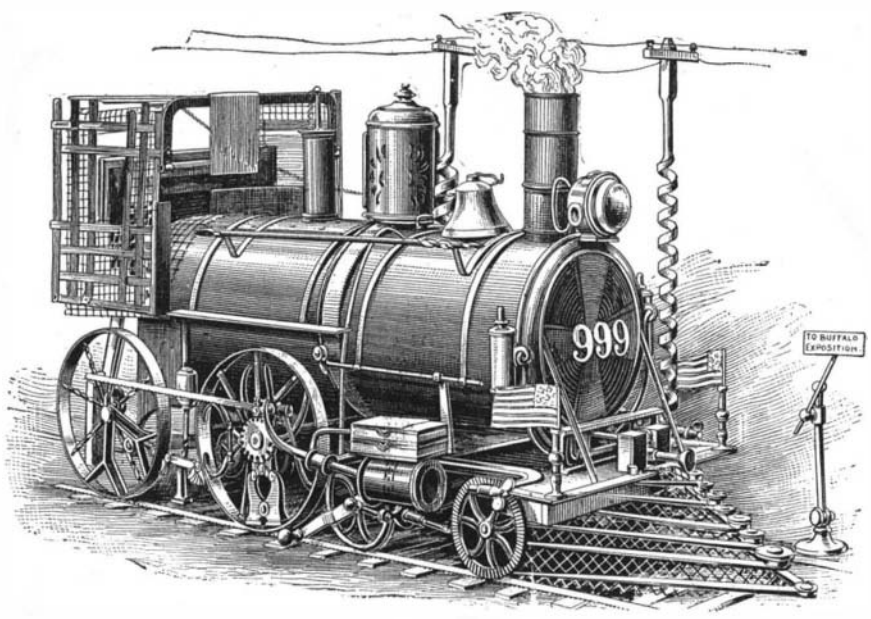
A HARDWARE LOCOMOTIVE.

A locomotive 42 inches long and 20 inches high stands in the show window of A. W. Gerstner, 632 to 634 Eighth Avenue, New York, says The Iron Age, to whom we are indebted for our engraving. It is constructed entirely out of articles taken from their stock by Sidney Stansbury, one of the clerks, who claims it contains some radical improvements over the famous Empire State engine, No. 999, after which it was modeled.

The several parts of the locomotive were made up as described below: Boiler, two plumbers' furnaces; head of boiler, one ventilator; front truck, four hand drills; platform for truck, two squares and six scale rules; cylinders, two piano makers' glue pots; steam chest, four pocket levels, four scrapers; steam pipe, two blowpipes; cow catcher, six calipers; draw head, dowel pointer and wire cutter; front rod to boiler, two legs of Starrett's dividers; piston rod, two legs of Starrett's dividers; frames and guides for piston rod, two hack-saw frames; Westinghouse air brakes, two chucks; shoe for same, two thread gages; connecting rod for driving wheels, two saw blades; cab, hack-saw frames and blades; smoke stack, one plumbers' grease cup; head light, one pocket lantern; bell, one hand bell; sand box, one brazing lamp; sand box tube, two blowpipes; whistle, one brazing lamp; hand rails on boiler, two bell hangers' bits; walk along boiler, two steel rules and two brass rules; smoke, Russia hemp rope; telegraph poles, three shin augers; railroad sign, one surface gage; side lights, two alcohol torches; eccentric rods, two blowpipes; firebox, two combination squares with center heads.

The four driving wheels are 8 inches in diameter, each being brass bound. The hubs of each are made of wire gages. The spokes of the first are composed of a pair of Starrett's cutting nippers, two thread calipers and center punch; the second of two center heads, two scale rules, four twist drills and two flat metal drills; the third of four pin vises and four screwdriver bits, and the fourth of one pair of Hall's cutting nippers, one pair end cutting nippers and five taps. Electric wire couplings were used for the driving rod pins. The track is made of saw webs and the ties of two-foot rules.



A HARDWARE LOCOMOTIVE.

THE LAUNCH OF THE BATTLESHIP "MISSOURI."

The battleship "Missouri," which was launched at the Newport News Shipbuilding and Dry Dock Company's yards on December 28, 1901, is the last of the three fine battleships of the "Maine" class to take the water. The "Maine" was launched at the Cramps shipbuilding yards, Philadelphia, Pa., May 30 of last year, and the "Ohio" was launched on May 22 at the yards of the Union Iron Works, San Francisco, Cal.

The "Missouri" is an enlarged "Alabama," with all the excellent characteristics of that ship and the added advantages of higher speed, larger coal capacity and a more powerful battery. The dimensions of the "Alabama" are: Length, 360 feet; beam, 72 feet 2½ inches; mean draft, 23 feet 6 inches; displacement, 11,656 tons; speed, 16 knots; and maximum coal supply, 1,355 tons. As at first designed, the "Missouri" and sister ships were to have been similar in size and speed to the "Alabama" class; but ultimately it was decided that, in view of the high speed being given to foreign battleships that were building when the "Missouri" contract was about to be let, the contractors should be asked to draw up designs of their own for vessels of 18 instead of 16 knots speed. To provide for the increased motive power necessary, and to secure the finer lines to suit the higher speed, the vessels were made 20 feet longer, the breadth and draft remaining the same, while the displacement was increased from 11,565 tons, as in the "Alabama," to 12,230 tons in the "Missouri." To secure the necessary 16,000 horse power for 18 knots speed, the "Missouri" is equipped with water-tube boilers and twin-screw vertical, triple-expansion engines. The displacement given, 12,230 tons, is that of the vessel when she is fully equipped, ready for sea, with all stores on board and a normal coal supply of 1,000 tons. When loaded to her fullest capacity she will displace 13,500 tons.

Both for offense and defense these ships are among the most powerful in the world. In the first place, they have an armor belt extending from the stem more than two-thirds of the way aft, which has a maximum thickness of 11 inches at the top and 7½ inches at the bottom, this thickness being maintained in the wake of the engines and boiler room. From the forward barbette the belt tapers to a thickness of 4 inches at the stem. Above the main belt there is a complete wall of 6-inch armor which covers the sides of the vessel between the main barbettes and extends to the level of the spar deck. Diagonal bulkheads of heavy armor extend from the main belt to a junction with the barbettes, while above the main bulkheads are bulkheads of 6-inch armor reaching from the 6-inch side armor to the main barbettes. The protection thus afforded against an enemy's projectiles is supplemented by the coal bunkers, which extend in the wake of the 11-inch and 6-inch side armor, and present a thickness of from 6 to 10 feet of coal against penetration by projectiles which might effect an entrance through the Krupp armor. Further protection against the entrance of water is afforded by a belt of cellulose, 3 feet in width, which is worked in at the back of the 6-inch armor at the point of its junction with the main 11-inch belt. The main barbettes for the 12-inch guns are protected with 12 inches of Krupp armor, while the turrets are 11 inches in thickness, except on the port plates, where the armor is increased to 12 inches.

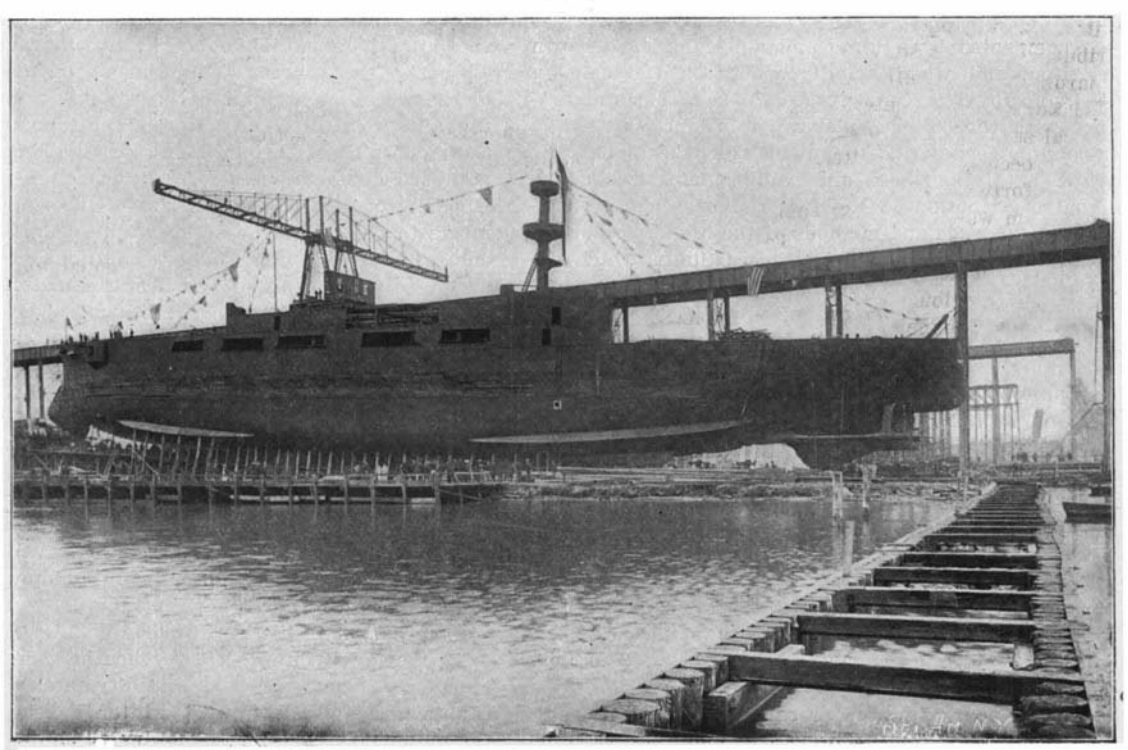
The main battery of four 12-inch guns is carried in the two main turrets forward and aft. The secondary battery consists of sixteen 6-inch rapid-fire guns. Of these, ten are mounted on the main deck behind the 6-inch armor, each gun position being separated from the next by a screen of 2-inch armor. Forward, toward the bow on the same deck, are two separate gun positions, protected by 6 inches of Krupp armor, in which are mounted two more of the 6-inch battery, while the other four 6-inch guns are carried two on each side of the vessel upon the spar deck, the protection consisting of 6 inches of steel. The rest of the rapid-fire battery consists of six 3-inch guns, four of them mounted on the gun deck aft and two of them on the main deck forward; eight 6-pounders and two 1-pounders mounted on the bridges and fighting tops, besides two Colts and two 3-inch field guns.

A new feature which has not before been adopted in the United States navy is the submerged torpedo tube, of which the "Missouri" will carry two. The dangers of above-water torpedo tubes were well exemplified in the Spanish war and in the battle of the Yalu between China and Japan. In both wars a vessel which carried above-water tubes was completely wrecked by the detonation of its own torpedoes—the result of their being hit by the enemy's shell fire. The torpedo tubes on the "Missouri" are located well below the water-line at about the depth at which the torpedo is desired to travel, and the firing stations for these tubes, which are above the water-line, are well protected by armor.

Although the "Missouri" has substituted the lighter 12-inch gun in her main battery in place of the 12-inch gun carried by the "Alabama," she will be able to deliver a much more powerful fire from these guns alone. Moreover, she carries two more guns of 6-inch caliber, and several of the very effective 3-inch pieces. All of these weapons are of the new long-caliber, smokeless-powder type, the 12-inch guns being 40 calibers in length and the 6-inch and 3-inch 50 calibers in length. The 12-inch gun has a muzzle velocity of 2,800 foot-seconds, and a muzzle energy of 46,246 foot-tons; the 6-inch piece has a muzzle velocity of 29,000 feet per second and a muzzle energy of 5,838 foot-tons; while the 3-inch gun has a muzzle velocity of 2,800 feet per second and a muzzle energy of 709 foot-tons. At 3,000 yards the 12-inch projectile, if provided with a soft cap, can penetrate 19.5 inches of Krupp steel, while the 6-inch projectile, if capped, can penetrate 5.9 inches of steel. The high velocity and consequent flat trajectory of the new guns increase greatly the danger zone, that is to say, errors of sighting are greatly reduced and the point-blank range is increased. Hence the number of hits that are liable to be scored by a gun crew will be much larger with the new guns than with the older weapons which they have supplanted. The "Missouri" will have a complement of 551 officers and men.

A new bath for the easy development of a quantity of negatives simultaneously has been devised by Herr Simonis. The dish is made of glass or glazed earthenware. It has a raised ridge running along the bottom of deeply corrugated sides. The photographic plates fit in the corrugations and rest on the bottom ridge so that the solution circulates between the plates over the films.

STERN VIEW OF THE BATTLESHIP "MISSOURI."



LAUNCH OF THE "MISSOURI."