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 A tug boat is driven into the slip until all the ice from its stern outward is expelled; it is then withdrawn and backed into the slip until the rest of the ice has been driven out.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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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

upon the few weekly shillings she earned. He had been wont to beat her, and, upon coming out of an hospital, where he had been for rheumatism, he heard an evil report of her, and because of it beat her with unusual severity. But that he meant to kill her, our author denies, on the reasonable ground that without her, he would have to work for his own living. Therefore, though it was a murder, it could scarcely be called "willful," for it was not intended.

THE CELESTIAL WORLD.

VENUS AND MARS.

The principal feature of planetary interest during December is the approach of the planets Venus and Mars, the former gaining upon the latter, and overtaking him on January 2, 1889, at 7 h. 47 m. A M., Venus being 40′ south at the time. The planets will not be visible at the time of conjunction, but will be near each other on the evening of the 1st, when Venus will be west of Mars, and also on the evening of the 2d, when she will be east of Mars. Both planets are moving eastward, Mars being in direct motion, slowly receding from the earth and approaching the sun. Venus is moving eastward, approaching the earth and receding from the sun. As she moves faster, on nearly the same track, she must overtake her rival. On the 1st they are 15° apart, on the 31st they are less than one degree, the difference in the time of setting being about six minutes. The rapid approach of the two stars will be easily discerned.

No planets in the system are more contrasted in tone and tint than Venus and Mars. The delicate pearly luster of the one and the ruddy hue of the other give a pleasing variety to the celestial picture that every evening adorns the southwestern sky, the two planets being the only "wanderers" among the countless throngs that glisten in the star depths. Our nearest inferior neighbor and our nearest superior neighbor hang side by side in the sky. They are simply stars to the unaided eye, the one the brightest starry gem the sky reveals, the other an unpretending ruddy star, his martial air and gorgeous coloring dimmed by distance, a king uncrowned.

How different is the picture revealed by the telescope! Venus is a sphere in gibbous phase, shining with an intense brightness, and surrounded by a dense atmosphere that hides her real face so completely as to leave but a faint hope that the impenetrable veil will ever be pierced by human eye. Her much talked of satellite is a myth and a nonentity. Even the time of her rotation on her axis and the inclination of her axis to her orbit are not determined beyond a doubt.

Let us turn the telescope upon Mars. He is in a condition unfavorable for observation, for he is drawing near the sun and will soon be lost to sight. But no one can look upon his ruddy face without a feeling of intense interest. The prestige of his appearance at his opposition on April 11 still lingers around him, as well as the distinction that he alone of all the planets displays his real surface to terrestrial star gazers. Perrotin, Schiaparelli, and Terby have made him famous for the marvelous sights they saw, as night after night, when skies were clear, they gazed upon his double canals, submerged continent, and polar ice, and watched the disappearance of old canals and the appearance of new ones in unexpected places. They are astronomers with practiced eyes, and saw objects which to ordinary observers are but cloudy haze. Men of science are waiting patiently for the next Martian opposition in 1890, when it is hoped that the Lick telescope will be in its best working order, and the telescope for the Los Angeles observatory, with its forty inch aperture, will be a new power in the field of observation. With such instruments and such observers, the capacity of the human eye will be the only obstacle in the way of obtaining all possible knowledge of the Martian planet.

Dosing Trees with Sulphur and Other Substances.

There is a prevailing and popular idea that insects may be driven from trees by boring holes through the bark into the wood, placing sulphur therein, and plugging the hole. There are some persons who profess to have tried the experiment with success, to have cleared trees, such as elms, of the destroying worm, etc. Prof. C. V. Riley, Entomologist of the Department of Agriculture, pronounces these remedies as fallacious.

"The belief in their efficacy," he says, "is founded on the supposition that the poison passes with the sap into general circulation and with it into the foliage, and is destructive to leaf-feeding insects. It is an entirely unfounded idea, and is based upon ignorance of the fact that the substance remains intact, and is not taken up in the circulation. Instances where it has seemed to succeed have been recorded, and in such cases its apparent efficacy was due to a coincident disappearance of the insect from some other cause. Sulphur which I plugged up in such holes many years ago was found to be perfectly unchanged after many months. All such remedies may be stamped as nonsense."

Waste in the Workshop and Counting Room.

One of the most common among the many sources of everyday expense incidental to the carrying on of an industrial business, and one most generally neglected by those whose duty it should be to prevent it, is that of waste in the workshop and among the employes. Although the amount in each particular case may be, and probably is, of small proportions, and is consequently considered of little or no consequence, yet in the aggregate it really becomes an expensive item, which tells heavily upon the debit side of the ledger when accounts are balanced up.

In some shops the quantity of small articles, such as screws, nails, panel pins, washers, etc., that may be seen lying upon the floor, kicked about by every passer-by, is astonishing. There seems to be no idea of their value either by the workmen or foreman. If a man drops such a slight article, he will not take the trouble to pick it up, and the result is that all around the ground is littered with them, they soon become covered with shavings, sawdust, and rubbish, and when the sweeper comes at stated times to clear up, he as likely as not shovels half of them into his barrow, wheels them away to the fire, where the rubbish is burnt, or throws them in with the ashes and other refuse of the ballast heap. Even if he carries a box, as he often does, into which he may throw say one half of what is dropped, they become of very little use, from the fact that nails and screws of all kinds and sizes become mixed and jumbled up together, unless properly sorted into their various kinds, and this is just what is left undone in the majority of cases. We do not imagine that it would be feasible for a man to stoop down every time he drops one of the small articles in question, but he at least might be made to take that trouble occasionally, and put them back in their proper receptacle in his nail box. As it is, whatever is once dropped may be considered lost. This looseness, too, leads to another and greater evil, and that is peculation and petty theft. It is not to be wondered at that a man, seeing these things treated as if of no value, says to himself, as he picks them up and puts them in his pocket, "These nails will come in useful to make that fence or fowl house in my garden," or "These screws will just do for the box I am going to make for my wife at home." In fact, the men almost look upon it as a kind of perquisite, to supply themselves. Even such comparatively large articles as bolts, nuts, and rivets are often seen strewn about the ground, especially out of doors where they get trodden into the earth. The amount of old iron, etc., that is shot out at the heaps or tips of rubbish would well pay the employer to keep a man to look them over. As it is, women and boys may often be seen outside the works raking over these heaps, and making quite a good thing out of the cinders and old metal which they collect. The same waste often takes place at the saw mills, where good sized pieces of expensive wood, such as teak, mahogany, etc., too small to be utilized on the premises, are cut up for fire wood instead of being sold to makers of small articles, fancy goods, or others. Again, the brass dust and filings made by the fitters are collected in trays fixed to the vises in some establishments, but are swept up with the dirt and wasted in others. Another instance may be mentioned in that of oil, which is often allowed to drip and fall from the shafting pedestals upon the floor, making everything about them greasy and dirty, but which, if caught in tin dishes suspended beneath, may be used again for the same or other purposes. In the case of gas, too, extravagance requires checking in some factories, where it is allowed to flare away at full pressure all over the place without any control, the supplies being of the largest size and most extravagant pattern. If a man leaves his work for an hour or two, he does not think to turn down his gas, but allows it to burn all the time. In another better regulated shop, however, the burners are of the duplex or some other economical kind, pressure regulators being fixed upon the various branch pipes to control the consumption, which often varies very much at different times as some divisions are turned off or put on. The waste in this item alone in a large manufactory with some hundreds of jets burning every day would, if carefully examined into, be found rather startling. Even in the offices, the difference may be often noticed between a loose and thrifty system of using the stationery. The waste paper, such as envelopes, etc., are in some places thrown away or burnt, while the clerks think nothing of taking a new sheet of writing or foolscap paper, or a memorandum form, to work out their calculations. In others, the envelopes, fly leaves of letters, etc., are set aside, not only for this purpose, but are utilized, as are the backs of useless vouchers, invoices, etc., by printing on them and using them about the premises for instructions to foremen, reports, etc., being as good as new for such purposes. In some drawing offices the amount of tracing paper and cloth wasted, too, is considerably more than there is any necessity for. Some draughtsmen will cut their paper recklessly, leaving five or six inches margin, which has to be cut off ultimately, or will put the roll of paper back in a dirty drawer, or on a dirty table, thus making a soiled mark along the underside of the roll, which must be cut off by the next user, thus involving another waste of six or seven inches.

The greatest cause is carelessness among employes and want of sufficient supervision. It is their employer's material and not theirs, and so they do not trouble themselves to economize unless compelled to. The same men when they are at home are most careful of their own coals or gas, and if they are doing any little carpentering job of their own will drop on their knees and search for every nail in the most careful manner. A few words from the employer or foreman will generally suffice to put a check on the practices, while making an example by discharging a few men will have a wholesome effect upon the rest.

The Migratory Quail.

A correspondent of the *Forest and Stream* writes from the island of Anacapri, in the Mediterranean Sea:

The first quail arrived on the 23d of April, but not in great quantities; the pigeons straying along a few days before. *Le reti* or nets were in readiness, but the birds came very straggling. Every conceivable spot on the edge of the island was occupied, giving it the appearance of being fenced in. These nets are from nine to ten meters high, the higher the better, with rings on their sides, through which good-sized cords are run. These are securely fastened on the tops of immense high poles, and when the wind is not too strong are kept continually spread, otherwise they are unfastened and run down like a sail or a curtain. These nets are contrived in such a manner as to form a kind of sack, by leaving it in folds, or having a piece added to it, so at every interval of perhaps a meter or meter and a half comes one of these bags. The poor, unwary birds come flying, wearied and fatigued from their trip over the sea, on in full force, strike against the fence (no better name can I find for these nets, encircling the island as they do), fall into the bag, become entangled, and are immediately pounced upon by the greedy islanders. Sometimes, not often, after a lucky struggle, a bird frees itself and clears the net, but only to fall a victim to one of the numerous hunters with guns standing on the other side, scattered in all directions and distances from the shore.

From 50,000 to 60,000 quail are sent away from this island alive every year; how many are shot is more than I know. It seems that the renown of this island as a quail-hunting place is very old, for I have read that somewhere about the year 1786 the quail, doves, and other migratory birds were a source of increase to the revenue. The number caught varied every year, the greatest catch in one day was 12,000, and during the whole time of passage, which does not last more than fifteen days, they never caught more than 150,000 birds. Capri had a bishop who derived the most of his income from the quail, etc., and from this fact he was somewhat irreverently styled the Bishop of Quail.

A Novel Steam Launch.

At the American Institute Fair is being shown just now a novel type of launch, burning kerosene and with the boiler and engine at the stern of the boat. The method of firing the boiler is also new. Instead of atomizing the oil, as formerly, it is vaporized in a coil by heat, then driven out into the fire box and mixed with the air. The gas thus formed burns without smell or smoke and does not foul the tubes or sides of the boilers. The generator is of two horse power, its dimensions 12 inches wide, 12 inches deep, 24 inches high, and weight 150 pounds. It is made of Damascus steel and drawn brass tubes, tested to 600 pounds hydraulic strain. Three to four minutes, it is said, is ample time to get up steam and a working pressure of 140 pounds. The hull has a fine entrance, well rounded bilges, and a long, clear run. The wheel, well dipped, meets plenty of solid water. Length on deck, 22 feet 6 inches; beam, moulded, 4 feet 6 inches; estimated speed, six knots an hour.

Chicken Cholera and the Rabbit Pest.

Pasteur's method for ridding the Australian fields of the swarms of rabbits that infest them has not proved altogether successful; at least in the experimental tests. At Rodd Island, Port Jackson, New South Wales, pens were built of close wire netting, and a large number of rabbits collected within; pains being taken to get the several varieties, so to mark the effects of the poison on each. Vegetables, sprinkled with liquid containing the microbes of chicken cholera, were distributed freely about among others not so tainted. Then Bunny was set free among them, and fell to feeding with his usual avidity. So far as the investigations of the commission go, those rabbits which ate of the poisoned vegetables died; but others, apparently selecting their food among the untainted, survived, and, together with still others forbidden access to the field of trial, but put in the same pen with those which had died of the disease, were in nowise affected. In other words, there was no proof of the assertion that those taken with the disease would carry it to others; no signs of contagion.