SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO. - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year, for the United States or Mexico.....$3.00
One copy, one year, for Canada..... 3.75
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THE SCIENTIFIC AMERICAN PUBLICATIONS

Scientific American (Established 1845) .....$3.00 a year
Scientific American Supplement (Established 1876)..... 5.00 "
American Homes and Gardens..... 3.00 "
Scientific American Export Edition (Established 1878)..... 3.00 "
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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JUNE 22, 1907.

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.

HOW THE LAW MAY PREVENT RAILROAD ACCIDENTS.

The president of one of our leading railroads, who has risen to his present position by steady advancement from the ranks, recently told the writer that in a last analysis of the causes of railroad accidents he was convinced, as the result of his long experience, that it was to be found in the lack of discipline; the disposition to play fast and loose with established rules. In proof of this, he cited the fact that as the result of a journey which he had recently taken through Europe, during which he investigated the signal systems on several of the roads which have shown a remarkable immunity from accident, he was surprised to find in how many cases these systems were inferior to those which were installed on some of the leading American railroads, including his own. And yet, in spite of superior protective appliances, the list of casualties was much larger on our roads in proportion to the number of passengers carried. The question of the enforcement of discipline by the strict imposition of penalties was rendered difficult, according to this authority, by the action of the various labor associations which, in their zeal to protect employees (a zeal perfectly proper when exercised with due discretion), too often demanded the reinstatement of those who had been proved guilty of flagrant disobedience to established rules. Moreover, it would happen, in cases in which the management was prepared to fight out a contested case on a point of principle, that an intimation would be quietly conveyed from Wall Street, to the effect that under no conditions was a strike to be precipitated, at least for the time being.

Without entering into the merits of the case as thus presented, it is certain that such a condition of things is full of frightful menace to the safety of the traveling public; and the question may well be asked, whether some higher power may not be invoked to deal with the situation. Such an opportunity is, of course, presented when accidents involving the death and injury of the passengers or employees occur; and a case has recently been brought to our notice in which the criminal negligence of an employee was visited with immediate and severe punishment, and steps were taken to prosecute the company for operating their railroad under laws which, by rendering such an accident possible, were a constant menace to the safety of the public.

The case in question was a head-on collision which occurred last year on the Grand Trunk Railroad. The coroner's jury found the engineer and the conductor of the train, who had overlooked the train with which it had collided, responsible for the accident, and in the subsequent trial the defendants were charged with the death of the employees who were killed, and also with violating the rules of the company. The jury found them guilty on the second count. The judge threw aside the plea that the conductor had worked overtime, and sentenced him to three years' imprisonment. In imposing sentence he said that, if the accident were the fault of the rules and regulations of the railway company, then terrible was the guilt of those responsible for such rules and regulations. "Much of the slaughter, however," said the judge, "is due to the sheer neglect and downright and inexcusable carelessness of those who are intrusted with the carrying out of these rules and regulations; and if you and your fellow trainmen had used even ordinary care, the three men now lying in the grave as the result of your act might now be happy and useful citizens." It was shown that the conductor had been working from nineteen to twenty hours a day, for which he received about forty dollars a week; but that these long hours of work were optional, and that he was entitled, under the rules, to a rest of eight hours.

Referring, on the other hand, to the responsibility of the railroad company, the judge said: "To my mind, the persons who even permitted you to work from nineteen to twenty hours a day, day after day, five days of the week, were guilty of a gross wrong; the persons who made the rules and regulations under which this was possible are themselves almost as guilty, morally, perhaps legally, as yourself in the death of these three victims. I shall cause to be sent to the Crown authorities a copy of the proceedings of this trial, with the recommendation that all proper investigations be made, and that the persons responsible, no matter what their position may be, be proceeded against so far as the criminal law permits."

Although the penalty inflicted in the present case may seem to have been severe, it cannot be denied that one of the most effective "safety appliances" for the prevention of the unnecessary and shocking list of railroad fatalities and casualties, could be found in the swift and impartial action of the law, in every case where the death or injury of passengers or employees can be shown to be the result of faulty regulations on the part of the companies, or of inexcusable carelessness on the part of the employees.

WE BUILD A LOCOMOTIVE ON THE METRIC SYSTEM.

The opponents of the introduction of the metric system into America have asserted that its use would involve endless confusion in our mills, machine shops, and other industrial establishments in which the operatives have been accustomed all their lives to the use of the English measurements. It has been claimed that the change would so thoroughly disorganize the working forces, that it would involve many months of time, and a great loss of money, to get any establishments that made the change into the full swing of the new conditions.

The Baldwin Locomotive Works, however, has proved that in this case, at least, "an ounce of fact is worth a ton of theory"; for they have recently completed twenty locomotives for the Paris-Orleans Railway of France, which were built entirely from drawings made on the metric system and furnished by the railway company themselves. Of course, this is not the first time that work has been done in this country under the metric system of measurement and computation; but the successful execution of such a large order must certainly be regarded as a strong indorsement of the system as tried under American shop conditions. We are informed that not only have the locomotives fulfilled strictly the requirements of the specifications, but that the officers of the company were favorably impressed with the working of the new system.

BRUNEL AND THE SEVEN-FOOT GAGE.

When that far-sighted engineer Brunel built the Great Western Railway in England with a gage of seven feet, he aroused a storm of opposition among his brother engineers, the great George Stephenson being one of his most active opponents. Stephenson, for no better reason, apparently, than that it was the established English wagon gage, adopted 4 feet 8½ inches as the distance between the inside edges of the rails of his "narrow gage" railroads. Brunel, on the other hand, possessed as he was of what almost might be called a prophetic instinct, built for the future, whether he was engaged on the problem of transportation by sea or by land. His "Great Eastern" steamship was not exceeded in dimensions until the advent a few years ago of the White Star liner "Oceanic," and his 7-foot gage on the Great Western Railway maintained itself for half a century, giving most excellent results, in spite of the fact that the "battle of the gages" had been won by Stephenson with his narrow-gage roads, almost at the very outset.

The vindication of Brunel's foresight has been complete. If we take half a dozen of the latest of the transatlantic liners, we find that they are approximately of the same size, if not larger than, the "Great Eastern," while it was only the other day that the most prominent railroad magnate in this country stated publicly that the 4 foot 8½ inch gage was too narrow for present requirements, and that a broad gage of 6 or 7 feet must ultimately be adopted. This statement was prompted by consideration of the fact that many of the main lines of this country are heavily congested, and are unable to handle promptly the enormous and ever-increasing amount of freight that is delivered to them.

It is a fact that, were it not for the enormous expense which would be entailed in the widening of the gage of our leading roads, seven feet would be an immediate solution of the difficulty of congestion; for with the wider gage it would be possible, without making any increase in the number of train movements, to increase the carrying capacity of the roads fully fifty per cent. It is the narrowness of the present gage which limits the size and power of the locomotive; for the dimensions of boiler and cylinders have been increased until they have reached the limits of the height and width of tunnels and bridges. With an increase of width of gage of fifty per cent, and a corresponding increase in the allowable height of locomotives and cars, it would be possible to build locomotives of more than double the power of the largest at present in use. This change, however, would involve the rebuilding of every tunnel, viaduct, bridge, and station platform throughout the whole length of the line so changed. Moreover, the enormous increase in the axle loads would necessitate the construction of an entirely different type of track from that which is now used—which, by the way, would be "a consummation devoutly to be wished." The present cross-tie, tee-rail, and spike method of track building is pitifully inadequate, even for present conditions; and if a 7-foot gage were used, some new form of track, with continuous longitudinal girders and heavy rail sections, would have to be built. In this connection it is interesting to note that Brunel adopted a longitudinally-supported track for his Great Western road. Though the change may not come in the present generation, the day is undoubtedly approaching when the engineers of the future will widen the gage, being driven to it by the stress of stern necessity.

ANOTHER LONG-DISTANCE TRANSMISSION IN CALIFORNIA.

The State of California has won another recognition of the enterprise which she has shown in overcoming the difficulty of the scarcity and high cost of fuel by utilizing the energy which is stored in the waters of the far-distant Sierra Nevada Mountains. At the beginning of the present century, as shown by the United States Census, she led the world in the number and daring of her long-distance hydro-electric transmissions. Notable among these is the plant by which, for several years, San Francisco has been supplied with electric power transmitted from water sources situated over 200 miles away from the city.

The most recent addition to these systems consists of the transmission of 25,000 horse-power for a distance of 117 miles, from the Kern River to the city of Los Angeles, at the extremely high pressure of 85,000 volts. This is the first installment of a total transmission of 60,000 horse-power, which is ultimately to be developed from that river and transmitted to Los Angeles. The water is deflected from the river and carried through the mountains and hills for a distance of 8 2-3 miles by means of twenty concrete-lined tunnels. It is then conducted down the slope of the mountain, through a total fall of 877 feet, to the power house, where, at a pressure of 400 pounds to the square inch, its energy is developed on eight impulse wheels, which serve to drive the generators. It is stated by the local president of the Edison Electric Company, which is carrying on the work, that there is no other community in the country in which the consumption of electricity per capita is so high as in Los Angeles, and that, with the exception of certain districts in the natural gas belt of the Middle West, there is no locality where the rates for power are cheaper. As showing the economy which is rendered possible by the great fall available in these mountain power plants, it may be mentioned that the conduit for conveying the water measures only 9 feet in height by 8 feet in breadth, and that the maximum interior diameter of the concrete-incased steel tube from the tunnel to the power station below is only seven and a half feet.

TINOL.

A new method of soldering has been brought out by a German company at Bonn which is claimed to be much superior to the present way of soldering with tin. Seeing that the quality of the joint depends largely upon the way in which the surfaces have been cleaned, great care must be given to this operation, and this is not always easy in the case of complicated pieces. Cleaning is usually done by acids, zinc chloride, sal ammoniac, etc., which have an acid reaction and leave traces of oxidation after the soldering. This may be a disadvantage, and in fact for electrical work the method of soldering by rosin must be used in many cases, in spite of the drawbacks which it has. As to the new solder, it is in the form of a paste which is more or less consistent, according to the needs. It contains the cleaning substance in itself and the soldering can be done without any previous cleaning. The paste is spread upon the metal surfaces and these are heated with the iron or by a lamp or furnace. For small pieces a candle flame is even enough. The substance is composed of lead and tin in fine powder, which is obtained by a patented process. A stream of metal coming from a nozzle is pulverized by compressed air or steam. The powder is then mixed with chloride of zinc or other similar reducing substances which are made fluid by adding glycerine, vaseline, etc. Consistence is given the paste by using cellulose, which burns without residue. These components are chosen so that when the paste is heated the metal melts first and appears as liquid drops in the midst of the medium and the latter is not altered, also protecting the metal from oxidation. Then these bodies decompose in turn, cleaning the metal and al-