BOLLEE'S STEAM CARRIAGE.

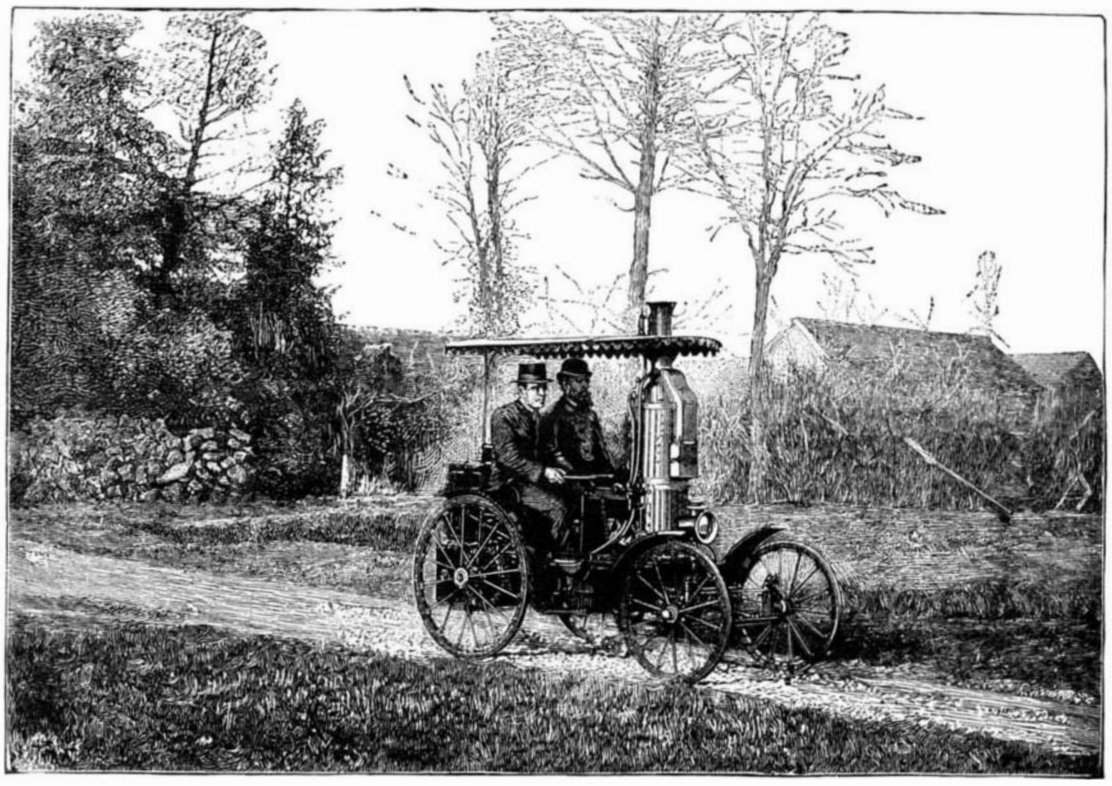
Mr. Amedee Bollee has just sent us a description of a small sized steam carriage that he has recently constructed and experimented with. We present an engraving of the apparatus made from a photograph taken by Mr. Sollier, an amateur at Mans, and, in addition, we give the details of construction that Mr. Bollee sends us.

The carriage frame, which is wholly of iron and steel, is 6¼ feet in length by 2¾ in width, and rests upon four steel wheels, through the intermedium of springs, so as to prevent jolting. The driving wheels, which are in the rear, are 3¼ feet in diameter, and are actuated by a differential motion, which, on curves, allows the two wheels to assume different velocities. The steering wheels are 2½ feet in diameter, and are peculiarly mounted, so as to render it impossible for the carriage to overturn, and to make the steering of it very easy.

The generator, which is placed in front, carries all the requisite apparatus. It is of a new system, that permits of a wide heating surface with little weight. It is very easily cleaned. It holds 7½ gallons of water—a relatively large bulk, that has the effect of keeping the pressure more regular. It easily develops a power of 2½ horses. On the trial trip the pressure was about one hundred and eighty pounds to the square inch, although the ordinary pressure is only about seventy. While running, the water is fed by a pump, and, during stoppages, by an injector. The motor, which is in the rear, is an expansion and reversible one, and has a power of 1,446 foot pounds.

The passengers, two in number, sit behind the boiler, and the one to the right has within reach all the apparatus necessary to run the engine. The fuel, which is stored at each side of the boiler, suffices for a run of sixty miles. The weight of the carriage, when empty, is 1,430 pounds. It easily ascends the steepest gradients, and its mean speed is 15 miles per hour. Mr. Bollee has several times obtained speeds of from 21 to 24 miles.

The apparatus may be given various forms and dimensions. In the fancy ones the boiler is in the rear.—*La Nature.*



BOLLEE'S STEAM CARRIAGE.

The Merchant Navy of the World.

The *Bureau Veritas* publishes the following statistics respecting the merchant navy of the world in 1885: The total number of sailing vessels in existence that year was 43,692, with an aggregate tonnage of 12,867,375; that of steamers was 8,394, with a tonnage of 6,719,101, making a total of 52,086 vessels and 19,586,476 tons. The largest fleet, naturally, is that of England, with 4,852 steamers, with a tonnage of 4,159,003, and 14,939 sailing vessels, of 4,714,746 tons. Next follows France, with 505 steamers, of 498,646 tons, and 2,173 sailing vessels, of 398,561 tons. Germany possesses 509 steamers, with a tonnage of 110,064, and 2,424 sailing vessels, with 863,611 tons. With regard to the importance of their steam navy, the maritime countries are classified as follows: England, France, Germany, United States, Spain, Holland, Italy, Russia, and Norway, which last country owns 103,792 tons of steam shipping. With regard to sailing vessels, the classification as regards importance is as follows: England, United States, Norway, Germany, Italy, France, Russia, Spain, Sweden, and Holland.

Use of Sandpaper.

In handling this subject, we expect to tread on the toes of both bosses and workmen. Still, we think a few suggestions will not be amiss. Sandpaper occupies a very important position; and, as it is more frequently used, and in greater quantities, than almost any other single article, it becomes a serious question as to cost. The workman, if so disposed, can materially reduce or increase the cost by using the paper up thoroughly or only using it half. We have seen some throw the piece away if only the edge was off the paper; others would use the edges and corners, and the center be good; and others, again, the center, and leave the corners good. That is a waste. As the paper is given to use, it is immaterial what shape you use it in, so that it has answered its purpose. It does no good to pile it up, or stow it away in a box to be used again; except in a very few cases, it never gets used again, and only accumulates for nothing. We generally use ours up until there is no virtue left in it, and then throw it away, either into the fire or into the waste box.

Now, we know there are some bosses who never seem satisfied unless they see a box of refuse paper around, and insist that we must use it, because it is to them like getting double service out of it. So they do, but at what a cost! Sandpaper, as bought by them, stands them in the neighborhood of about one-half cent per sheet. Divide that into, say, eight parts, which makes the cost about one-sixteenth of a cent per part. It is used until the cutting edge is off, and then thrown to one side. It has done all that can be expected from one-sixteenth of a cent. Now, to use it again will require at least two-thirds more time than at first. Say a man is getting 20 cents an hour; he can use the eighth part of a sheet up in about from five to ten minutes, according to the condition of the job he is doing. Give him ten minutes, and he has done, say, one-half of a large panel. Now make him do the other half with the same piece of paper, and I think I would not be far wrong when I place the time at half an hour, even if he could do it at all, which I doubt. The question is, Which is the more valuable, the paper or the man's time? In the first instance, the man occupies one-third of the half hour at a cost of 3⅓ cents in time and one-sixteenth cent in paper. To cover the same amount of surface with the same piece of paper again would bring the cost of the time occupied on the second half to 10 cents, from which might be deducted one thirty-second of a cent for the use of the old paper. In other words, trying to save one-sixteenth of a cent, we have actually lost twenty minutes in time and 6⅔ cents in money—enough to buy over thirteen sheets of new paper. As I said before, we use our paper as long as there is any virtue in it, and no longer. We turn and cut it up so as to get all there is of service in it, and then cast it away.—*Carriage Monthly.*

Electrical Surgery.

A student 22 years old, in the College of Burlington, Vt., slipped on the pavement about two months ago and strained his thigh. He soon lost the use of his left leg and suffered excruciating pain. He came to New York, was placed on a cot in the Post-graduate Hospital, and on January 25, Dr. J. Milton Roberts, a professor in the institution, performed on him a remarkable operation.

The young man was put under the influence of ether, and Dr. Roberts, with a scalpel, laid bare a portion of the hip bone about three inches wide. Then he called into play a bone cutting machine, invented by himself and called the electro-osteotome. It is worked by an electric battery and can revolve surgical instruments 12,000 revolutions, if necessary, in a minute.

The Doctor attached a small drill to the instrument and cut out portions of the hip bone up to its head, a distance of four inches. These pieces of bone under the microscope showed disease. The Doctor then used still larger drills until there was a space large enough to admit the entrance of a man's finger. He now wanted to see the exact condition of affairs inside of the bone. To do so he used a novelty for this class of work—a tiny incandescent electric light, about as big as a pea. This Dr. Roberts introduced inside of the passage in the bone, and the several flashes of light enabled him to see just where the diseased bone was. Then he took up his drill again, and cut out the diseased bone wherever it was necessary as easily as if the bone were open before him on an operating table. Dr. Roberts put in a drainage tube to take off diseased matter that might form, sewed up the wound, and applied antiseptic bandages. A hypodermic injection of morphine was given to the patient, and when he recovered from the effect of the ether he was in a satisfactory condition, and it is conjectured that he will in a comparatively short time be able to use his disabled limb.

Steel Ships.

As wood, in the construction of ships, was gradually replaced by iron, so iron, in its turn, is giving way to steel. The latter phase of the evolution has been very rapid. It is only seven years ago that steel began to attract attention as a substitute for iron in ship building. Its free use had just then been made possible—on the score of economy—by the perfection of the Bessemer process. But for the triumphant success of that cheap method of steel manufacture, such a thing as a steel hull would have remained the dream of naval architects. Seven years of trial have proved the advantages of steel over iron as a material for ships, as those of iron over wood had been previously demonstrated. The prime cost of vessels is increased by the change, but there is a great gain in durability, which makes the use of steel cheaper than that of iron in the long run.

The carrying capacity of a steel vessel is greater than one composed of iron. The tougher metal better stands the tremendous wear and tear of quick voyages. As to comparative safety in collisions with other vessels or with icebergs, the shock can be sustained with less damage to steel than to iron. For every exigency that taxes the strength of a hull, iron is less suitable than steel. It is rare that theory has been so well verified by practice. The position of steel as the material into which the navies of the world are destined to be transmuted in the early future seems now to be secure.

There is no known rival to steel in ship building. If aluminum could be produced as cheaply, its extraordinary tensile strength and its wonderful lightness would recommend it to such a use. But the great cost of its extraction from the superabundant clay in which it is found puts that use out of the question at present. After all the alleged improvements in its manufacture, its wholesale price was, at the date of the last government report on "Mineral Resources," not less than $6 a pound. And there is no other metal—or other material of any kind—from which steel has anything to fear as a competitor in the creation of a swift mercantile marine or an efficient war navy.

The Clyde statistics for 1885 tell the story of the gain made by steel on iron during the year. Of all the tonnage constructed and launched on the river last year, steel showed a percentage of 48. No further back than 1879 the percentage of steel tonnage produced on the Clyde was only 10¼. The proportion of steel to iron hulls has increased with great uniformity from year to year. The experience of the Clyde ship builders may be taken as that of all their craft.

The North German Lloyd now has three new steel steamers under headway at Govan, near Glasgow. The Havre line gives its orders for four more vessels of steel to the St. Nazaire shipyard in France. The descriptions of all these steamers show that they will be splendid additions to the steel fleet already in existence on the Atlantic. This revolution, now so silently but surely progressing, is not confined to Scotland or France. Every country which makes any serious pretensions to ship building assists in the transforming process.—*Journal of Commerce.*

California Soda.

Works have been begun at Owens Lake, in California. A portable engine is employed; and as soon as a vat is filled, the engine is moved to another, and the water is left to evaporate from the one that had been filled. This process will be repeated at all the vats until the soda sediment in the accumulating water in the pit reaches the surface. It will take about a year to get a crop of soda by this method, which will bring $35 per ton. It is expected that fifty tons of soda to the acre will be annually gathered. The number of vats will be increased till they hold an area of 50,000 acres of soda, the income from which is expected to be nearly $2,000,000 a year.