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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

## THE NORTH RIVER BRIDGE BILL.

The storm of opposition, which has been aroused in New York by the passage of the North River bridge bill by the New York Legislature, is directed not against the bridge itself, nor even against the proposed elevated structure from Fifty-ninth Street to the Battery; for the erection of the bridge has come to be regarded as a necessity, and the extension of the bridge tracks along the Hudson River waterfront is admitted to be the necessary concomitant of the bridge itself. The present violent opposition is based upon the fact that, in giving to a private corporation the right to build an elevated structure along five miles of the city's waterfront, on the payment of a merely nominal consideration, the Legislature is practically handing over to private individuals property which, in the estimate of ex-Mayor Hewitt and the present Comptroller of the city, may easily prove to be worth from sixty to a hundred million dollars.

The North River Bridge should be built, and if private capital wishes to undertake such a gigantic scheme, it should be encouraged by all proper legislative assistance. To render the bridge effective, its tracks should certainly extend south from Fifty-ninth Street throughout the full length of the city's waterfront. But that any private corporation should be allowed to secure such a practical monopoly of ocean and river traffic as would result from the carrying out of the present bill, is not to be thought of for a moment. The present city government, the leading commercial bodies of the city, and the most prominent of its present and past officials, are unanimous in condemnation of the extraordinary audacity displayed in the present bill. If a franchise for the construction of the West Street line is to be granted, it should only be done subject to such conditions as are suggested by ex-Mayor Hewitt, namely, a rental equal to the interest, with a contribution to the sinking fund for the repurchase of the property within fifty years, and with the power of resumption by the city at any time during that period by paying the amount actually spent on the work plus a reasonable percentage. We are inclined to think, however, that in view of its enormous and ever-appreciating value, a railway of this kind giving access to all the docks, would develop such a vast earning capacity that the city could not do better than undertake the construction and ownership itself. The company that owned the combined bridge and approach would absolutely control the shipping situation in New York, and there would always be the temptation to operate the system on the vicious principle of charging up to the limit of what the traffic would bear, thereby sacrificing the interests of the city as a shipping point to those of the shareholders of the company.

From an engineering point of view the scheme is entirely feasible. Looked at from the standpoint of operation, moreover, there is everything to be said in its favor. The proposed bridge will have a capacity of six or eight main-line railroad tracks, and it will doubtless be capable of accommodating all the traffic from the West which now finds a terminus in Jersey City. Freight could be carried from any western shipping point, direct across the Hudson River, down the West Street elevated structure, and switched off, if need be, on to the steamer pier at which it was to be unloaded—an ideal traffic arrangement, and one to which New York city is bound ultimately to come, if it is to maintain its position as the chief shipping point on the Atlantic coast.

It is sincerely to be hoped that after Governor Odell has heard the committees from New York which are opposed to the bill and has looked at all the bearings of this momentous question, he will veto the measure and leave it for the bridge company and the city authorities to make an equitable arrangement which will be mutually profitable.

## RE-ROLLING OLD STEEL RAILS.

During the past five years, there has been developed a method of utilizing old steel rails which bids fair to become an important factor in the steel industry. When steel rails were first introduced, the question arose as to what disposition could be made of them when they had been so far worn out as to be unfit for further service, and it was not until the introduction of open-hearth furnaces that it became possible to cut up the old rails and remelt them with pig iron and scrap from the stockyard.

About ten years ago Mr. W. E. McKenna, one of the officials of the Chicago, Milwaukee and St. Paul Railroad, turned his attention to the problem of utilizing these worn-down and defaced rails by re-rolling them to a size somewhat smaller than the original section. After considerable experimental work, the first of which was done in 1895, it was determined in 1897 to erect a plant for the special purpose of re-rolling old rails. The first plant was erected at Joliet, Ill., and in 1898 a second plant was built at Kansas City, Mo. At the present time over a thousand miles of track have been relaid with rails that have been passed through the re-rolling mills, a total of nearly one hundred thousand tons having been thus treated by the new system.

The wear upon the rails is, of course, chiefly on the top and inside of the head of the rail. In the process of re-rolling, the rails are very slightly reduced in the webs and flanges, while the contour of the head is restored to a symmetrical, though somewhat smaller section. Briefly stated, the process consists in first passing the rail beneath a set of grinders, which take off the slivers and rough edges from the head, then heating them in a special furnace to a temperature of 1,700 degrees, and rolling them down to the desired section, the rails passing out of the finishing rolls at a temperature of 1,480 degrees. The rails are then sawed to proper length, straightened, and the holes drilled for the angle bars.

The thorough working over of the metal at such a comparatively low temperature serves to improve its quality, not chemically, of course, but by virtue of the density and toughness which result from a thorough working over of steel and iron. The reduction of the section of the rail produces a corresponding elongation, a 30-foot rail being increased by 1 to 2 feet in length for a reduction of cross section of 8 per cent. The value of this system is obvious, particularly in view of the fact that theoretically the oftener a rail is re-rolled the better its quality. Since many of the great railroad systems use as many as three or four different weights of rail, according to the character of the traffic in different localities, it is evident that re-rolling will result in considerable economy, worn rails of a section being simply sent to the mills and rolled down to a section suitable to other divisions of the road.

## NITRO-CELLULOSE VS. NITRO-GLYCERINE SMOKELESS POWDERS.

The facts brought out in an article by Lieut. A. T. Dawson, late of the Royal Navy, in a paper read before the English Society of Arts regarding the behavior of the British smokeless powder, cordite, are a decided indorsement of the wisdom of the Naval Ordnance Bureau in directing its attention to the development of pure nitro-cellulose, or all-gun-cotton, smokeless powder. Nitro-glycerine, on account of its great explosive energy, is an attractive ingredient in the manufacture of smokeless powder; but it has the great defect that the temperature of explosion is abnormally high and that the erosion of the interior surface of the gun is proportionately increased. The South African campaign has afforded an excellent opportunity to judge of the amount of this deterioration, and it is a fact that many field pieces in the Transvaal have been returned badly eroded, and that several of the 4.7-inch guns supplied from the navy were in constant need of replacing, the wear and tear of service having completely spoiled the shooting qualities. Variations of 400 yards in the range have been experienced with guns that had been some time in service and were badly eroded.

These results may be compared with those mentioned in the last report of Rear-Admiral O'Neil, in which it is stated that tests carried out by the Bureau of Ordnance with the navy nitro-cellulose powder prove that there is practically no erosion whatever, a 4-inch rapid-fire gun at the Indian Head Proving Ground having been fired 661 times, and a 5-inch gun 636 times, without causing any wear that could be detected by micrometer measurement.

Some of the nitro-cellulose powders used on the Continent have given ballistic results which entirely disprove the oft-repeated assertion that, weight for weight, cordite possesses much greater power than any nitro-cellulose compound. In a recent trial of a 45-caliber 6-inch gun, a charge of 28.6 pounds of cordite gave a velocity of 2,873 foot-seconds, while 36 pounds of Rottweil nitro-cellulose powder gave 2,910 foot-seconds. The corresponding energy for 2,910 foot-sec-

onds is 5,872 foot-tons, whereas the velocity developed by the same gun in service, using cordite, is only 2,539 foot-seconds, equivalent to 4,438 foot-tons, or 32 per cent less energy. A further advantage of high velocity is the increased danger space, which in a 6-inch gun with 3,000 foot-seconds is 465 yards as against 226 yards in the case of the service 6-inch guns using cordite.

## THE SMITHSONIAN REPORT.

Dr. S. P. Langley's report of the Smithsonian Institution for the year ending December 30, 1900, deals with the Institution proper, the United States National Museum, the Bureau of American Ethnology, the International Exchanges, the National Zoological Park and the Astrophysical Observatory. The total permanent fund now amounts to \$912,000, and is deposited in the Treasury of the United States and bears interest at six per cent per annum, the interest alone being used in carrying out the aims of the Institution.

Congress charged the Institution during the fiscal year 1900 with the disbursement of \$397,540, of which the National Museum received the greater part, although the grants of \$75,000 to the National Zoological Park and \$50,000 to the Bureau of American Ethnology may be regarded as a very satisfactory disposal of public funds. Appropriations made by Congress for the fiscal year 1901 were \$428,540. The Institution has continued research work in various fields of science, including experiments in the solution of the problem of mechanical flight, and, through its Astrophysical Observatory, investigation on the solar spectrum. The Institution has made some interesting experiments during the year on "radio-active substances." The different branches of research now progressing under grants from the Hodgkins fund are making satisfactory advances. The income of the Hodgkins fund is devoted to investigations of the properties of atmospheric air. In accordance with the urgent desire of many of the leading biologists of the country a contract for a table in the Naples Zoological Station for a third term was entered into, and the appointments to the seats were at once approved. While it has never been possible for the Institution to devote a large amount of its income to carrying on explorations, it has, nevertheless, been able to promote such work in various ways, particularly in connection with the bureaus of the Institution and in co-operation with the executive departments of the government. These explorations have a very wide range, and are productive of a very great increase in the knowledge of natural history of the region visited, and of the ethnological conditions of the people. During the past year the Institution has thus been more or less directly concerned in explorations in various parts of the world, from the Arctic regions as far south as Patagonia, and in the distant possessions in the Philippines, as well as in South Africa.

Through the publications of the Institution and its bureaus much is done each year in carrying out its fundamental object, which is the "diffusing of knowledge." Works covering practically every branch of the human industries have been distributed throughout the world to librarians and institutions where they may best be available to scholars and to the reading public. The number of volumes, parts of volumes, pamphlets and charts given to the library has aggregated 25,701, and now only completed volumes are entered in the accession book. The secretary notes with regret the failure of Congress to make an appropriation to send a representative to the conference on the International Catalogue of Scientific Literature held in London.

Dr. Langley states that he is fitting up in the southern tower of the Smithsonian building a small room which is to be called the "Children's Room." The little group of specimens which it contains is meant to stimulate interest and imagination rather than to ostensibly instruct. Latin is banished from its labels, and the classification is not that of science but that which is most intelligible to the untrained minds. This room will, without doubt, prove very attractive to children and will probably be taken as a model the same as is the Children's Museum of the Brooklyn Institute, which we have illustrated.

The correspondence of the Institution embraces letters having reference not only to the scope and work of the Institution, but also relating to the bureaus placed by Congress under its direction. A part of \$300,000 appropriated for a government exhibit at the Pan-American Exposition has been apportioned to the Smithsonian Institution and its bureaus. The collection will chiefly consist of specimens illustrative of its scientific functions and more especially of the National Museum and Bureau of Ethnology.

Robert Ridgway, Curator of Ornithology in the National Museum, published, a number of years ago for the use of the naturalist, a handbook on color, and he requested a grant from the Institution for a new edition. It appeared to the secretary that a work upon a more extended scale and a somewhat different plan would be of value, primarily to the naturalist,