

AMERICAN NAVAL ARCHITECTURE.

THE STEAMER "HANKOW."

This steamer, erected by Thomas Collyer, of this city, is owned by Messrs. J. M. Forbes & Co., of Boston. She will soon assume her appropriate position on the route of her intended service—the river trade in the Chinese empire. This is the third boat constructed for this firm for the China trade, all of which have been successful. We subjoin full and correct particulars of her hull, &c.:

Length on deck, from fore part of stem to after part of stern-post, above the spar deck, 212 feet; breadth of beam at midship section (molded), 30 feet 6 inches; depth of hold, 11 feet; depth of hold to spar deck, 11 feet 4 inches; draft of water at load line, 7 feet; light draft of water, 5 feet 6 inches; tonnage, 720 tons.

Her hull is of white oak, hachmetac, &c., and very securely cross fastened with copper and treenails. The floors are molded 14 inches; sided, 4 inches. Frames apart from centers, 27½ inches; these frames are strapped with diagonal and double-laid braces, 3½ inches by ½ an inch, thereby securing great strength and durability.

The *Hankow* is fitted with one vertical, beam, condensing engine; diameter of cylinder, 48 inches; length of stroke of piston, 12 feet; diameter of water wheels, over boards, 29 feet; material of same, iron; length of wheel blades, 7 feet 6 inches; depth, 2 feet; number of same, 26.

She is also supplied with two return tubular boilers, located in the hold; length of boilers, 20 feet; breadth of same, 11 feet; and their height, exclusive of steam chimney, is 9 feet; number of furnaces to each, 2; breadth of these, 4 feet 9 inches; length of grate bars, 7 feet; number of tubes above, in each boiler, 64; number of flues below, 10 in each boiler; internal diameter of tubes above, 5½ inches; internal diameter of flues below, 8 of 12½ inches, and 2 of 15½ inches; length of tubes above, 14 feet; length of flues below, 7 feet 10 inches; diameter of smoke pipe, 64 inches; height of same, above grate surface, 45 feet. The engine is fitted with expansion gear; point of cutting off, variable; the boilers possess a grate surface equal to 132 square feet, and a heating surface of 3,216 square feet.

In addition to these features, she is provided with one independent steam fire and bilge pump, and has bilge injections and bottom valves to all openings in her bottom. The depth of her keel is 4 inches. She has 2 masts and is schooner rigged. Ample protection has been made against fire, &c. The machinery was constructed by the Morgan Iron Works, foot of Ninth-street, this city. Capt. George W. Sand will command this vessel.

THE STEAMER "FIRE DART."

This steamer is intended for service on the Chinese coast. Her hull was constructed by Thomas Collyer, foot of Forty-third-street, this city; the machinery being supplied by the Neptune Iron Works. Her commander will be Capt. Henry W. Johnson. We append full and correct particulars of her hull and machinery:

Length on deck, from fore part of stem to after part of stern-post (above the spar deck), 200 feet; breadth of beam (molded), 30 feet; depth of hold, 11 feet; depth of hold, to spar deck, 11 feet 3 inches; draft of water at load line, 5 feet 6 inches; area of immersed section at the above draft, 140 square feet; tonnage, 650 tons.

Her hull is of white oak, hachmetac, &c., and cross fastened with copper and treenails. The frames are molded 14 inches; sided, 5 inches, and 26 inches apart from centers; these frames are strapped with double-laid and diagonal braces, 3½ inches by 7-10ths of an inch. The floors are not filled in solid.

The *Fire Dart* is fitted with one vertical, beam, condensing engine; diameter of cylinders, 46 inches; length of stroke of piston, 12 feet; diameter of water wheels, over boards, 28 feet; material of same, iron; length of wheel blades, 8 feet; depth of same, 2 feet, and the number is 24.

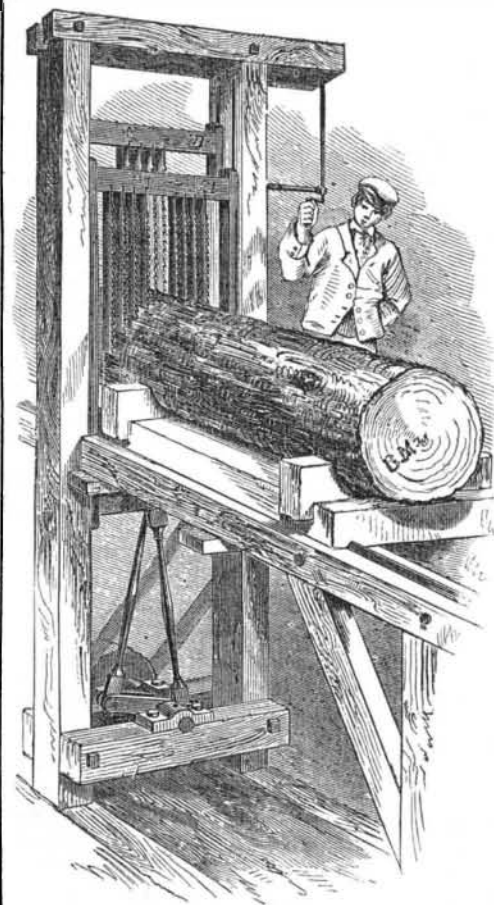
She is also supplied with two return-flue boilers, located in hold; length of boilers, 27 feet; breadth of same (at furnace), 9 feet 9 inches, and their height (at shell), exclusive of steam chimney, 8 feet, 9 inches; number of furnaces, 2 in each boiler; breadth of these, 4 feet 3 inches; length of grate bars, 7 feet; number of tubes above, 14 in each boiler; number of flues below, 10 in

each boiler; internal diameter of tubes above, 7 inches; internal diameter of flues below, 6 of 12 inches, 2 of 14 inches and 2 of 16 inches; length of tubes above, 19 feet 6 inches; length of flues below, 14 feet; diameter of smoke pipe, 72 inches; height of same above grate surface, 42 feet. The engine is fitted with expansion gear; point of cutting off, variable.

Ample protection has been made against communication from fire by the boiler, by zinc, felt, &c. The boiler possesses a grate surface equal to 120 square feet, and a heating surface of 3,259 square feet, the keel is 4 inches in depth. She has one independent steam fire and bilge pump, and bilge injections and bottom valves to all openings in her bottom; bunkers of wood; has 2 masts and is schooner rigged. This vessel is owned by Messrs. Augustine Heard & Co—an American house in China. She has been constructed of the best materials, which have been put together in a masterly manner. The model appears to be without fault, and it is hoped that she will equal any of her builder's previous efforts.

WESTON'S IMPROVEMENT IN HANGING SAWS.

Uniformity of resistance is very important in order to secure a good running of machinery, and there is perhaps no machine in which there are more frequent changes in the amount of resistance than in the reciprocating saw. As the whole of the cutting is done during the descent of the saw, and none while it is rising, the rapid alternations of great resistance with an almost complete cessation of resistance, sometimes produce vibrations which shake the whole mill. This difficulty is very effectually obviated by the plan here illustrated,



the invention of Charles Weston, of Salem, Mass., which consists in the employment of two saw gates, one just in the rear of the other, both operated by pitmans from a double crank on the same shaft. The front gate, A, has two or more saws to operate, upon the outer portions of the log, while the rear gate, B, carries the saws for cutting the middle portion of the log. As one saw is descending, and consequently cutting, while the other is rising, the resistance is rendered very nearly uniform; and all the jerks, strains and vibrations caused by the old mode of hanging are avoided.

The patent for this invention was procured through the Scientific American Patent Agency on the 8th of May, 1860; and further information in relation to it may be obtained by addressing Charles Weston & Sons, Salem, Mass.

TO MAKE STEEL FROM PIG IRON.

The last number of Newton's *London Journal of Arts* contains a report of an interesting patent trial had before Baron Wilde, at Liverpool, England, relating to the infringing of Rieppe's English patent for manufacturing the famous "puddled steel" from pig iron. The suit was brought by Jacob Mayer, steel manufacturer, of Prussia (the assignee of the patent), against Messrs. James Spence and F. Worthington, manufacturers of steel and tin plate. Ewald Rieppe—now deceased—was a German, and obtained his patent in 1850, and since that time puddled steel has become well known. The most distinguished patent counsel were employed on both sides, and men of great scientific reputation appeared as expert witnesses, who, as usual in such cases, contradicted each other. The evidence before the court was substantially as follows:—

The common method that had before been practiced in the making of steel was by reducing pig iron to wrought iron—which contains less carbon than steel—then carbonizing this wrought iron again in close crucibles. The object of Rieppe's invention was to stop the decarbonization of pig iron in the puddling furnace, at that point where it holds the exact amount of carbon in steel, and thus do away with the old round-about process of cementation. In the specification of Rieppe, the invention is described as follows:—"I employ the iron puddling furnace in the same way as for making wrought iron. I introduce a charge of about 280 pounds of pig iron and raise the temperature to redness, and as soon as the metal begins to trickle down in a fluid state in the furnace, the damper is to be partially closed to temper the heat. From twelve to sixteen shovelfuls of cinder (oxyd of iron) taken from the squeezers, are now put in on the top of the molten iron, and the whole is then uniformly melted down. A little black oxyd of manganese, some common salt, and dry clay (technically called "physic"), in powder, are now placed among the mass. Up to this point, the process is the very same as that for making puddled iron, but at this point, 40 lbs. of pig iron are put into the furnace near the fire bridge, upon an elevated bed of cinders, and when this melts and trickles down, and when the other mass of 280 lbs. also throws up a well-known blue flame, the 40 lbs. of the pig iron are raked into the mass, and the whole mixed together. The entire mass now swells up, small grains are seen to form in it and then break through the cinder on the surface."

This is the grand criterion point claimed as Rieppe's invention; this is the sign or discovery made by him that the melted mass is now steel, that the requisite quantity of carbon has been expelled, and that a sufficient quantity for steel remains. This, then, is the point at which to arrest the decarbonizing process, and is an important discovery, because everything in the management of the furnaces depends upon the appearance of the iron. As soon as these grains appear in the puddling furnace, the damper is shut down about three-fourths, and the mass is thoroughly stirred. The blue jets of flame now gradually disappear, the peculiar grains fuse together and form a wax-like mass, which is then gathered together in a ball, taken out and rolled or hammered, and is the steel. Such is a description of Rieppe's process for making steel from pig iron in a puddling furnace.

Mr. Wm. Clay, of the Mersey Steel Works, Liverpool, stated that he manufactured steel by license under Rieppe's patent; he did this without difficulty; but unless he wanted very hard steel, for tools, he never added the extra forty pounds of pig iron. He manufactures puddled steel on a large scale, and has been engaged in the business all his life, but never knew how to make it from pig iron until he read the specification of Rieppe.

Dugald Campbell, an analytic chemist, of London, Dr. Frankland and Mr. Homersham had been appointed by the court to examine the works of Messrs. Spence & Worthington, and report how the process was conducted in them. Mr. Campbell stated that a common puddling furnace was employed with the exception that it contained two fireplaces and no dampers in the chimney. When the decarbonization of the pig iron was to be stopped in the furnace, instead of doing this by shutting down the damper to exclude the air, the air was excluded by shutting the ashpit doors.

He considered that the process of the defendants