

## Engineering Notes.

The Fishkill Landing Machine Co. at Fishkill-on-the-Hudson, N.Y., have issued a circular, giving illustrations which show the best arrangement of horizontal tubular boilers, with a list of such sizes as are commonly used. These boilers are constructed of either iron or steel, wholly or in part, as may suit the views of purchasers. On all sizes about 36 inches in diameter, the lateral seams of shell and flanges of dome are doubly riveted; and when desired, the bottom of shell may be made in two courses, with only one girth seam over the fire. The edges of sheets are planed bevel for caulking, and particular attention is given to laying out and punching the holes for rivets, so that when the sheets come together, the holes may be "fair," and receive the rivet without the use of drift-pin. Special care is taken in the arrangement of the tubes, to obtain the greatest amount of heating surface consistent with large liberating area, ample steam room, and free circulation. The heads above and below the tubes, are thoroughly secured by long "crow-foot" braces of Ulster iron, well fastened to the shell of boiler. Every boiler has a man-hole either in the dome-head or top of shell, and usually, in the larger sizes, an additional man-hole in the front tube-head below the tubes, with the head re-inforced by a wrought iron ring riveted around the opening. A hand-hole is located in every back head, and another in the front head of the smaller sizes of boilers, and all man-holes and hand-holes are supplied with suitable plates and guards. In ordinary cases heavy cast iron supporting brackets are riveted to sides of boiler, to rest on side walls; or when preferred, wrought iron suspension stirrups may be used in their place. An angle-iron arch is fastened to back head of boiler to support arch of brick work for back connection. Their boiler shop is supplied with the latest and most approved tools; only the best brands of iron or steel plates and lap-welded tubes are used; the work is done by skillful mechanics under the supervision of one of the best practical boiler-makers in the country; and, when completed, every boiler is tested by water pressure, and proved tight before shipment.

The cause of practical education, the "learning by doing" principle, is making somewhat slow but very sure progress, and this is a matter in which every manufacturer is interested. Much has been written of late antagonizing the recent remarks of Rev. E. E. Hale, on the subject of half-time schools, but while he offers no relief for the fault, he finds he states a truth when he says that children who devote their whole time to obtaining book knowledge are but half educated. The remedy, however, in the present state of society, can not come in turning the children into the streets one-half the time, but must come by introducing real practical work into our school course of instruction in some way. Probably no cast iron rule for this reform can be laid down, as the circumstances and conditions must be so very different in different parts of the country, and in different towns and cities even in the same section. The school boards say the fault is not with them, but with the parents and the changed conditions of society, but while that may largely be true, it is much easier for the schools, with a perfect organization, to be adapted to society than for individual members of society to adapt themselves to the schools. How can a man who is employed in some mercantile or manufacturing establishment, and living in a tenement house, find useful and instructive employment for his boy one-half the time, and even if he could, how could the boy comply with the present school rules and pursue such employments? There is no question as to who must institute any reform that comes, and there seems to be little doubt but the reform is to come surely and with increasing rapidity when once fairly started. The Kindergarten method of instruction has for fifteen years been very gradually and very solidly gaining a sure hold in the hearts and minds of our best informed primary educators and it will stay and become the foundation on which will be builded a grand system of practical education all the way up to the colleges. A minister, a lawyer, a merchant, is a better man in his place if, with his literary attainments, he also has such a knowledge of affairs and practical work that he can grasp such subjects as he comes in contact with in all their details. The Milton Bradley Co. of Springfield, Mass., have been the pioneers in the manufacture of the material for the Kindergarten works, as also in the publication of cheap and useful guidebooks, and they are now giving special attention to extending the same principles with the primary and grammar grades of

the public schools. They have a good exhibit of their material at New Orleans, which is said to be attracting much attention, and they have furnished the government with such material as it needs in its practical educational exhibits, in which Gen. Eaton is much interested and to which he is giving his personal attention in the arrangement and perfecting of the early details and, later, it will be under the special care of his competent assistant, Lynden Smith, Esq. All the state exhibits have given special attention to Kindergarten work, and everywhere is seen encouraging signs of the rapid growth of interest in the practical side of education. But it still remains for the manufacturers, who are most directly interested in this matter, to encourage their school boards in a properly regulated advance in this direction, till every student has the privilege of learning something of the business and work of practical life.

## Miscellaneous Notes.

A new shrapnell shell for 100-ton guns has been invented by an Italian admiral. At 30 yards from the cannon's mouth the shell bursts, throwing forward 75 smaller projectiles, which in their turn burst into a fan-shaped shower of balls and fragments of metal with terribly destructive effect.

ON the Prince Edward Island Railway recently, engine No. 7, hauling one baggage car and three coaches, ran 3,336 miles with 1072 bushels of coal, which is equal to a consumption of 32 bushels per 100 miles; and engine No. 21, hauling the same number of cars, ran 3,168 miles with 1066 bushels, being 33 bushels per 100 miles.

A CARPET which had covered the floor of one of the chambers of the mint at San Francisco, for five years, was recently taken up, by order of the authorities, cut in small pieces, and burned in pans. The ashes were then subjected to the process employed with mining dust, and the amount realized from the daily deposits of the precious metals used in coinage during that period, was \$2,500.

THE money kings have an evident mania for all kinds of watered stock. J. Gould's aquatic luxury, *Atlanta*, requires ten tons of coal per day, and costs \$5,000 per month for fuel, provisions and crew. William B. Astor's magnificent steel yacht will cost the neat little sum of \$350,000. Poor souls, they are really forced to curtail the wages of their employees, in order to meet their expenses.

A LONDON scientist says that the highest velocity that has been imparted to shot is given as 1,626 feet per second, being equal to a mile in 3.2 seconds. The velocity of the earth at the equator, due to rotation on its axis, is 1,000 miles per hour, or a mile in 3.6 seconds; and thus, if a cannon ball was fired due west, and could maintain its initial velocity, it would beat the sun in its apparent journey around the earth.

ALL kinds of ingenious contrivances have been brought forward at different times for the detection of fire-damp in mines, but most of them have been of a very complicated nature. The last of the series, however, is so simple that it seems astonishing that no one thought of it before. A child's india-rubber ball with a hole in it is squeezed flat in the hand and held in the place suspected of fire-damp while released, and allowed to suck in a sample of the air. This ball is now directed toward a safety lamp, and again squeezed, when the tell-tale blue flame will show if it contains any inflammable vapor.

THE *British Medical Journal* suggests a danger to horses at public drinking troughs. It believes that glanders are spread among horses in this way, and recommends a stand-pipe and bucket as the safest and best arrangement for watering animals in cities. It is more comfortable for the horse, who has not to strain his neck against the collar to reach the water, the water is fresher and more palatable, and there is far less danger of its being contaminated with dust, dirt, and the germs of disease.

A French officer of engineers has conceived an idea for enabling vessels upon the high seas to communicate with the shore by means of the existing submarine cables. He proposes that these cables shall be supplied at convenient intervals with short branches, the free ends of which shall be buoyed in such a manner that passing vessels, provided with the necessary batteries and with a key by which to obtain access to the wires, may telegraph home. Experiments to test the feasibility of the scheme are about to be begun, and several branches are being attached to the cable which connects Algiers with Marseilles.