SHIP BUILDING ON THE GREAT LAKES.

The launch which affords the subject of our first page illustration, besides being rather unusual to Eastern eyes in that the vessel slides off the ways in a sidewise position, is remarkable in the fact that it represents the building of the ninth steel screw propeller of this class by one firm in a little over eight months, with an aggregate carrying capacity of over 26,000 tons. The builders, the Globe Iron Works Company, of Cleveland, Ohio, claim that this not only exceeds the amount of tonnage in iron and steel ships produced for a corresponding time by any shipbuilding firm in America, but believe that it surpasses the work of any European ship yard for a similar period. The launch was in every way a success, the vessel sliding smoothly into the water, and rolling but little before settling into her natural position.

The Norman is a staunch steel steamer, of the same style as her eight predecessors, with a length of keel of 296 ft. 5½ in.; length over all, 312 ft. 5½ in.; beam, 40 ft.; moulded depth, 24 ft. 7 in.; draught, 15½ ft. Her engines are triple expansion, with cylinders 24, 38, and 61 in. diameter, respectively, and a 42 in. stroke. She will have an independent air pump condenser. Her wheel is sectional and 14 ft. in diameter with a lead of 17 ft. She has two boilers of the Scotch type, each 14 ft. in diameter and 12½ ft. long, with three furnaces, the boilers being designed for 160 pounds pressure to the inch. She has eight loading and two fueling hatches, with steam windlass and capstan forward, steam capstan aft, and steam steering apparatus. She will have three pole spars with standing gaffs, but no canvas.

The importance of the commerce of the great lakes on our northern border, and the great shipbuilding industry necessarily developed thereby, are matters which people on the seaboard are too likely to underestimate. The growth of shipbuilding on the lakes has been particularly marked within the past three or four years, the vessels being mostly large freight carriers of iron and steel. Chicago has just entered this field, the keels of her first two steel ships having been laid in July. The material for them is being brought from Cleveland, but it is expected soon to use steel plates rolled at South Chicago. Last year the tonnage put afloat by lake builders was almost exactly equal to that built at all the Atlantic, Gulf of Mexico, and Pacific ship yards combined.

Lake navigation is very materially interrupted by ice during the winter months, but during 234 days of last year tonnage was passed through the Detroit River to the amount of 10,000,000 tons, which is more than the entries and clearances of all the seaports of the United States, and 3,000,000 tons more than the combined foreign and coastwise shipping of Liverpool and London.

Profit Sharing by a Coal Company.

Three years ago the Campbell's Creek Coal Company, in the Kanawha Valley, commenced the sharing of profits with its men, and on the first occasion divided something over $6,000. Last year the amount was much less, because the profits were smaller. The result this year is shown in the announcement that on September 20 the company will divide $4,500 among the men. The money is given out in proportion to the amount of wages the men earn, and the next distribution will give each man an average of about $60. Besides sharing the profits, the company does a sort of insurance business among the miners in a novel and commendable manner. In that district the miner is "docked," or forfeits a certain amount of his wages when the coal he turns out has over a fixed percentage of slate. The company mentioned takes the dockage according to the general custom, but that amount, instead of going to the company, is put into a fund for the benefit of the men. From this fund the men are entitled to draw $4 per week when sick. On several occasions, when through numerous demands this fund has become exhausted, the firm replenished it temporarily. In another way this company and its employes have moved together for the common good. In that locality the public schools are open only about four months in the year. To continue the schools for nine months each year, the miners pay each twenty cents per month into a private school fund. The effect of this plan of sharing profits, and the mutual good feeling between the men and their employers, is plainly apparent. The men are contented and steady; they have improved morally and physically.—*American Manufacturer.*

A New Antidote to Cholera.

According to the *British Medical Journal*, M. Roux has tried to cultivate the cholera microbe of Koch in an infusion made from the refuse of malted barley left after extraction in the brewing of beer. It is a liquid in which nearly all other microbes grow well, except the one above mentioned. This not only will not thrive in it, but when immersed in it is quickly killed. He has therefore suggested to the *Societe des Sciences Medicales*, of Lyons, that the infusion might be of use in the treatment and prophylaxis of cholera.

Correspondence.

Work of Amateur Electricians.

To the Editor of the Scientific American:

I am a subscriber to SCIENTIFIC AMERICAN and SUPPLEMENT, and right here I would like to state one thing in reference to my views on the question of amateurs and others making electrical apparatus according to instructions given in these papers, and that is this: That if any person wants to make any success, let him follow out the instructions religiously. In making the simple electric motor, from the very start I made only slight deviations from the instructions, and every time I had to commence right from the start, and when I did so everything came out as promised. I have not finished my motor yet, but from my experience I can assure you I shall keep strictly to your instructions.

I merely mention this, as in my own experience I have found others who have given up a motor half finished, because they had not enough common sense to do as they were told.

The "army" you referred to in your original notice is indeed a mighty one, possibly greater than you have any idea of. E. MAYER.

Beaver Falls, Pa.

The Cube Root--Easy Method for its Extraction.

To the Editor of the Scientific American:

The following is a quick method of extracting cube root, when root is a whole number, from 1 to 1,000. For larger roots I prefer method published in SCIENTIFIC AMERICAN SUPPLEMENT of September 6, 1890. In illustration the following eight examples were done in twelve minutes, without the slightest knowledge of the roots. The last four were calculated mentally.

Find cube root of following:

Example 1.—	918,330,048.	Answer—	972.
" 2.—	741,217,625.	"	905.
" 3.—	188,132,517.	"	573.
" 4.—	7,345,373.	"	197.
" 5.—	493,039.	"	79.
" 6.—	175,616.	"	56.
" 7.—	42,875.	"	35.
" 8.—	512.	"	8.

In extracting the cube root of numbers of three periods it is not difficult to find the largest cube in first period mentally, and by two or three trials to get the largest cube in first and second periods; but to get the last figure of root requires many trials by old methods. But by this method the last, or unit, figure of root is the easiest to obtain, provided the root is a whole number. If it is not a whole number, this method is so rapid that it is quicker to use it, and cube the root found afterward by way of proof. By use of following table, which can be easily committed to memory, it is surprising how rapidly you can extract cube root of any number a perfect power up to 1,000,000,000.

All cubes ending in—

1—	its root will end in	1.
2—	" "	8.
3—	" "	7.
4—	" "	4.
5—	" "	5.
6—	" "	6.
7—	" "	3.
8—	" "	2.
9—	" "	9.

This is easily committed to memory. The first and last numbers, 1 and 9, and center numbers, 4, 5, and 6, are always the same in unit column, in cube and root.

When cube ends in 2, root will end in 8; added = 10.
" " 3, " " 7; " = 10.
" " 7, " " 3; " = 10.
" " 8, " " 2; " = 10.

Example—What is cube root of 343? If it is a whole number, it must be 7, as 10 − 3 (the unit figure) = 7 = cube root. If you doubt it, how quickly you can multiply 7 × 7 = 49 × 7 = 343.

Referring to example 1, what is cube root of 918,330,048? We know that 9 is largest cube contained in 918. 9 × 9 = 81 × 9 = 729. We now want the second figure of root. As 918 is nearer 1,000 than 729, we take it for granted our trial root should be nearer 100 than 90. So will try 98 for trial root and find it too large. Try 97, and find it the largest cube root contained in the first two periods, 918,330. To get the last or unit figure of root—by reference to table that can be remembered easily, as cube ends in 8, root must end in 2, making answer 972. As it takes but two or three minutes to get this result, it will pay to use this rule always, as you can cube the root found, and if it proves to be right, which is always the case when cube is a perfect power, it saves a much longer method. Examples 1, 2, 3, and 4 are all done in the same way. Examples 5, 6, 7, and 8 are so easy they are done mentally.

Example 5.—What is cube root of 493,039? The largest cube root in 493 is 7 × 7 = 49 × 7 = 343. Cannot be 8, as 8 × 8 = 64 × 8 = 512. Having found root of first period = 7, second period, referring to table, is 9. Answer, 79.

Example 7.—What is cube root of 42,875? The largest cube root in 42 is 3 × 3 × 3 = 27. 4 is too large. The root of second period, per table, is 5. Answer, 35.

Brooklyn, N. Y. E. G. TREMAINE.

Quenching of Fires on Steamships.

The fire which burned for an hour or more among cotton bales in the hold of the White Star line steamer Majestic, at her New York pier the other night, suggests again the query why the owners of the large steamship lines do not make some effort to adopt a system for fire extinguishment by means of carbonic acid gas, which has been shown to be so effective and economical a quencher of flames in confined spaces. In this case considerable damage was done, mainly by water, before the fire was put out, while when the steamer Mentone put into Plymouth the other day with her cargo on fire her hold had to be entirely flooded, to the ruination, probably, of her whole lading; and so it is, and must naturally be, in every instance of the kind where water is employed. Upon the other hand, *Fire and Water* sensibly adds, many cases are upon record where by the injection of carbonic acid gas into the hold fires have been smothered and the damage entirely confined to that by burning.

As a case in question may be cited that of the bark Whistler, mentioned by C. T. Hopkins in the *Commercial News*, of San Francisco. Every effort to put out a fire on this vessel by the usual methods had failed, when the injection of carbonic acid gas was tried and the flames extinguished, and when the underwriters appraised her cargo, it is said that "not the least particle of damage attributable to gas was discovered." Again, last December, the bark Beltana put into Lyttleton, N. Z., with a six days' old fire in her cargo, which, however, was put out in four days by fifty-two charges of carbonic acid gas forced into the hold through holes in the deck and sides.

In commenting upon those facts an insurance contemporary remarks: "It does seem strange that this effective safeguard, which requires for its generation only a few barrels of marble dust and twenty or thirty gallons of hydrochloric acid, with a little simple machinery in the way of hogsheads for the confinement of the gas and hose for its injection, is not universally required for the preservation of life and property on the high seas, especially as in the hold of a vessel, which can be tightly closed, the principle of chemical extinguishment can be applied with almost certain success." And this reflection would appear to apply more particularly to the great Atlantic liners, in which the addition of such apparatus to the existing machinery and equipments would be so simple a matter; while there is so much reason to believe that the adoption of the system would result not only in the saving of property, but might at any time prove the means of averting loss of life.

Trade Schools.

The Philadelphia *Telegraph* thinks Secretary Wallace struck the keynote of the discussion before the United Typothetæ, in Boston, recently, when he offered the mechanical trade schools as the true solution of the problems connected with the education of skilled labor. The apprentice system, which formerly afforded the means of trade education, has been abandoned, and is now hardly anywhere in practical use. It is futile to discuss the merits and demerits of that system in view of the facts. Whether good, bad, or indifferent, our people have departed from it, and there is every reason to believe they will never return to it. We may regret it—and some of our conservative mechanics doubtless do regret it—but that does not alter the case in the least. The fact is that apprenticeship is a thing of the past, a bygone institution so far as America is concerned. We could not revive it if we wanted to, and it is, therefore, incumbent upon us to provide other means whereby our youth can acquire mastery of the handicrafts by which the work of the community is carried on. The means best adapted to this use in this country is the trade school.

Success of Vaccination in Germany.

Under the law of Germany making vaccination compulsory and providing for revaccination at stated periods of life, says the *Sanitary Inspector*, small pox is almost completely disappearing from the German empire. A late official report states that in 1888 only 110 deaths from small pox occurred in the whole empire, and that this number is 58 fewer than occurred in 1887, and 87 fewer than in 1886. Of the 110 deaths, 88, or about four fifths of the whole number, occurred in those parts of the empire immediately bordering other countries not well protected by vaccination, and in which there is constant intercourse between the vaccinated and the unvaccinated sides of the boundary. More than one-third of all the deaths occurred in the Prussian province of Posen. Comparing the small pox death rate of the large cities of other countries with that of the larger cities of Germany, it was 136 times as great in the cities of Austria, 30 times as great in those of Hungary, 16 times as great in those of England, 24 times as great in those of Belgium, and twice as great in those of Switzerland as in the German cities.