hurricane deck, will be elliptical in section, the long axis being parallel with the keel of the boat.

The effect of these changes will be to give 20 per cent more room for trucks and carriages. By abolishing side wheels, the large paddle-wheel boxes which now encroach upon the cabin spaces on either side of the present boats will be done away with, and unincumbered cabins will be provided. In this way the capacity for passengers will be increased 35 per cent.

But it is not only in these respects that the boat is expected to be an improvement on the old system. It has been found that ferry slips can be cleared of ice very advantageously by the use of a tug boat. This ice often forms to a very great depth, and paddle wheels are found quite inefficient in coping with it. A tug boat is driven into the slip until all the ice from its stern outward is expelled; it is then withdrawn and backed into the slip until the rest of the ice has been driven out. This has been found to be a most effective way of disposing of the trouble. Paddle wheels only drive ice twenty feet away, but the screw has a greater range of action. The new boat, with a screw at each end, both working in the same direction, will have a double effect. The front screw will create powerful water currents which will carry the ice toward the stern, and the after screw will supplement the work and send the ice out far into the stream. It is believed that even this one boat will play an important part in keeping the slips clear in winter for the other side-wheel boats that will run over the same route.

In order to be adapted to the requirements, the model presents certain peculiarities. A very clean run fore and aft is requisite, in order to give good water for the screws to work in, so that below the water line her model is very fine. On account of its overhanging guards and the crowds of people that it carries, and which are liable to crowd always toward the front end, a high initial stability is required in a ferry boat. The hull, therefore, as it rises swells out, so that for some distance above and below the water line it is characterized by exactly the opposite lines of those mentioned. The bow and stern, as she floats, will appear very full, while the model, further down, is a sharp one.

In general dimensions she is 200 feet in length, and 62 feet across her guards in extreme width. Her hull is 32 feet wide, and 17 feet deep. With engines and all in place, and her load of passengers on board, she will draw from 9½ feet to 10 feet. Her boilers, which are 8 feet in diameter and 23 feet long, are of tubular type, and will work at 160 lb. pressure. She has two furnaces, each one 3 feet 4 inches by 6 feet 9 inches. They will burn about 14 lb. of coal per square foot per hour. Her engine is a triple expansion one. It has one 18½ inch, one 27 inch, and one 42 inch cylinder, all of 24 inch stroke. The crank pins are of uniform diameter, because the engine will have to work as much in one direction as in the other. The shaft will vary from 8¼ to 8¾ inches in diameter. The screws, which were in place when she was launched, are 8 feet in diameter, and 9¼ feet pitch. In making them, both faces were made exactly alike, because they have to be worked first in one direction and then in the other. She is built of steel throughout.

In one of his papers read before the Naval Institute, Lieut. Zalinsky alluded to the use of ferry boats for harbor defense, stating that pneumatic dynamite guns might be mounted on them, and that such vessels would do good service against a hostile fleet. This new ferry boat emphasizes this suggestion. It has no paddle wheels to be damaged by shots or ramming. As will be observed, all its machinery is under the deck. By the addition of ballast it could be submerged still deeper, so as to bring most of it under the water line. Coal bunkers could be introduced on each side of the engine and boilers, to further protect them, while the guards could be used for the suspension of torpedo nets. The space included between the guards and the sides could be lined with cofferdam or other light resisting material as a species of armor. Should such measures be found necessary, she could readily have been made stillmore serviceable, a deflective deck could have been easily introduced, and the coal bunkers could have been disposed so as to protect her machinery.

The practicability of making use of the ferry boat type as a war vessel was abundantly proved in the late rebellion, when so many were called into active service. This new vessel would certainly be much more efficient if impressed into service than the old-fashioned paddle wheel type. With our present defenseless seaboard, such considerations are not wholly without weight, and the advantage of having a class of boats at our disposal that could be quickly converted into an efficient river fleet is not to be underestimated. Of course this feature was not borne in mind in the construction of the Bergen, the chief advantages sought for being greater room, higher speed, a more efficient and powerful vessel with which to cope with the ice blockade in the river and slip, and more commodious, airy, and handsome saloons, extending unbroken through the entire length of the boat.


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## SCIENTIFIC AMERICAN SUPPLEMENT

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### ELECTRICITY AND PLANT LIFE.

From time to time, of late years, experiments have been made of the effect of the electrical light on flowers and plants, with results seemingly the same, to wit, feeble efforts of some plants to prolong their periods of bloom into the night and then premature decay. One has only to study their actions, as observed, to conclude that even plants need rest, or, to be more precise, they seem to thrive best under the conditions which Nature has imposed—the period of darkness and the period of the light, which is heat as well; or else that the family of plants, as now they are, sprung from these exact conditions, and will not thrive without them. It is the nature of some flowers, as every one knows, to open at one period of light and close at another; of others to open only at night and close before or at the moment when the orb of day tops the horizon. So strictly do some of these follow their unwritten laws, that floral clocks have been constructed, so that one may step out into his garden, of a bright day or clear night, and learn the time by the condition of bloom on the floral dial.

Prof. Wollney, of Munich, satisfied by experiment that electrical light will not advance or improve plant growth, recently tried the effect upon them of the current itself. We quote the following, being the means employed and its result:

He "took patches of ground 12 or 13 feet square, separated by boards penetrating the earth to the depth of a foot. In one case he applied two earth plates and interposed five earth cells; in another he inserted an induction apparatus; and in a third, a plate of copper at one side and a plate of zinc at the other side to form a natural battery. Peas, potatoes, carrots, etc., were planted on these and other patches, but the electricity, whether of high or low potential, seemed to have either no influence or a bad one upon their growth."

Plants being full of sap, and sap a fairly good conductor, every fiber must have been reached, and, so far as the Professor was enabled to perceive, the only effect of the current was to provoke a perturbation on the protoplasm.

### "SCENES FROM A SILENT WORLD."

Behind prison bars there is a life little known for the curious phases of character, the strange moods and fancies, the result, not of imprisonment by itself considered, but of long-continued jailing among abnormal conditions—the despondency of hopelessness. Most of those with inclination and the time to study convict life have lacked the opportunity. Their visits to a State's prison have been under the guidance of officials, before whom all is made spick-span. On parade is the order of the day; the turnkeys put on their best manners, their charges are even more silent than is their wont. As well go a-ducking with a brass band ahead, or study an ant-hill in a thunder storm. A writer in the current number of *Blackwood's*, under the title quoted above, one who, indeed, seems to have had unusual opportunities to pursue such studies, declares that extraordinary revelations in human nature and in the possibilities of human destiny have been their fruit, and, with able pen and no little ingenuity, he has collated much evidence bearing directly upon the often doubted reasonableness of *lex talionis*.

There are those who have come into a legacy of vice, are criminals, not because they love the life especially, but because of the inclination inherited, who cannot keep straight, as he who has inherited a taste for liquor cannot keep aloof from it. These poor people, who come down from a long line of vicious ancestors, he has, and very naturally, much sympathy with. Had he chosen, he might have quoted Mr. Herbert Spencer to support him in his assertion as to hereditary vice, to prove that they came honestly by dishonesty, as one might say; and that entire unconsciousness of wrong-doing which he has observed them to possess, that belief that they are being punished unjustly, is, according to that eminent man, only the expression of that protest against civil and moral law that has come down the ages. Then there are those who have had time to repent their crime over and over again, who have been regenerated, so to speak, and move in that society against which they have sinned, more proof against offense.

But so long as they kept among vicious surroundings, so hopeless seems their fate, so cruel society, that they sink to the standard of those around them as water descends to its own level. The stages by which the real convict comes to his anomalous state of thought and action, the mental processes that lead him to a condition which, the author says, has no counterpart among that part of the human family not so restrained, is cleverly described and bears the impress of careful observation.

As to the unreasonableness of the criminal law, we will quote one illustration: A man of that low order, as to intelligence, often found near English manufacturing towns, being charged with wife murder, and the proof positive, the judge charged the jury to bring in a verdict of willful murder.

The evidence showed that they had lived in a sort of tent pitched on the border of a piece of moorland, and that for years he had done no labor, relying wholly