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WORK OF THE LIFE SAVING STATIONS.

The record of the government Life Saving Service for the past year has been exceedinglygratifying. The number of disasters has been greater than in any previous year in the history of the present system. Superintendent Kimball, of the Service, states that 380 vessels in distress have received help. The total number of passengers on these vessels was 4,054, of whom 3,993 have been saved and but 61 of whom have been lost. The shipwrecked persons to receive shelter at the various stations along the coast number 658, and some 83 lives have been saved among those who have fallen from wharves or bridges. The value of the vessels and cargoes in distress is estimated at $10,000,000, and of this amount $7,688,000 have been saved. The cost of maintaining the system for the year has been $1,250,000, and the work has been considerably improved and extended.

AN INTERNATIONAL POSTAGE STAMP.

The German government is about to place a proposition before European countries relative to the issue of an international postage stamp. It is believed that such a stamp would be a boon to all who carry on any foreign correspondence. At present, if any one wishes information from a foreign country, he is unable to send a postage stamp for the reply, since no country will receive a foreign stamp as postage on an outgoing letter. One is therefore compelled to depend upon his correspondent's generosity to pay the return postage. The United States consuls in Europe, for example, are in receipt of thousands of letters of inquiry every year, not one of which contains postage for the reply. The German minister of posts has designed such an international stamp and has arranged a plan for its adoption. The stamp will contain the names of all the countries in which its value as postage is recognized, together with a table giving its value in the money of each of these countries. It is thought that only certain European countries will adopt this system, but it is to be hoped the United States will enter the agreement.

GOVERNMENT CONTROL OF RAILROADS.

The recent report of the Interstate Commerce Commission furnishes some very interesting data concerning the economic side of placing railroads under government control. According to these statistics, such management by the government has not in the majority of cases been found successful. At present there are in all 18 countries partly owning and operating the railroads of their countries. The most important of these are France, Germany, Russia, Australia, Japan, Norway and Sweden. In these countries the government fixes the tariff on all traffic, has power to revise these rates at will, and is compelled by law to reduce the rates when the earnings exceed a prescribed percentage. In the majority of cases this percentage does not exceed 15 per cent. The result of this system may be seen in part by the following significant figures. The cost of transporting freight in Great Britain is 2·8 cents per ton per mile, in France 2·2, in Germany 1·64, and in the United States 1 cent. In the case of the interest paid on the capital invested, however, England pays 4·1 per cent, France 3·8 per cent, Germany 5·1 per cent, Russia 5·3 per cent, Austria 1 per cent, Belgium 4·6 per cent and the United States 3·1 per cent. The advantage, it will be seen, is in favor of private rather than of government control. Several States, including Pennsylvania, Michigan, Indiana, Massachusetts, and others, have attempted to manage their railroads, but in every case without financial success.

CAST AND WROUGHT IRON FOR FRAME WORK OF BUILDINGS.

A trite definition of the age we live in describes it as the age of steel. Only a few years have elapsed since the production of steel was a very roundabout process, involving the long heating in a cementation furnace of wrought iron bars with nitrogenous organic matter. The wrought iron was generally produced from pig iron by the puddling process. When the steel bars were taken from the cementation furnace they had to be reforged, and if a perfectly uniform product was desired, the steel was melted in a crucible.

The inventions of Bessemer and Siemens have changed the aspect of the case. Now cast iron in quantities of five to twelve tons in the Bessemer converter is converted into steel in a few minutes. In the Siemens furnace steel is produced by melting down on the open hearth many tons of metal at once. In either process, the percentage of carbon can be regulated with great accuracy, and, notwithstanding the fact that pure iron is one of the most difficult substances to melt, either process can deliver melted steel of so low a carbon percentage as to be practically iron. The melting is so thorough that the metal flows like water.

The civil engineer and architect in times past executed their work with the most brittle of substances. If the foundation of a brick or stone building settle ever so little, one or more cracks make their appearance, unless, of course, the settling is absolutely uniform over the entire area. The best cement and toughest building stone and brick in a building are subjected to such strains that their tensile strength is but a secondary element. Briquettes of cement are tested for resistance to tensile strain, while the materials which the cement is to bind together are tested usually for compressive strength. But in the completed structure, if any irregular strain of sufficient intensity comes into existence, brick, stone and cement crack and break before a distortion of a fraction of an inch in extent is produced.

When constructors had presented for their use a material lead-like in its toughness, one which could be made to stretch and draw out of shape like iron in the blacksmith's forge, and which possessed also an enormous initial resistance to such deformation, a difficulty as old as their own art was removed. It is no wonder that within the last few years stone and brick have been given a semi-retirement, and that soft steel has been substituted for them in bridge work, and more recently in city buildings. The resistance of steel to all strains is enormously greater than is that of masonry, and if steel does yield to unforeseen strains, there is at least an impression that it will bend through a considerable arc before it will break. Engineers accordingly, perhaps over-appreciative of toughness and ductility, call for what is practically wrought iron in their specifications. The tall office buildings which have been and are being erected in the large cities of this country are made of this soft steel, as regards their frame. Their stone, brick or terra cotta fronts and walls are but sheathing; the building depends for its support upon a metallic frame.

No substance is more strikingly affected by the presence of small quantities of other elements combined with it than is iron. Without carbon it is ductile and malleable to a considerable extent, even when cold, and may be heated and suddenly or gradually cooled without any noticeable effect. But with a few tenths of a per cent of carbon combined with it, the material becomes far less ductile, and can, by heating followed by sudden cooling, be made brittle like glass. When the carbon reaches a proportion of two per cent the metal becomes cast iron, which is always brittle and rigid, and which by chilling from the fluid state becomes excessively hard and easily broken. Thus within the range of two per cent of carbon widely different products result.

The fashionable product for the use of the civil engineer of the day is virtually wrought iron, and now the impression is growing that too much faith has been placed in it. The tendency to use it is a species of reaction from the old days of brittle materials. Like many other reactions it has probably gone too far. The presence of carbon in iron does more than we have described above. It not only affects the resistance of iron to strains, but it affects its resistance to corrosion and oxidation. Soft iron acted on by the atmosphere in the presence of moisture oxidizes. The carbon dioxide of the air is probably an active element in the operation. Cast iron, on the other hand, resists oxidation almost like stone or brick. It is inferior in tensile strength to modern structural steel, and if it is subjected to a distorting strain it breaks before it bends to any extent. But it is strong enough for almost all purposes. No one supposes that the steel members of a building are to bend and twist, or even to be subjected to strains which cast iron would not perfectly resist.

This question has recently been presented to the architectural profession: Are we not going too far in using so corrodible a material as soft steel for the frame work of buildings?

A complaint or criticism which finds fault without the suggestion of a remedy is of little value. But this criticism, coming from one of the leading architects of the country, is not of this character. Our iron founders can supply cast iron which will be just as good for compression members as is steel, and which will never corrode. By bottom casting if necessary, and by rigid tests of each piece, cast iron cantilevers and columns of absolutely certain quality can be produced. The recent extensive introduction of steel castings indicates the practicability of supplying castings of comparatively low percentage of carbon, with enough carbon to make the material not corrosive, yet not so much as to make it too brittle.

It appears as if the recent rejection of cast iron as a building material has gone too far—already the signs of its new growth in favor are apparent. It would seem that in the production of special castings for tall buildings, castings of proper carbon percentage, and made by proper foundry processes, much valuable work could be done by our foundrymen and engineers. It cannot be considered an attractive practice to make the integrity of a twenty-storied building depend upon paint for protecting its frame from corrosion and ultimate destruction.

There is another point to be remembered. The integrity of a "steel cage" building frame depends on riveted joints. The rivets of these joints under strain may be expected to shear off long before the iron