The Race Across the Atlantic.

In a recent number of the *Scottish Review*, Professor Henry Dyer gave an interesting article on the race across the Atlantic, in which, says *Industries*, he traces the development of steamships and their machinery, and gives figures to show the increase in speed and efficiency. After a preliminary notice of some of the earlier attempts at steam navigation, Professor Dyer devotes a little space to clearing the reputation of Dr. Lardner of some of the charges which are sometimes brought against him in connection with ocean navigation by steamships, and he expresses the opinion that, while Dr. Lardner may have erred in the way of overcaution, and have failed to estimate the possibilities both of engines and ships, as he based his calculations on a coal consumption of 12 pounds per indicated horse power per hour, with a speed of 8 knots, he does not deserve to be held up to ridicule, as he generally is when his name is mentioned in connection with the early attempts at transatlantic navigation.

The development of the marine engine forms an interesting study, both from a theoretical and a practical point of view. The effects of the increase of the pressure of the steam, the action of the steam jacket and of multiple cylinders, and the present position of practice are all traced by Professor Dyer, and they, combined, show the great improvements which have taken place. These are roughly indicated by the amount of coal consumed per indicated horse power per hour. Until about 1830 the boiler pressure seldom exceeded 3 pounds on the square inch above that of the atmosphere. From that date a gradual increase took place, and in 1845 the average was about 10 pounds per square inch. By 1850 it had reached 15 pounds. In 1856, Randolph, Elder & Co. employed pressures of 30 pounds in their compound engines, but it was not till almost ten years later that such pressures became general in the merchant service. On the compound engine becoming common, pressures suddenly rose to 60 pounds, and in some cases to 80 pounds and 100 pounds per square inch, and now for triple-expansion engines the average is over 150 pounds, while for quadruple-expansion engines it is 200 pounds per square inch. With regard to coal consumption, the earliest marine engines must have used very nearly 10 pounds per indicated horse power per hour. In the well known side lever engines it was about 7 pounds, while for engines in use before the general introduction of the compound type 4 pounds to 4½ pounds was the average. Randolph, Elder & Co., with their compound engines, had an average of from 2½ pounds to 3 pounds. In 1872, when the compound engine had been in use for some years, the average was found to be 2·11 pounds, being a saving of nearly 50 per cent over the ordinary engines, while in 1881 there was a reduction to 1·828 pounds, or a further saving of 13·37 per cent. With triple and quadruple expansion engines there has been a still further reduction of about 25 per cent, the consumption in some of those engines being as low as 1½ pounds or 1¼ pounds per indicated horse per hour.

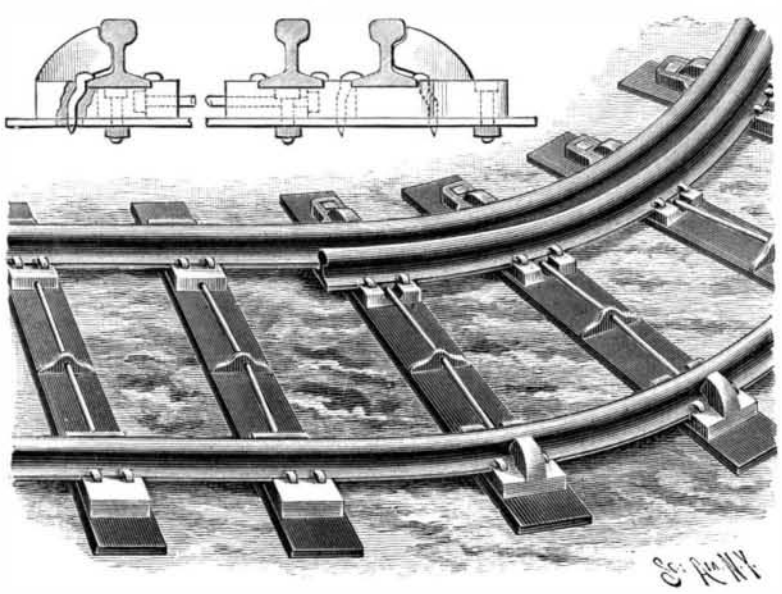
Professor Dyer traces the development of the size of steamships from the Great Western up to the present date. He gives figures to show the best runs during that period, and these are brought down to the recent ones of the Teutonic and Majestic. The latest development of the Atlantic race shows a close approximation between the best steamers of the White Star, the Inman, and the Cunard lines, there being only a difference of a few hours in favor of the order in which their names are given, the fastest passages of each varying from 5 days 16 hours 31 minutes to 6 days 2 hours 31 minutes. The Cunard line is thus temporarily a little behind in the race, but a company which has shown such spirit in the past is not likely to give up the contest. Two new steamers, each 600 feet in length, have been ordered, and it is stated that their guaranteed speed is to be 22 knots on the measured mile and 21 knots at sea. This latter speed will enable the passage across the Atlantic to be accomplished in about 5 days 10 hours.

Professor Dyer is of opinion that, as progress has been made by slow and steady steps, this is likely to continue unless we have a complete change in the type of ships, of engines, and of boilers. So far as can be seen at present, the shape of steam vessels is not likely to be materially altered, as it is substantially the same as that of the Viking's craft of more than a thousand years ago, and seems to conform to the arrangements of nature, with regard to fishes, as nearly as the materials at our disposal will admit. It must be remembered that increased speed is not simply a question of more power relatively to displacement, but that each shape of vessel has a speed to which it is specially adapted, and that any attempt to drive it beyond that speed would lead to a great expenditure of power with little useful result, as the energy would be chiefly expended in raising waves. If anything like the present speeds had been attempted with vessels of the size which were common on the Atlantic thirty or forty years ago, the size of engines required, and the extra expenses involved, would have reduced the earning power of the ships very much, and possibly in many cases made it disappear.

The future development of steamships, however, depends on conditions about which it is impossible to say anything very definite. The materials of construction have been changed from wood to iron, and from that again to steel. The engines have developed from inverted Watt engines, through a great variety of forms, to multiple-expansion engines of great complexity and considerable efficiency. All these may be rendered useless by some other form of heat engine or by the application of electricity. It is evident, therefore, that the limits of the sizes and speeds of steamships in the future are to be determined by commercial considerations and experience, rather than by abstract scientific speculations.

A PRACTICAL METALLIC RAILROAD TIE.

The improved metallic tie shown in the illustration has been patented by Mr. Ellison Saunders, of Austin, Texas. The base of the tie has outwardly and downwardly turned ends, preventing endwise movement, and rail-supporting blocks of cast or malleable iron are secured to the base by rivets or bolts, as shown in the sectional view. The rails are secured in their seats in the blocks by spikes, the apertures for which are preferably cast with a bend and twist, so that the upper half is out of alignment with the lower half of the aperture, the spike when driven then following the shape of the aperture, by which it is bent and twisted in for its lower half, so that it will not get loose. The two rail-supporting blocks of each tie are connected with each other by a tension rod, by adjusting the nut on which any desired strain may be given to the blocks and base plate to prevent spreading of the rails, the base of each rail resting in a longitudinal recess in the block. On curves or switches the guard or switch rails are fastened on an extension of the block, formed with a recess under the rail for the nut or head of the tension rod. Centrally on each tie is a block through which the tension rod passes, to prevent accidental displacement.



SAUNDERS' IMPROVED METALLIC RAILROAD TIE.

This tie has been in practical use for nearly a year on a portion of a trunk line railway in Texas, and is said to have well withstood the atmospherical changes and the heavy traffic, it being officially stated that "at no time since they were placed in position has any attention been given to them, while on either side the oak ties have needed attention at different times." At the Grand Central Station, New York City, these ties have been in use for the past nine months at a point where some of the largest engines pass over them each day, with many switching engines and cars, and the supervisor of the yard, Mr. Robert White, writes that "they have had no attention paid to them since being put in, and still remain in perfect order. The spikes have not started, but are the same as when put in."

Method of Producing Photo-mechanical Printing Plates.

BY LUDWIG SCHAEFER, OF HEILBRONN, GERMANY.

Upon exposed and developed sensitive gelatine paper I cast a layer of plaster of Paris whose tendency for hardening has been retarded to a certain extent by the addition of marble dust, glue, borax, or the like. As soon as the plaster cast has the necessary degree of compactness the gelatinized paper is removed or pulled off, and in place of the same is laid a glass plate. The plaster cast is allowed to rest on the glass plate, so that the weight of the cast will cause the elevations to be forced back into the mass until every delineation comprising the drawing or representation lies upon one and the same level. The depressions or indentations between the delineations of course lie on a lower level than the delineations; but said delineations occupy a common level, so as to be suitable for printing. From the plane and level plaster cast thus obtained casts in wax, metals, plaster of Paris, or the like can be made, or after the hardening of the original plaster cast I can press into the same any mass that is capable of being shaped or formed.

Somnal.

In a recent article in the *Medical Record* by O. M. Myers, M.D., of Rochester, N. Y., he says:

Much interest has centered upon the new hypnotic, somnal, and clinical reports of its use, together with experimental data, are rapidly confirming, and even exceeding, the claims of its discoverer. The medical fraternity will gladly welcome this new-comer to its materia medica, as it seems to possess the properties of a hypnotic *par excellence*, without the distressing and dangerous qualities of other drugs of this class. All of these latter are notoriously uncertain and inconstant in action, and most of them, especially chloral and morphia, expose the patient to the dangers of habitual use. The administration of somnal is happily free from these unpleasant sequelæ. Since the time of its discovery by Radlauer, of Berlin, in the fall of 1889, the action of somnal has been rigidly scrutinized and impartially investigated, which has resulted in unqualified indorsement of its efficiency and reliability; and its prompt and harmless qualities have been the delight of all clinical observers.

Summary.—1. Locally, somnal is non-irritant, exerting rather a stimulating effect upon the mucous membrane of the stomach. When applied directly to the heart of the frog, it acts as a powerful poison, destroying its electro-excitability.

2. In therapeutic doses the drug exerts no appreciable physiological effect upon the heart, and may be regarded as safe. Toxic doses depress that viscus: *a*, by direct action upon the muscle fiber; *b*, by stimulation of the cardio-inhibitory centers.

3. Therapeutic doses have little or no effect upon the pulse rate. A slight primary rise in the arterial tension may be observed, which soon returns to normal, or may even fall below—the latter probably due to muscular relaxation during sleep. Toxic doses rapidly diminish pulse rate and pressure; probably due to direct action upon ganglionic heart centers.

4. Ordinary doses cause the respiration to become slow and full. Toxic amounts induce rapid, shallow, and irregular respiration; the result of depression of the respiratory center at base of brain.

5. As, in therapeutic doses, sleep is induced without perceptibly affecting any other portion of the economy, it is fair to conclude that somnal acts directly and primarily upon the cerebrum.

Therapeutics.—The indication most promptly and perfectly met by somnal is to induce sleep, and it may be confidently relied upon by the prescriber in all cases where the insomnia is not the result of pain or syphilitic disease. As the nervous element predominates, somnal is the more certain to fulfill the requirements; as, for example, insomnia due to functional over-excitement of the brain after mental strain or anxiety, sleeplessness of delirium tremens, and in maniacal and hysterical disturbances. Its sedative and somniferent action is strikingly efficacious in the insomnia occurring during convalescence from acute disease. Where an adynamic condition exists it must, of course, be used with caution. In whooping cough, spasmodic laryngitis, asthma, "nervous cough," and chorea, it possesses decided sedative properties. A great element of safety is that the action of somnal, so far as I have observed, is never out of proportion to the amount ingested, nor does it act in a cumulative or other unexpected manner. The drug appears to possess little or no influence over insomnia due to acute inflammatory conditions.

A Simple Relief for Lung Troubles.

It has long been known that pine needle pillows would alleviate persons afflicted with lung troubles, and a Florida editor relates an incident in support of the fact as follows: During a visit to the home of a most estimable lady living on Indian River, this editor was told of a discovery that had been made which may prove a boon to sufferers from lung or bronchial troubles. This lady having heard that there was peculiar virtue in a pillow made from pine straw, and having none of that material at hand, made one from fine soft pine shavings, and had the pleasure of noting immediate benefit. Soon all the members of the household had pine shavings pillows, and it was noticed that all coughs, asthmatic or bronchial troubles abated at once after sleeping a few nights on these pillows. An invalid suffering with lung trouble derived much benefit from sleeping upon a mattress made from pine shavings. The material is cheap, and the *Christian at Work* says it makes a very pleasant and comfortable mattress, the odor of the pine permeating the entire room and absorbing or dispelling all unpleasant odors.