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THE "LORD CLYDE"—ENGLISH IRON-CLADS.

The English Government has lately completed another iron-clad vessel of large dimensions both in hull and engine.

The vessel is of the class adopted by the English, being high out of water, and presenting a fair mark in hull and spars for artillery practice.

The hull is 280 feet long, 59 feet beam and 21 feet deep, and is 4,067 tuns burthen and finely modeled. The engines are the largest afloat; they are of the double piston-rod pattern, back-acting, with cylinders 116 inches in diameter and 4 feet stroke. The cylinders weigh nearly 30 tuns, and have slide valves working *vertically* (?) on the outside, by link motion; also gridiron expansion valve worked directly from the main shaft by eccentrics. The boilers are 9 in number and have brass tubes 2¼ inches in diameter, with an aggregate heating surface of 19,000 square feet, and 700 feet of grate surface. The chimneys are 7 ft. 6 in. in diameter. There are surface condensers on Hall's plan; that is to say, the tubes are packed, top and bottom, with glands and stuffing-boxes, to allow them to expand without leaking. Two centrifugal pumps supply the water for circulation; these are worked by independent or donkey engines. Steam is used superheated in the main engines. Auxiliary engines are also supplied to work the main engines at starting or in maneuvering. The screw is four-bladed, 23 feet in diameter, and 22 feet 6 inches pitch.

At the trial of these massive engines on the measured mile, with steam at——pounds, and vacuum at 28 inches, the speed obtained was 13½ knots per hour. The speed of the screw was 12·825 knots per hour, showing a negative slip of three-fourths of a knot. The draft of water was 22 feet forward, and 24 feet aft—a condition highly unfavorable to speed. It is not stated by our cotemporary, the London *Engineer*, from which we derive these particulars, what pressure of steam is carried, or the grade of expansion.

The *Lord Clyde* is the fastest vessel in the English navy.

THE DIFFERENCE BETWEEN DISTILLED AND FERMENTED LIQUORS.

In all ardent spirits the alcohol is formed from sugar by fermentation; in distilled liquors a portion of the water has been separated by distillation; the difference, therefore, is, that distilled liquors contain more alcohol in proportion to the water than merely fermented liquors.

Brandy is obtained by the fermentation of the sugar of various fruits—fructose; rum by the fermentation of cane sugar; and whisky by the fermentation of glucose, the sugar which is produced from the starch of various grains and roots. In all these cases a fermented liquor is first produced, and then a portion of the water is separated by distillation.

The process of distillation depends on the difference in the volatility of alcohol and water. Alcohol boils at 173° and water at 212°; by subjecting a mixture of the two, therefore, to a temperature of 173°, the alcohol is boiled away, and the water is left behind. The vessel is closed by an air-tight cover, from which a long pipe, bent in spiral form, is wound through a tub of cold water, and thus the vapor of alcohol is condensed to the liquid state again, when it can be caught and barreled. Alcohol has, however, so strong affinity for water, that it carries over considerable, and the separation by distillation is far from perfect; the strongest liquors obtained in this way do not contain more than 54 per cent of alcohol. A further portion of the water is separated by passing the liquor through quicklime, or other substance for which water has a stronger affinity than it has for alcohol.

Brandy and whisky both make their first appearance in fermented liquors—brandy in wine, cider, or perry; and whisky in ale or beer. The difference in the flavor of these liquors is due to the presence, in very minute quantities, of certain essential oils and ethers. From the extremely small quantities of these oils, it might be supposed that there could be no difference between brandy and whisky in their action on the system; but this is not a safe inference. As the action is upon the nerves, it is impossible to say how small a quantity may produce the most important effects.

FIVE HUNDRED DOLLARS REWARD FOR A VARNISH.

In our advertising columns will be found an offer, by the Aerial Navigation Company, of a reward of $500 for a baloon varnish that will fill certain conditions, one of these conditions being, that it shall prevent endosmosis and exosmosis. As these terms may not be familiar to all our readers, let us briefly explain them.

If a piece of bladder is tied over the lower end of a long glass tube, and the tube, partly filled with alcohol, has its lower end inserted in a vessel of water, the water will pass inward through the bladder more rapidly than the alcohol will pass outward, and the liquid in the tube will consequently rise upward until it overflows at the top. Dutrochet, who first examined this phenomenon, called the flowing inward of the liquid endosmosis, from the Greek *endon* inward, and *osmos* impulse. At the same time a small portion of alcohol passes outward, and this movement be called exosmosis. At the present time the flow in both directions is designated by the general term osmose.

The explanation of the experiment described is, that the bladder absorbs water more readily than it does alcohol; as the water reaches the upper surface of the bladder it mixes with the alcohol, in accordance with the general law of liquid diffusion, giving place for the absorption of a further supply of water. On the other hand, the flow of alcohol in the opposite direction is in proportion to its affinity for the substance of the bladder.

In almost every case in which osmotic action occurs, a chemical change is wrought in the material of the bladder or other membrane employed; and if a partition of gypsum, clay, compressed charcoal, or other porous substance that is not acted on by the liquids, is substituted for the organic membrane, no osmotic action takes place.

When balloons are filled with hydrogen gas, or with carbureted hydrogen, and surrounded by the mixture of oxygen and nitrogen that constitutes our atmosphere, the gas within the balloon passes outward through the oiled silk or other material of the balloon, and the atmospheric air passes inward. This transference is called by some osmose, but we suppose the term not to be applicable in this case. If the interposing membrane exerts no absorbent action on the gases, but if they merely pass mechanically through its pores, the action would not be called osmotic.

What the advertisers want, however, is a material that will retain the light gas within the baloon, and will exclude the atmospheric air.

PROFESSOR CHANDLER ON BOILER INCRUSTATIONS.

We noticed last week a report on boiler incrustations made to the President and Directors of the New York Central Railroad, by Charles F. Chandler, Ph. D., Professor of Analytical and Applied Chemistry in the School of Mines, Columbia College, New York, and, in accordance with our announcement, we now proceed to lay the principal portion of this report before our readers.

PLAN OF THE INVESTIGATIONS.

"The following investigations were undertaken with the object of diminishing, as far as possible, the bad effects of the impure water supplied to locomotives on the section of the New York Central Railroad between Syracuse and Rochester. The large quantities of sulphate of lime and of the carbonates of lime and magnesia which these waters contain give rise to incrustations, varying from a loose mud to a hard crystalline scale. These deposits form a non-conducting lining to the boiler, involving loss of heat and consequent waste of fuel, and at the same time cause an over-heating of the metal, sometimes resulting in destructive explosions. The quantity of incrustation produced varies greatly. As much as thirteen hundred pounds have been taken from a boiler at one time, though this is an extreme case. The most serious injury from these waters is suffered, however, by the lower plates of the boilers, which are rapidly corroded in deep furrows and pits, and are sometimes even completely perforated, particularly along joints and about braces.

"In planning these investigations it was considered desirable—first, to subject the waters to careful analyses; second, to analyze the incrustations; third, to examine the various articles and methods in use for preventing incrustations and corrosion; fifth, to institute a series of experiments on the boilers themselves."

COMPOSITION OF WATERS NOW SUPPLIED TO LOCOMOTIVES.

Stations.	Corroding Constituents.						Incrusting Constituents.						Incrustat'n Preventives.			
	Ch. of Potassium	Ch. Sodium	Ch. of Magnesium	Sul. Potassa	Sul. Soda	Sum.	Sul. of Lime	Car. of Lime	Car. M'gnesia.	Oxide of Iron.	Silica	Sum.	Car. Potassa	Car. of Soda	Org. Matter	Total.
Syracuse, Onondaga Creek	0·32	2·14	....	....	0·98	3·44	10·68	7·25	4·31	0·06	0·28	22·58	....	....	0·31	26·36
Syracuse, Hydrant	0·24	....	....	0·07	0·07	0·38	16·71	6·84	3·69	0·06	0·25	27·55	....	....	trace	27·93
Warner's	1·91	[illegible]	....	1·81	....	3·72	....	7·17	3·63	0·11	1·37	11·29	2·17	6·09	0·37	23·63
Memphis	0·29	0 6	....	....	0·36	0·91	10·12	6·75	4·11	0·09	0·31	21·68	....	....	0·18	22·77
Jordan	0·33	0·76	....	....	0·62	1·71	4·02	5·03	2·30	0·03	0·09	11·47	....	....	0·06	13·24
Port Byron	0·39	....	....	0·32	0·37	1·08	0·01	5·43	1·57	trace	0·16	7·17	....	....	1·28	9·53
Savannah	0·59	....	....	0·07	0·69	1·35	....	11·93	5·04	0·13	0·56	17·63	....	....	1·52	20·50
Clyde: Spring	0·14	....	....	0·18	0·45	0·77	....	9·66	4·40	trace	0·58	14·64	....	....	2·16	17·58
Clyde River	0·52	0·37	....	....	1·21	2·10	4·40	6·07	3·03	trace	0·80	14·30	....	....	1·88	18·28
Lyons	0·29	....	....	0·03	0·71	1·03	3·17	4·38	3·34	trace	0·18	11·07	....	....	1·00	13·10
Newark	0·47	0·38	....	....	0·32	1·17	3·19	9·15	6·01	0·08	0·30	18·73	....	....	2·16	22·07
Palmyra	0·76	....	....	....	0·67	1·43	18·81	8·41	5·98	0·02	0·17	33·39	....	....	1·46	37·28
Macedon Swamp	0·14	....	....	0·18	0·39	0·71	0·14	7·68	2·23	trace	0·48	10·53	....	....	0·80	12·04
Fairport	0·34	0·69	2·16	....	....	3·19	8·72	5·07	1·03	0·04	0·20	15·06	....	....	1·14	19·39
Rochester, North street well	0·96	4·82	1·53	....	....	7·31	6·46	16·92	8·88	0·10	0·90	33·26	....	....	1·60	42·17
Rochester, Genesee River	0·28	0·05	....	....	0·85	1·18	3·16	4·64	2·06	0·69	0·90	10·85	....	....	1·64	13·67
Rochester, Canal, Round House	0·33	0·17	....	....	0·61	1·11	2·16	4·60	1·81	0·05	0·18	8·80	....	....	1·24	11·15
Average	0·49	0·67	0·22	0·16	0·49	1·93	5·39	7·47	3·75	0·05	0·39	17·05	0·13	0·36	1·10	20·57

The numbers represent grains per gallon of 231 cubic inches.