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O. D. MUNN, S. H. WALES, A. E. BEACH.

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UNSAFE STEAMERS.

T is a common custom with British writers, in alluding to accidents in America, to denounce our steamers as so many floating volcanoes, constructed in the most flimsy manner, and managed with the most desperate recklessness to life—all for the love of the "almighty dollar." Safety, they consider, is the exception, and dangerous accidents the rule in American traveling; and they look upon their own vessels as the very models of perfect construction, security and good management. Such sentiments are altogether erroneous, and we think they have been the main cause (by engendering a feeling of safety) of several very sad disasters. The most terrific calamity which can befall a vessel at sea is to take fire, without the power of extinguishing it. A crowd of beings in a ship on fire, with the lurid flames beneath and around them, and no way of escape presented, is a dreadful spectacle; and this has been the case with two British built steamships on the Atlantic ocean, within the past two years. The first was the *Austria*, an account of which we gave on page 37, Vol. XIV. (old series), of the SCIENTIFIC AMERICAN; the last was the *Connaught*, which was consumed on the 7th inst., when about one hundred and fifty miles east of Boston. By the first accident no less than five hundred persons lost their lives; and had it not been for the timely arrival of the American brig, *Minnie Schiffer*, as many would have perished in the latter case, as there were five hundred and fifteen passengers on board. Both of these steamers were said to be built in the most substantial manner, with iron plated hulls, divided into several water-tight compartments. They were given out to be proof against fire, owing to the materials of which they were constructed; yet they were destroyed by fire, and in the case of the *Austria*, with a loss of life unsurpassed on any wooden vessel. The idea of safety from fire in the case of these iron steamers was a delusion—a falsehood palmed off upon the public; and perhaps most of the British iron steamers now running on the ocean are not more safe than these two which have been destroyed. That iron steamers can be built fireproof is a question which admits of no dispute, but that these steamers were not so constructed is an established fact which should lead the whole world to execrate either their builders or owners.

As the ocean is the highway of nations, all persons are interested in the safety of those who go out upon the "mighty waters;" and we are especially so in those who voyage upon the Atlantic. Every nation is responsible for the character of the vessels built within its borders, and Great Britain has been degraded by the miserable iron steamers which have been built by her marine engineers during the past few years. The materials of which they have been constructed were either of the most inferior quality, or else they were put together in a manner which would disgrace the youngest apprentices in any American establishment. We make these strong assertions, not for the purpose of giving pungency to a paragraph, but because painful facts call them forth. Our wooden steamers seem to be, infinitely stronger and safer than the British iron steamers which have recently become their competitors on the ocean. The iron steamer, *Royal Charter*, went down like a stone when she struck the rocks last year on the English coast, and a like fate was experienced last summer by the *Hungarian* on the American coast. The most disgraceful case of all, however, was that of the *Connaught*. She was represented to be a most safe and perfect iron steamer; yet she first sprung a leak and was gradually sinking, when, to add to the horrors of the scene, she was also soon wrapped in flames. This was proof of construction and arrangement so defective, that we search in vain for a parallel in the history of steam navigation.

Neither England nor the United States has a proper system of steamship inspection. We hope that the many disasters which have occurred with steamships during the past few years—and which, in most cases, might have been prevented with common foresight—will lead to the adoption of some system whereby no steamer will be permitted to go to sea without first being thoroughly inspected in all that relates to her construction and equipment, so as to insure greater safety to passengers.

BELLS AND THEIR MANUFACTURE.

The various purposes for which bells are employed connect their sounds with the most touching and diversified associations. In the early days of youth, they recalled our busy feet from the playground to the schoolroom; on Sabbath morning, they invited us with sweet and solemn cadence to the house of God; and on "Independence Day," their stirring notes made the heart vibrate with the wildest emotions. Although most persons know considerable about the form and sound of bells, the number is small, we believe, who are acquainted with the mode of their manufacture; some facts in connection with this art will, therefore, be of general interest.

The most famous bell foundry on our continent, so far as we know, is that of A. Meneely's Sons, situated at West Troy, on the banks of the Hudson river. While on a recent visit to that section of the country, we took the opportunity and had the pleasure of inspecting this establishment, where all the operations were freely explained to us by one of the brothers.

Bells are formed by casting an alloy of copper and tin in molds prepared for the purpose. The method of molding conducted in this foundry is a very great improvement upon the old system. A mold consists of a hollow space, the exact form and dimensions of the bell to be cast. Two separate hollow iron cases, shaped like a bell, and of a size to correspond with the casting to be obtained, are employed to form a mold. Their sides are full of small perforations or vent holes; one case is made smaller than the other and forms the *core* for the inside—the larger one, called the *cope*, forms the outside shell of the mold. The inner case is first swathed with straw rope, and a coat of loam is placed on the outside of this; when perfectly dry, it forms the core. The outer case is lined on the inside with loam, and carefully swept, to obtain the proper thickness and surface for the casting. When the cores for a number of bells are ready, they are placed on the even floor of the foundry, and their copes are lowered over them by machinery, and guided to their exact positions by gages. The spaces between these cases then form the molds for the bell castings, and different sizes are employed for bells, according to their desired weight. Large reverberatory furnaces are used for fusing the bell metal, and when it has reached a proper state of fluidity, it is poured into the prepared molds in the usual way. The casting operation is an interesting sight at night, as the intense heat of the metal causes numberless jets of bluish-green flame to issue from the vent holes of the mold covers, which appear like domes of fire, and rival a gorgeous display of colored fire-works. The straw ropes on the cores take fire and burn very slowly, as the casting cools, and the shrinkage of the metal thus goes on gradually and prevents sudden undue straining. Great care and practical experience are necessary to conduct these operations, although apparently simple; the metal must be perfectly fluid and of the same temperature at every part of the mold, to produce a homogeneous casting. The castings which we examined were beautiful and uniform in their texture. Formerly, when entire loam molds were employed for bells, these were packed in pits beneath the surface of the foundry floor, to enable them to resist the great pressure of the fluid metal. Serious explosions frequently occurred then, by the confined air within these packed molds becoming highly heated; and inferior, porous castings were also very common. These evils are now avoided with the iron vent casting.

After the bells are cast, they are scoured bright in rotating frames, in which a sand cushion is brought to bear upon the inside and outside surfaces of the metal. Each bell is tested as to its tone and quality, and if the least imperfection is detected, it is condemned; no inferior article is allowed to pass outside the foundry gate. After this, the bells are fitted with clappers and yokes, and mounted on frames. The thickness of a bell, from its crown to the *sound-bow*, varies with its diameter—about one-fourteenth of the total diameter being the proportion.

Mr. Andrew Meneely, the father of the present proprietors, commenced the manufacture of bells at West Troy, in 1826, and from that period up to the present date, no less than 14,000 bells, averaging 500 pounds weight, have been manufactured. These have had a wide circulation. Every State and Territory in the Union has been furnished with a number; some have gone to Mexico, Brazil, Europe, Asia, and Africa. During the past ten years, the number cast annually has averaged 600, of 500 pounds weight each, and, in the week of our visit, 20 were sent out, averaging 700 pounds; while no less than five chimes have been completed for as many different places, during the past six months.

Some large bells have rung out their cheerful notes for centuries, while others have been cracked after a few years' service, by the clapper continually striking in the same place. In order to change the surface of the bell to the blows of the clapper, all those ranging from 400 pounds and upwards, are fitted with Meneely's patent adjustable yoke, which was illustrated on page 22, Vol. I. (new series), of the SCIENTIFIC AMERICAN. The bells thus hung can be easily adjusted to present a new surface to the action of the clapper.

On bells of 100 pounds and upwards, a cushioned steel spring hangs down like an arm on each side of the tongue, so that when the latter strikes, it is caught and moved back to prevent it from clattering on the sides of the bell and injuring the vibration. Bells of 400 pounds and upwards are also provided with a tolling hammer, set on the frame, so that they can be employed for alarms as well as for ringing. The yoke of a bell is furnished with a gudgeon at each side, and is hung in a frame connected with a wheel to which a rope is attached for ringing. A counterpoise weight is bolted on the rim of the wheel, at the top, to diminish the labor of swinging, and a stop clutch is provided at the top and bottom of the frame of very large bells, to prevent them from being thrown over in ringing. Bells varying in size from 10 pounds up to giants of 25,000 pounds weight are manufactured in this foundry and sent everywhere.

The quality of a bell depends upon the character of its metal, the uniformity of the casting in density, and in its form, although the last is really not such a fixed question with bell founders as many suppose. The great bell of Pekin, which weighs 55,000 pounds, is of a cylindrical form, and devoid of the *sound-bow*, or flaring mouth which is common to our bells. "Big Ben" of Westminster, about which so much was said in the London papers a few years ago, became cracked a few days after it was hung up; and upon being re-cast, the same fate attended "Big Ben" the second. Its alloy was composed of 3 parts copper and 1 of tin; it was too weak for such service. Common bell metal consists of 4 parts copper to 1 of tin, and is twice as strong as the former alloy. A bell should be so constructed as to give out the same note at whatever part it may be struck, but there are few (if any) bells which are so perfect in tone. In order to give out the greatest volume of sound, a bell must be swung instead of being struck, but this, of course, is difficult with large signal bells of from eight to ten tuns in weight. The tower or steeple where a bell is hung should be as open as possible at the sides, and sealed close at the top. We have seen some church steeples constructed with slatted blinds around their sides, as if they had been designed for the very purpose of strangling the sounds of the

——Swinging bell
Which afar doth swell
O'er moor and fell.