are traceable to faulty wiring, and they could be practically eliminated by care in mounting the motors and controllers, by the use of the best systems of insulation, and by systematic inspection and testing.

TWO HUNDRED THOUSAND DOLLARS IN PRIZES FOR AIRSHIPS.

It has been fully and finally determined on the part of the officers of the Louisiana Purchase Exposition Company to have a tournament of airships and an aerostatic congress at the World's Fair at St. Louis in 1903. In order to stimulate inventors along this special line of experiment, prizes aggregating \$200,000 will be offered for the most successful contestants. In view of the remarkable results attained by M. Santos-Dumont at Paris last year, when he made a thirty-minute trip around the Eiffel Tower, having his airship under control during the entire journey, the coming tournament is in the line of progress. It is the desire of the officers to achieve better results than those of Santos-Dumont, and for that reason the prize is made a most liberal one.

It was early recognized by officers of the Exposition that the navigation of the air is one of the great problems for scientific solution, and that this Exposition would not fulfill its duty to the world unless it lent

its encouragement and furnished an opportunity for those who are skilled in this difficult science to demonstrate the results of their endeavors. The experiments of M. Santos-Dumont have set the inventors to thinking anew upon this most interesting problem, and the tournament at the coming World's Fair will be one of the most novel in history. A cablegram from London says that Sir Hiram S. Maxim, the American inventor, has expressed himself as willing to expend \$100,000 in addition to the large sums he has already laid out in experiments in aerial navigation to win in the coming contest, if assured that the prize will be as large as announced. In reply to this, President David R. Francis, of the Louisiana Purchase Exposition, is quoted as follows: "Mr. Maxim will receive all the assurance he desires when the committee on aerial experiments has crystallized the plan for the contest. If he abides by the conditions of the competition and invents an airship that will obey the directions of an operator in midair, as well as develop speed, he will be entitled to be adjudged as a real contestant.

"The total sum of \$200,000 has already been set aside by the Executive Committee for the purpose of defraying the expenses of the proposed aerial tournament. Of this sum \$100,000 will constitute the award for the successful operation of a craft in the air, \$50,000 will be devoted to premiums for races between airships, and \$50,000 to defray the expenses of the competition. We have opened correspondence with noted experts in aerial science, and the entire matter of suggestion with reference to the management of the contest will come from that authority."

Secretary Walter B. Stevens of the Exposition Company says: "The recommendation of Director of Exhibits Skiff on the subject of the airship contest has been unqualifiedly indorsed by the entire Executive Committee. Nothing in the way of a suggestion for an exposition feature has received such immediate and strong approval."

The Executive Committee of the Exposition has appointed as a sub-committee in charge of the tournament and congress, Mr. Charles W. Knapp, proprietor of the St. Louis Republic, and Nathan Frank, representing the St. Louis Star. This sub-committee has invited Prof. S. P. Langley, secretary of the Smithsonian Institution, of Washington, D. C., and Octave Chanute, of the Western Society of Engineers, at Chicago, distinguished scientists who have devoted much attention to aerostatics, to visit St. Louis for a conference upon the subject of the aerial tournament and aerostatic congress at the World's Fair. At this conference rules for the event will be determined and a proper division of the \$200,000 will be decided upon. It is also probable that they will recommend for appointment a chief of the aerostatic display.

The announcement that such a liberal sum would be set aside for the encouragement of experiments in aerial navigation has stirred up a very lively interest in the science, and many inquiries have been received by mail and wire at Exposition headquarters. Secretary Stevens reports that it is probable there will be at least one hundred entries representing not less than ten countries.

VERDICT IN NEW YORK CENTRAL TUNNEL WRECK INQUEST.

The Coroner's jury, at the inquest into the deaths of the seventeen victims of the late disaster in the New York Central tunnel returned a verdict to the effect that the collision was due to the failure of the engineer of the Harlem train to stop his locomotive at the danger signal at Fifty-ninth Street, which was properly set. The verdict proceeds to say:

"We further find that the said engineer, John M. Wisker, owing to the heavy atmosphere, due to weather conditions, together with the presence of large bodies of steam and smoke escaping from trains passing on various tracks in said tunnel, obscuring said signal, was unable to locate said danger signal.

"We further find faulty management on the part of the officials of the New York Central and Hudson River Railroad, and we hold said officials responsible for the reason that during the past ten years said officials have been repeatedly warned by their locomotive engineers and other employes of the dangerous condition existing in said tunnel, imperiling the lives of thousands of passengers, and they have failed to remedy said conditions; and also for the reason that certain improvements in the way of both visible and audible signals could have been installed, and this disaster thereby have been avoided, and for the further reason that no regulation of speed at which trains should run in said tunnel has been enforced, thereby allowing engineers to exercise their own discretion."

The export of horses and mules from New Orleans to South Africa from October 1, 1899, to November 30, 1901, shows a total valuation of \$13,483,052. This is exclusive of feed, which amounted in value to \$992,618. The total number of horses and mules shipped is 143,050, of which 75,991 were horses.