

**ENGINES OF THE STEAM YACHT LADY TORFRIDA.**

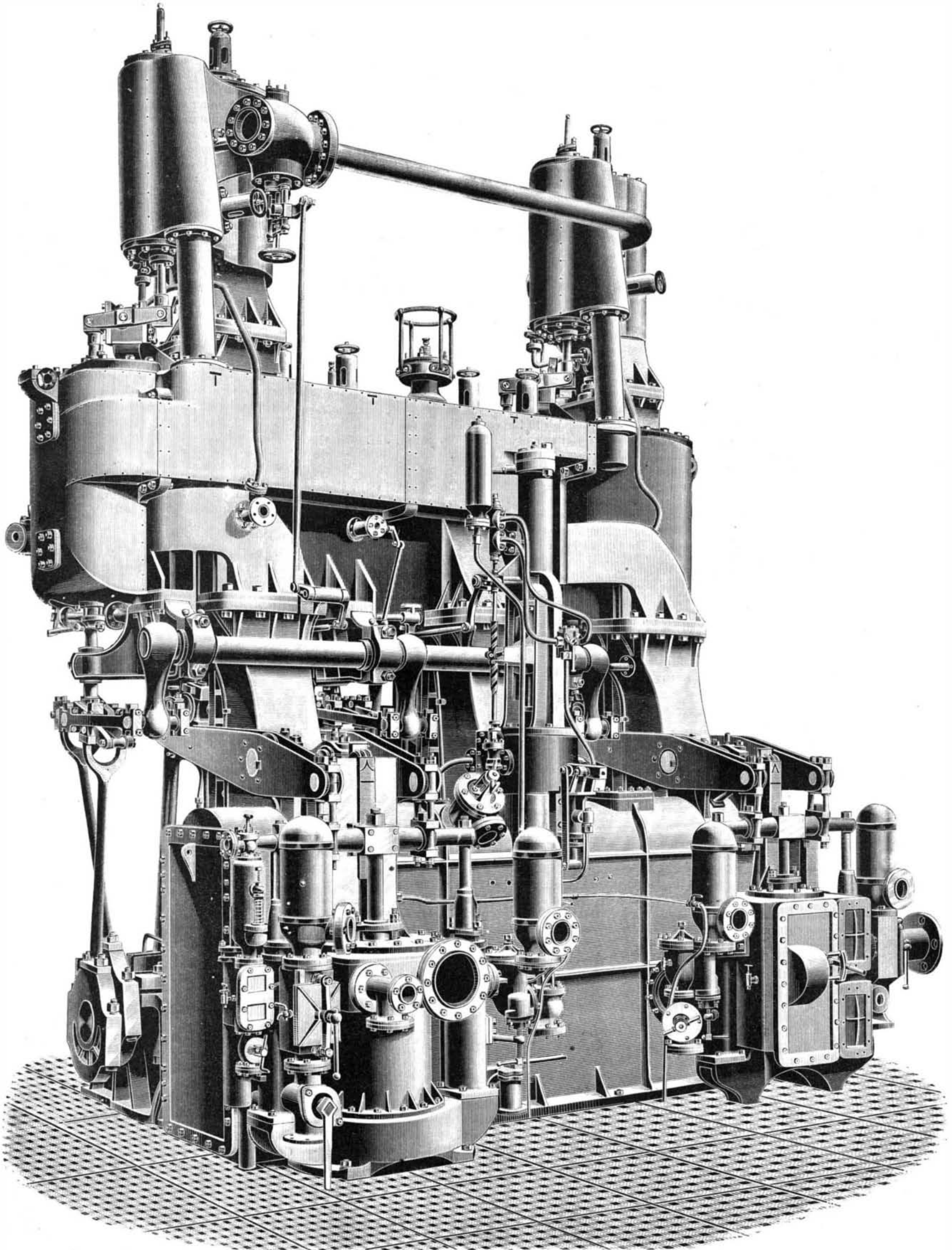
The Lady Torfrida was built by the Fairfield Shipbuilding and Engineering Company, Govan, Glasgow, for the late Sir William Pearce, Bart.

The engines of the Torfrida have five cylinders, two being high pressure cylinders 14 $\frac{1}{4}$  inches in diameter,

valve to each of the other cylinders. All the valves are worked by double eccentrics and link motion.

The crankshaft is in one forging and is, together with the tunnel, thrusts and propeller shafts, made of steel. The propeller has four movable blades of manganese bronze. The design of the engines generally compre-

boiler 15 feet 9 inches in diameter and 9 feet 5 inches long, having four corrugated furnaces. The boiler is constructed entirely of steel, for a working pressure of 150 pounds per square inch. The shell of the boiler is made in two plates only, which is an important feature in boiler construction of this size.



TRIPLE EXPANSION ENGINES OF THE STEAM YACHT LADY TORFRIDA.

and two low pressure cylinders 38 inches in diameter, and one medium pressure cylinder 30 $\frac{1}{2}$  inches in diameter. This medium pressure cylinder is placed in the center and at either side of it is a low pressure cylinder with a high pressure cylinder above. The cylinders thus arranged work a three-throw crankshaft, the piston stroke being 30 inches. A piston valve is fitted to each high pressure cylinder, and an ordinary slide

hends all the newest appliances. Among other fittings, a feed water heater is fitted to the feed pipes.

There is an electric engine and a Kapp dynamo placed in the engine room, with a number of storage batteries, so that the light can be maintained throughout the ship for a considerable time without working the electric engines.

Steam is supplied to the engines by one single-ended

boiler fitted on board for supplying steam to the electric engines and for other subsidiary purposes.

The Lady Torfrida is of beautiful model. She has a clipper stem, with handsome figure head, and elliptical stern. She is 216 feet 6 inches long, 27 feet beam, and 19 feet depth moulded, and her tonnage is 735 tons. The vessel is schooner rigged, with long, rakish masts,

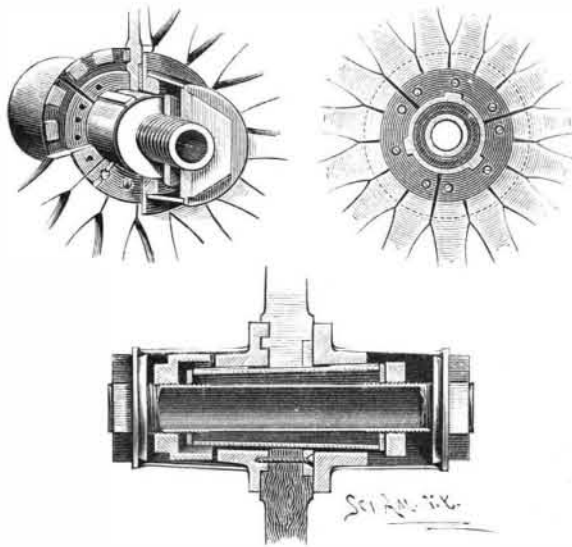
and is fitted with a steam windlass forward, and hand and steam steering gear aft, with a small steering wheel on the bridge amidships. All the deck fittings are of manganese bronze. There is a large steel deck house amidships, covered with teak, inclosing the engine and boiler space, deck saloon, and smoking room, and in addition affording entrances to the cabins forward and aft. The accommodation is well planned, and the decorations and furnishings do credit to the artistic taste of the late owner.

The accommodation for the officers and crew is provided aft, and for the former it includes a general mess room and cabin for each.—*Engineering.*

**A NEW WHEEL HUB.**

The engraving shows in three sectional views a novel wheel hub, in which the inner ends of the spokes rest upon a slightly elastic support, and in which the wheel is made expansible within certain limits to give it the required amount of "dish," and also to cause it to closely fit the tire.

A spindle box forming the central or foundation part of the hub is provided at opposite ends with an exterior screw thread for receiving at one end a plain nut and upon the other a cup-shaped nut. Between these two nuts is placed a conical sleeve of elastic material, and upon the conical sleeve are arranged flanges, each of which is formed in three segments. One of the flanges is furnished with inwardly-projecting lugs for locking the spokes. The spokes are connected by means of a segmental flange secured by bolts passing through alternate spokes into the flange upon the smaller end of the conical sleeve. The segmental flanges are arranged to register with each other, so as to permit of the expansion of the wheel. Metallic shells are slipped over the bosses of the segmental flanges and held in place by nuts upon the ends of the spindle box. A cup-shaped nut in the interior of the shell



HALL'S WHEEL HUB.

bears upon the boss of the segmental flange on the smaller end of the elastic sleeve.

When it is desired to expand the hub, the segmental flanges are moved forward by turning the cup-shaped nut. The conical elastic sleeve is provided with longitudinal ribs which fit in corresponding grooves in the other parts, and hold the parts in their proper relative positions.

The lower view shows the hub in section; the upper right hand view shows the parts before the flanges are applied, and the upper left hand view represents the hub with parts broken away to show the interior construction.

This invention is patented by Mr. Thaddeus M. Hall, of Grenada, Colorado; and Messrs. L. W. Markham and Thomas H. Cecil, of Lamar, Colorado, are owners of one-half of the invention.

**New Green Vegetable Coloring Matter.**

In a paper presented to the Royal Society of Edinburgh, Mr. C. M. Smith describes a green coloring matter obtained from the bitter green pulp of *Trichosanthes palmata*. The spectrum of the alcoholic solution of this substance differs from that of chlorophyll in its first absorption band having its center nearly midway between the two chief bands in the spectrum of true chlorophyll, while the bands III, IV, and V are probably coincident with corresponding chlorophyll bands. The behavior of this substance with ammonium sulphide differs altogether from that of chlorophyll. It appears to be a substance in which the "blue chlorophyll" of Sorby, or the "green chlorophyll" of Stokes, is replaced by some other substance easily decomposed by reducing agents and by acids.

Mr. C. B. Atwell records, in the *Botanical Gazette*, the occurrence of true chlorophyll in the embryo of *Tilia americana* and *Ipomoea purpurea*. In the latter species the chlorophyll makes its appearance as soon

as the first traces of cotyledons can be recognized in a cross section of the seed, and it is abundant in the capsule while the seeds are developing.

**IMPROVEMENT IN THE UTILIZATION OF WATER POWER.**

We give an engraving of a novel device for utilizing the power of the falls of rivers and other water-courses where the fall is sufficient to permit of the application of the invention.

As will be seen by a reference to the illustration, a number of sluices or cuts are made in the river bed, which extend up the river. The walls of these cuts are lined with masonry which extends above the river bed to a point above the high water line, and upon these walls are built the mills or power houses. The spaces between the power houses or mills serve as canals or flumes for supplying water to the turbines located in the power houses. The penstocks for supplying water to the turbines are made by boring holes in the bed of the river and continuing them upwardly through the walls. A number of these penstocks are provided, and each one communicates with an inlet from the flumes, and at the lower end of the penstock is arranged an outlet for discharging the water from the turbine into the cut or tail-race between the buildings. Truss gates like that shown in detail in Fig. 2 are placed at the upper ends of the cuts or tail-races, to shut off the water, and cause it to flow around the power houses. Covered bridges extend between the power houses and communicate with them through stairways, the bridges being built on the top of the houses so as to be out of the way of any floating material that may come down the stream. The upper ends of the walls upon which the houses rest are provided with suitable ice breakers, and the gates at the head of the tail-races are made sufficiently strong to withstand any pressure that may be brought to bear upon them.

This invention has been patented by Messrs. A. H. & A. Quain and G. P. Warner. Further information may be obtained by addressing Mr. A. H. Quain, Seio, Oregon.

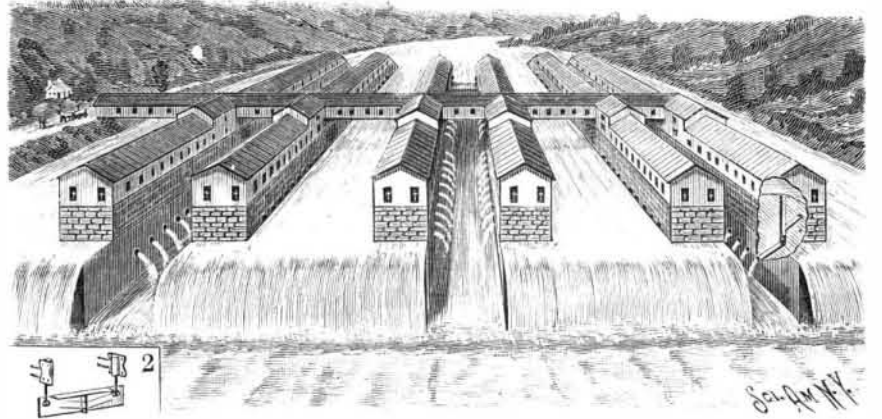
**A NEW FARM GATE.**

We give herewith an engraving of a farm gate provided with simple and effective mechanism for unlatching and opening, and closing and latching the gate from either side, and for locking the gate in an open position. The gate is pivoted in a frame formed of the posts, a sill, and a cross bar connecting the tops of the posts, and the pivoted stile of the gate is extended to the upper cross bar. The inventor preferably extends a pivot from the center of the stile into the sill, but in some cases he uses ordinary hinges. In the gate is pivoted a long latch which extends from the free end toward the pivoted end, the end of the latch nearest the end of the gate being made heavier so as to cause the latch to close by its own gravity. To the gate post is secured a notched plate having beveled ends for receiving the projecting end of the latch.

To the upper bar of the frame in which the gate is pivoted is fulcrumed a lever carrying a toothed sector which engages a pinion on the upper end of the pivoted stile, and to the free end of this lever is pivoted a trip bar, the lower end of which is connected by a cord with the inner end of the gate latch, the cord passing through a guiding loop projecting from the stile of the gate. To the upper end of the trip bar are attached four cords, arranged in pairs, which extend in opposite directions. One cord of each pair extends through an eye supported by an arm attached to a post a short distance from the gate. The other cords pass over pulleys which reverse their direction; these also pass through the eyes supported by the posts. By pulling one of the cords, the trip bar is tilted, thus lifting the longer arm of the latch, and releasing the gate, at the same time a further movement of the cord operates the sector lever and swings the gate. Catches are provided for holding the gate open, and the operation of closing the gate is the reverse of that just described. This invention has been patented by Mr. Charles Oesterling, Barnhart's Mills, Pa.

**Richard Francis Burton.**

Sir Richard Francis Burton, the famous African explorer, died on October 20 at Trieste. Sir Richard was born in 1821 in Hertfordshire, England, graduated at Oxford, and in 1842 joined the East Indian service. He commenced his explorations in the Neilgherry Hills, in India, and then acquired a wide acquaintance with Eastern languages. In 1851 he visited Mecca and Medina as a wandering dervish and wrote up his trav-



HIGH-GRADE WATER POWER UTILIZER.

els. He later visited East Africa, served in the Crimean war, and in 1856, with Capt. Speke, penetrated to the lake regions of Central Africa and discovered Lake Tanganyika. Since 1872 he had been British consul at Trieste. He published in all over fifty books of travels in Africa, the United States, Brazil, Palestine, Arabia, India, etc.

**New Bleaching Fluid.**

Ozonin, a bleaching fluid, patented by L. Schreiner, is made as follows: 125 parts resin are dissolved in 200 parts oil of turpentine, to this solution is added a solution of 22.5 parts potassium hydrate in 40 parts water, also 90 parts hydrogen peroxide. The resulting jelly exposed to light changes in 2 or 3 days into a thin fluid called ozonin, this same change takes place in the dark, but then requires some weeks for its completion. An emulsion of one gramme ozonin in one liter water acts as an energetic bleaching agent on fibers, wood, straw, cork, paper, also on solutions of gums and soaps; the bleaching effect is as energetic in acid as in alkaline solutions.—*Chemiker Ztg.*, 1890, 1004.

**A Process for Recovering Tin.**

The French Society for the Encouragement of National Industry have given the prize allotted for the utilization of works' residues to M. Martinon, for his process of recovering the tin contained in the wash waters from silks which have been treated with bichloride of tin, for the purpose of giving weight. By adding milk of lime to the water, and by properly agitating, the tin settles down in a few hours in the state of oxide, which can be readily collected and disposed of. This economy is said, for Lyons alone, to effect an annual saving of \$60,000.

HUDSON MAXIM, of Pittsfield, Mass., brother of Hiram Maxim, the well known inventor, has developed a new smokeless powder for guns, that has, so far as tested, merited the eager attention of army officers. The production of a new small caliber rifle is entirely dependent upon the result of tests of this class of



OESTERLING'S IMPROVED GATE.

powder, and at present the tests made with the Maxim powder give gratifying evidences of success.

ONE of our leading doctors says a potato is most digestible if boiled in its jacket.