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CONGESTION OF TRAFFIC AT THE GRAND CENTRAL STATION AND ITS REMEDY.

It is a remarkable fact that although New York is the second largest city in the world, it has but one railroad terminal station within its boundaries. Except in the unlikely event of the construction of a gigantic bridge across the North River, it is probable that the Grand Central Station at Forty-second Street will continue to be the only great terminal in New York. The enormous volume of traffic which it has to accommodate has for many years proved too much for the capacity of the station yard; and only by resorting to a practice which all railroad men, including the officials at the Grand Central Station themselves, condemn has it been possible to receive, make up and dispatch the large number of local and express trains which use this station. The practice referred to is that of separating the engine from its train as it enters the station, by means of what is known as a "flying switch," in which the engine is cut loose and steams swiftly ahead on to a side track, while the train runs into the station. The element of danger lies in the possibility of the switch being thrown too late, or of the train, which is not under air-brake control, being switched on to the wrong track and colliding with stationary cars. It is to the credit of the station yard management that an admittedly risky practice has been followed for many years with so few accidents.

An attempt is now being made to improve and accelerate the handling of trains in the yard by installing a complete pneumatic switch system and abolishing the flying switch; but the experience of the first three days of operation was so disastrous that a return has been made to the old plan of separating the engine from its train. Almost from the hour in which the new system was inaugurated the yard service was thrown into such disorder that trains, both suburban and express, were detained from one to two hours, either in the station or in the tunnel approach.

The fact that the flying switch is again in force proves to a demonstration that the facilities are altogether inadequate to the ever-increasing number of trains that must be accommodated; and it is evident that some radical change must be made in this terminal or the traffic within the next few years will be thrown into a condition approaching a deadlock. The simplest solution of the difficulty would be to separate the express and local trains, reserving the present station for the former, and accommodating the local trains on a series of loops built on an elevated structure above the present yard. The two outer tracks of the tunnel should be reserved for local trains. Shortly after it leaves the tunnel the incoming track should be carried on an incline to a level at which it would clear the station yard. It should then connect with a series of concentric loops, which would extend around the yard in front of the present train shed, and unite on another incline by which the outgoing local trains would leave the station. Three or four loading and unloading platforms would be provided. As part of this plan, local trains would be made up at such points as New Haven, Stamford, and New Rochelle, and would run through the New York terminal and back to these towns without change of engines. A precedent for this arrangement exists in the great loops beneath the terminal station at South Boston—the main difference being that at Boston the tracks are depressed, whereas at New York they would be elevated.

By providing such an elevated station as this, the congestion would be completely relieved and its recurrence indefinitely removed. The overcrowding of the tracks involved in making up the local trains would be avoided, as these trains would be made up at such points as Stamford and New Rochelle, and would pass through the Grand Central Station intact. There would be no insuperable structural difficulties involved in the erection of the incline and loops suggested. Moreover, it is a change which could be made with the least cost to the companies and with absolutely no discomfort or delay to the traveling public; as the terminal could be run under the present system until the very hour at which the tracks were cut and connections made between the new elevated station and the existing incoming and outgoing local tracks.

PACIFIC COAST SHIP-BUILDING.

The ship-building industry on the Pacific coast for the past three years has enjoyed a period of extraordinary activity. From January, 1898, to September, 1900, thirty-two months, the number of new ships built aggregates seventy-four, with a total tonnage capacity of 37,910. Government vessels are not included in the list. Of the new craft, forty-five, with a tonnage of 14,229, were schooners, five were barkentines of 4,597 tons, one was a barge of 632 tons, and twenty-three were steamers having a tonnage of 18,452. The largest of the schooners rated 985 tons, and of the steamers, 4,597 tons.

Of the latter, three, aggregating 7,298 tons, were built of iron, the others of wood. San Francisco builders were the constructors of the larger number of both iron and wooden ships; but almost every port on the coast, from San Pedro to Puget Sound, wherever the necessary supplies of lumber were to be had, contributed to the total result. Creditable as the exhibit is, the outlook is even more flattering. There is not a shipbuilder along the 2,000 miles of coast who has not all the work contracted for that can possibly be handled, and who could not easily duplicate his present undertakings if the supply of labor warranted it.

The cause of this prosperity is easily explained. For many years prior to 1898 the industry languished, and the carrying trade, which had been stimulated by artificial "booms," was greatly depressed. Dividends on marine property were small. The earnings were swallowed by heavy expenses. Losses by sea were not made good, and the actual number of coast ships considerably decreased.

Just at the time that the maritime prospect seemed darkest, the extraordinary development of Alaska began. It was found that the number of vessels available for this profitable traffic was far below the demand. Every vessel that could be procured was chartered for the Alaska trade. High charters caused many to be withdrawn from the coast carrying trade, and a considerable scarcity of vessels for ordinary requirements began to be felt.

It was thought that the Alaska demand would be but temporary; but the contrary proved to be the case. It continued to increase, and is bound to be permanent. The Cape Nome traffic of the present year withdrew at least a hundred vessels of all sorts from available supplies; and with new discoveries along the Alaska coast, and the location of camps that indicate every sign of permanency, the demand for a greater number of craft than was required in 1900 is undoubted. The charters for 1901 for the carrying trade of the far North already assure this. The increased demand for vessels for the Hawaiian and Philippine trade has greatly depleted the coast fleet, until there is an actual insufficiency of vessels for the ordinary coastwise traffic. The dispersion of a great number of vessels to distant points occurs at a time when the conditions of Pacific ports are more prosperous than for many years, and when trade is remarkably active. Ocean freights have continued to advance until 50 shillings is asked on wheat charters to Liverpool, yet, even at this extraordinary figure, there are but few vessels available. The values of cereals in California, Oregon and Washington are uncommonly depressed, not because foodstuffs are not in demand, but for the reason that transportation cannot be engaged to deliver them.

Except in one instance, the single tonnage capacity of the new ships is not noticeably great; but the general average indicates a gradual increase in size. The steamer "Californian," referred to, an iron ship of 4,597 tons, built for the Hawaiian trade, and now in the Philippines, is the largest vessel of her class ever launched on the Western coast. If we except the steam schooner, a vessel which is said to be of a type peculiar to Pacific Coast waters, the coast vessels do not differ greatly in character from those constructed elsewhere in the United States. The largest schooner ever built was of 600 tons. These vessels are designed for the shallow harbors of the coast, and are, consequently, all of light draught and exceptional beam. Their carrying capacity is great and their seaworthiness uncommonly good. Most of them are fitted for passenger traffic, and have cabins on the upper deck aft, though in some instances the cabins are in the center. They are fitted with compound engines, and have an average speed of ten knots. Being schooner-rigged, they are largely independent of steam propulsion. The type is economical as regards the running expenses, both of crew and motive power.

THE COMPARATIVE EFFICIENCY OF THE KRUPP, ARMSTRONG, AND SCHNEIDER-CANET GUNS.

In determining the relative efficiency of modern guns there are many elements to be taken into consideration, particularly in the case of weapons which are intended for naval service, where velocities are usually much higher than those common in weapons for field service. A comparison of relative efficiency must take note of all ballistic features. As a matter of fact, the methods of designation used are apt to be misleading, for the reason that they make too much of certain elements of efficiency, and too little of others. Thus, we find that, popularly speaking, it has become the fashion to quote the muzzle velocity of a gun in preference to any other of its ballistic capabilities. If the public hears that a gun of a certain caliber is capable of a muzzle velocity of 3.000 feet per second, as against velocities of 2,600 or 2,800 feet per second in other guns of the same caliber, it is apt to consider that the high velocity weapon is incontestably the most effective. This superiority, however, by no means follows; for the mere statement of the muzzle velocity, unaccompanied by any statement of the weight of the shell to which such velocity is imparted, conveys no information as to the actual hitting power of the gun. Then again the relative efficiency may further be modified by a statement of the weight of the gun itself, for it is evident again that if two guns, one of which is considerably lighter than the other, show the same muzzle energy, the lighter gun is ton for ton a much more effective weapon. A further modification is introduced when the question of the "remaining velocity and energy" is introduced; for although a light projectile, issuing from the muzzle of a gun at an extremely high velocity, may have the same muzzle energy as a heavier projectile with a lower muzzle velocity, the lighter projectile will lose its velocity far more rapidly as the range is covered, and what is known as the "remaining velocity and energy" of the heavier shell will be relatively greater, the greater the distance that is covered. It is mainly for this reason that many of our naval officers regret to see the 13-inch guns displaced by the 12-inch, the hitting power of the 13-inch shell at long ranges being considerably greater than that of the lighter 12-inch shell.

In determining upon the armament of their navy, the Germans have evidently been governed by this consideration; for it is a fact that the Krupp guns, with which their ships are armed, fire projectiles which are considerably heavier for any given size of gun than those used in any other navy. Although the muzzle velocities given in the ballistic tables of these guns are not so high as those of other nations, the muzzle energies are greater and the "remaining energies" are in some cases enormously so. Just how great is this difference is shown in an article which we publish in the current issue of the SUPPLEMENT, which contains a series of graphical comparisons of the relative ballistic energies of the Krupp guns and those of the great firms of Armstrong and Schneider-Canet.

Thus, in comparing the velocities and energies of the Krupp 9½-inch gun with the Armstrong weapon of the same caliber, we find that, although the muzzle velocity of the Armstrong projectile is 762 meters per second, as against 729 meters per second for the Krupp gun, at 1,750 meters from the muzzle the velocities are equal, and at 5,000 meters the Krupp has a remaining velocity of 491 meters, as against a remaining velocity for the Armstrong shell of only 448 meters per second. The loss of velocity is due to the fact that the Armstrong projectile, weighing only 159·7 kilogrammes, as against 218 kilogrammes for the Krupp projectile, is more influenced by the resistance of the air, and therefore loses its velocity more quickly. Although the velocity of the Armstrong weapon is 33 meters greater than that of the Krupp gun, its muzzle energy is 1,098 meter-tons smaller, and at a range of 5,000 meters its energy is still 1,012 meter-tons less. Judging the two guns on the basis of the amount of energy developed per kilogramme of weight of gun, we find that at the muzzle it is for the Armstrong 176·8 meter-kilogrammes per kilogramme of weight of gun, and that in the Krupp weapon it is 214·4 meter-kilogrammes per kilogramme of the weight of the gun.

Comparing the guns on the basis of their armor-piercing ability, it is shown that while the Krupp 9½-inch rapid-fire gun can perforate 30 centimeters of Harveyized armor up to 3,100 meters range, an Armstrong gun of the same caliber, in spite of its greater velocity, can do this only up to 1,250 meters. Harveyized armor 25 centimeters thick is perforated by the Krupp gun up to 4,500 meters, by the Armstrong gun only up to 2,400 meters, while the Schneider-Canet 9½ inch gun cannot perforate that thickness at a range of over 2 000 meters.

Although a strong case is made out for the superiority of the Krupp guns along the lines referred to, there is one drawback to the use of the heavier projectiles which must not be lost sight of. We refer to the fact that the greater weight of the shell will reduce the total number of rounds that can be carried for each gun; a consideration which is of importance where every ton of the displacement of a ship is valuable when it comes to the question of distribution among the contending claims of armor, engines, stores, and ammunition. Furthermore, the increased weight must tell somewhat against the rapidity of handling; and if the ammunition is to be handled at the same speed, it becomes necessary to install heavier machinery for operating the hoists.