Philosophy of Mechanics.

No. 5.

FORM OF SHIPS—WAVE LINES.

Among the many plans which have been brought forward from time to time, to produce the best form for increasing the speed of sailing vessels, the experiments of Scott Russell and the conclusions arrived at by him, possess the greatest merit, because he has clearly set forth a fixed principle of construction:—this is called the "Wave Principle." It relates to the formation of parallels as adequate to the resistance on both ends of the vessel; in other words, several lines of floation formed in accordance with the form of the *waves*. This form of construction has been applied in the construction of British steamships, and also the new American steamships, and with great success. A few years ago vessels were built on the old principle of a nearly straight water line, excepting a little in the run of the ship, but no hollow line in the bow, rather convex. The wave principle has a long sharp bow with hollow lines, somewhat concave, like a razor. A committee was appointed a few years ago, by the British Association, with Scott Russell as its Chairman, to make experiments, so as to determine the form, and also the best proportional of vessels' width. These experiments demonstrated the fact that "the greatest speed that was acquired, the greater should be the length of the vessel, and that the vessel should merely be of the breadth necessary to enable the engines to be put in and to stow away the requisite cargo. The greatest width of the water line was found to be the best placed two-fifths from the stern, instead of *before* the middle, as was the way of old, or at the middle, as assumed by more advanced theorists." Instead of the old cod head bow, the edge of the razor was presented to the waves, (and here let me say this has been found to be the best form, as discovered by Farraday since then, for chimney caps.)—Instead of the old fine line abaft, Scott Russell discovered that a fuller line should be used abaft (a different plan from the "important discovery" to which I have alluded to in previous papers.)

As Marine Navigation is the grand subject of national rivalry, especially between England and America, great attention should be directed to the form of the vessels and all connected with them. The British have paid great attention to it, and with much success. The small steamship Viceroy, which lately arrived from Ireland, although her passage was longer than the large Cunarders, yet no one could look upon her without admiring the beauty of her build, and would be ready to say—"that is in model the perfection of a steamship." Fortunately for America, we commence the race of rivalry with England, having much made to our hands, for which we are indebted to her, but science is universal property—one nation at the present day, borrowing from and lending to another. Along with the form of steamships, the engines, paddle wheels and boilers, are as essential to speed as a wave line, or great length, and great improvements have been made within the past fourteen years, especially in the boilers and engines. Formerly the boiler flues were constructed of great length, so that the smoke was kept winding round and round in the flues and at last was allowed to escape with difficulty. Now, however, they have adopted the plan of getting as much fire as possible in the shortest space of time,—and this had been accomplished by imitating as nearly as they could the locomotive engine boiler, by having tubes of thin metal which would evaporate a much greater quantity of water in the same time as flues of the usual thicknees; now, also, instead of taking the smoke a long dance they use short flues of four to six feet in length, and by having a great many of as thin metal as possible, they heat the greatest quantity of water, and have the additional advantage of keeping the metal cool, in consequence of which a boiler of smaller extent and surface is of much greater efficiency, with less weight of metal. The next point of improvement was in the engine; in the construction of which, however, there have been less change than in other matters. The greatest changes which have been made within the last ten years consisted in the employment of greater quantities of wrought iron in the constuction of the engines, instead of the mass of cast iron formerly used. This was the only great change,—for the newest Halifax steamers were still fitted up with the old fashioned or lever engines,—and so are the Collins' Line. The next improvement consisted in working steam expansively to a much greater extent than heretofore. It was only within the last ten years that they adopted this principle; the effect of which was that instead of completely filling the cylinder with steam, they filled only to the extent of one-fourth—a volume of steam not of course of equal density, but by which they get two-thirds of the work done and at one-fourth of the cost. The next improvement has been made in the paddle; not so much, perhaps, in the wheel itself, but in driving the paddle-wheels faster. The old maxim which was, a good horse going 2½ miles an hour could not draw advantageously at more than 220 per minute, and that as the steam-engine was only a substitute for horses, and reckoned as so much horse-power, it ought not to go faster than 2½ miles per hour—and this one thing had kept them back for half a century, for 2½ miles an hour is only 4 feet per second, whereas steam at 15 lbs. pressure moves at 1,100 feet per second. The piston is now often moved at the rate of 250, 270, 300, and more sometimes, per second. The engines of the Cunard and the Collin's line are built on the same principle, and the object and aim of them is compactness and great power, with plenty of steam at a moderate pressure, from 7 to 10 lbs. Great improvements will yet be made, both at home and in England, in steamships, both in the build of the vessels, and the application of the power—the end of improvement is not yet. There is one thing, however, which is self-evident, and of great moment to the world, and that is, the only two great marine nations on the face of the globe, are the Mother and Daughter, both speaking one language—they, combined, could swallow up in a few months, all the other navies of the world.

Railroad Accidents.

Whenever trains in motion have run off the track or meet with obstructions, resulting in injury to passengers, it is well known that in almost all cases those in the forward cars have been the sufferers. Cases have occurred where an engine has been nearly smashed to pieces at the head of a long train, and persons in the last car were under the supposition that they had been merely stopped at some way-station, so slight to them was the concussion. In the accident at Princeton about a year since, two cars immediately before that in which was the writer were completly locked, dove-tailed together, their entire length, causing death to two and severe injury to many passengers, and yet in this third car no person was even bruised; old travellers generally select the rear of a train from an opinion of its greater safety, and it seems to the writer a little singular, with the light of experience so long before them, Railroad managers have not taken more effectual means to guard against the force of concussions.

As no one seems disposed to move in this matter the writer will venture to throw out some suggestions for the investigation of the public.

First: That not only the front and rear of each car be provided with more effectual fenders than those now in use present, but that there be run between the baggage and second-class car a fender car, expressly constructed for the purpose, and composed of masses of springs, or of properly combined materials suited to deaden the force of collsions. For a sufficient inducement the inventive genius of the country would produce the thing desired; and in view of accidents, where Companies would be held liable, motives of economy, if not humanity, should prompt the offer of such inducement.

Second: That the platform and frame-work of cars be constructed of iron. Cars thus constructed if properly padded and cushioned interiorly, would save the passengers from bruises in case of collision. They would also be protected at the top and sides by this frame-work, which would give to outer force or pressure, instead of breaking up into dangerous splinters; and under foot by a flooring which would let through neither snake-heads, broken rails, wheels nor axletrees. They would remain safe in case of almost any accident.

If found more expensive than those now in use, they might be termed Safety Cars, and extra prices charged to those who chose to occupy them: this would be readily paid by many, particularly if in addition pains were taken to deaden the sound of the wheels, so disagreeable to the invalid or those who wish to converse, through the construction of double floors, stuffed with cotton refuse, (an experiment all ready tried) and other suitable means.

Third: It is the custom to pass the Safety Cord(a rope intended to give the engineer notice when anything is wrong in his train behind him) over the roof of the cars instead of under and within the reach of the passengers; in case of breakage of an axletree immediate notice ought to be given. When it is considered that there are usually but two brakemen to half a dozen cars, and they may be thrown off or not be at the right spot at the right moment, this seems to be a great oversight.

Fourth: A system of signals through the motion of the arms or waving of an handkerchief or lanterns should be generally adopted and universally published, so that individuals not connected with Railroads may understandingly convey to those conducting a train in rapid motion, information of any danger which await them.

[We copy the above from the N. Y. Tribune, and believing it to contain some good suggestions, commend it to our friends as something worthy of exercising their ingenuity upon. The idea originated with a member of the Northern Patent Agency (No. 2 John street, N. Y.) who claim, by courtesy, the management of the matter, and we understand are now in communication with inventors and others interested, with a view of carrying it through.

Steamboat Accidents and the Bursting of Boilers.

In the article preceding this, our attention is directed to Railroad Accidents, and some remedies proposed for them. While the deaths by railroad accidents have been numerous, they have not been one tithe of those by steamboats, and the explosion of boilers. There is not a week passes over our heads which does not bring the news of some heart-rending accident of this kind. The explosion of boilers are accidents of so common an occurrence, that the public have become perfectly callous to the evil and crime of the same.—Last week the steamboat Griffith was burned on Lake Erie, and two hundred and fifty human beings were roasted or drowned by the accident. Good God! when are we to hear the end of such tragic occurrences, when shall we have just laws promptly executed to stop such legalized murders? Only think of it—250 of our fellow creatures enjoying perfect health, consumed alive amid devouring flames. If a foreign enemy was to land upon our shores and take the life of a single citizen, oh, how would the slogan of patriotism ring throughout every mountain and glen; but here we behold hundreds of our citizens killed, burned and drowned by the recklessness or cupidity of other citizens: and what is done to remedy the evil? Nothing—nothing. A coroner will call a jury, make a report—a wonderful sympathetic report to be sure, and there is an end of the matter. Who does not remember the thrill of horror which ran through our city, when the boiler at Messrs. Taylor's machine shop, in Hague street, exploded last spring. It was a dreadful thing to gaze on the mutilated corses of those who, in the midst of life and health, were almost in a moment sent from time into eternity. We well remember the report of the jury, but what has been done to those who were the direct cause of that murderous explosion? Nothing. They walk the streets as if no human blood was on the skirts of their garments. The only way to prevent accidents of this kind is by laws—good laws, and these are not worth a snuff unless administered with prompt impartiality. There is too much false philanthropy abroad. It is nothing more than sentimental conniving at crime. Every person who has had a son or near relative maimed or killed by an explosion, railroad accident, or steamboat accident, should sue the company or companies for damages. Widows and orphans made so by such accidents, should be maintained by the companies who were the causes of them. It is only by speaking to the pockets of the monied corporations, that such evils will be prevented, for this is the age of gold and it has no conscience nor feeling apart from dollars and cents. The best plans may be devised, and the best inventions brought forward to prevent accidents, these are all good and right, but they will not be adopted if they entail any extra expense, or unless they are to prevent some loss.

Tunnelling the Alps.

The passage of the Alps,, by Hannibal and his army, was long considered the greatest achievement of ancient generalship. After him, Napoleon astonished the world by performing the same feat—a feat which has been made famous by the painter and historian, but one which we have always considered inferior to that of Macdonald, in his famous retreat with the French army. But the feats of generalship must bow down to the genius of civil engineering:—the Alps are now to be pierced, and a highway for armies made through their granite sides, and the locomotive will yet wheel the traveller as safely beneath a thousand glaciers from the north to the south of the Alps, as if sitting at his own fireside. To accomplish this grand object, the Chevalier Mans, a highly accomplished engineer in the employ of the Sardinian government, has invented some very ingenious machinery for the purpose of boring, and transmitting fresh air to the tunnel. The tunnel is to pass under some elevated crests, where one can stand 4850 feet above the tunnel. Air is to be supplied by pumps worked by the mountain streams, conveying fresh air through tubes. The boring machine is also to be worked by machinery, and it is placed against the rock, projecting into it simultaneously four horizontal series of sixteen scalpels, working backwards and forwards by means of springs cased in, and put in motion by the same water power. While these are at work, one vertical series on each side works simultaneously up and down, so that together they cut four blocks, or rather insulate four blocks on all sides, except on the rock behind, from which they are afterwards detached by hand.

It has been already ascertained that each of the two machines, at the opposite side of the tunnel, will excavate to the extent of 22 feet a day, and it is estimated that the whole excavation will be completed in four years. The gallery to be perforated by the machines will be 13 feet wide by 7 feet high, and this once cut through, the bore will be enlarged by ordinary means to 25 feet in width and 19 feet in height, and a double line of rails laid. The estimated cost of this great tunnel is only 13,804,942f., or about $2,700,000. It is to be immediately commenced at the north entrance. The machines are constructed upon the principle of Foster & Bailey's, which was described in Vol. 3, Scientific American—the only machine of the kind adapted for boring horizontally, in a simple manner.

New Way of Catching Trout.

The Hallowell Gazette mentions a new method of taking trout in that vicinity, which has been practiced with success by some fishermen. It says—"A gentleman, of unquestioned veracity, informs us that he took sixteen fine trout out of a brook by tickling their tails, with his hand, and that he could have taken three times as many more if he had been disposed. In passing along, the gentleman noticed a deep place in the water, over which were two or three logs. He could see the trout in clear water—so getting on the logs and rolling up his sleeves, he cautously put his hand in the water and slightly rubbed the nail of his finger near the tail of the fish. The consequence was, they turned over on their backs in his hand, and he drew out, the sixteen in two or three minutes."