

THE CIRCULAR IRONCLAD "POPOFFKA NOVGOROD"

This vessel was designed by Vice Admiral A. A. Popoff for the Russian navy, and mainly intended for defensive purposes, being constructed with the view of combining a maximum tonnage with a minimum draught of water. This indeed, is the chief advantage of the circular form, as, owing to the greater displacement in comparison with the weight of hull, it enables vessels thus built to carry heavier armour and weightier guns than would be possible with those of the longitudinal form. This principle, which has been partly carried out by Mr. Reed in his broadening vessels to obtain a greater displacement, has been found to answer most satisfactorily, and notwithstanding that the tonnage of the Novgorod is 2,491, she only draws 13ft 2in of water, with all weights on board, and with a longitudinal keel. The armour plates are 9 inches thick, and are "baked" with Channel iron to the amount of 2 inches, so that the armour is virtually 11 inches thick. Moreover, from its circular form, the Novgorod is of an uniform strength throughout, and presents no weak point. The deck, which measures 101ft in diameter, is also plated to the depth of 2½ inches, while a thickly armoured breastwork protects the guns, which are worked in an open turret so as to ensure greater precision of fire, and which can be moved and fired either independently or together, as may be required. The guns are two in number, are 11 inch bore and weigh 28 tons each. The vessel is propelled by six screws worked by engines of no nominal 489-horse power, which, however, can be worked up to 3969 indicated horse-power. The speed attained is said to equal that of the monitors, but as the vessel is to be used for defending the mouths of rivers and weak positions of the coast line, a high speed, though desirable, is scarcely absolutely necessary. The rolling and pitching of the Novgorod are said to be far less perceptible than in vessels of an ordinary type, owing to her flat bottom. She was launched in the early part of last year, at Nicolaïeff, on the Black Sea. Another vessel of the same type is being constructed. She will be of a larger tonnage, and will bear armour 18 inches thick.

THE NEW OFFICES OF THE BURLAND-DESBARATS LITHOGRAPHIC COMPANY.

The need has long been felt of removing to more central and commodious premises, the publication offices of the *Canadian Illustrated News*, *The Canadian Patent Office Record*, *and Mechanics' Magazine*, and *L'Opinion Publique*. The growth of the business created by these several periodicals, as well as the importance assumed by the custom work of the establishment, made easier access to the public a matter of great moment. But on the formation of the Burland-Desbarats Company, the necessity for a move became still more urgent and manifest, and steps were at once taken with that object in view. The result has been the erection, now proceeding, of a handsome building, in one of the most central situations of Montreal, wherein we hope to see the company established in the course of the coming fall.

The building, of which we give a perspective view, is situated on Bleury street, near Craig. The lot it occupies is 80 x 70 feet, and the building proper 68 x 50. At the end of the building nearest Craig street, a passage of 12 feet gives access to the yard and boiler-house, which is to be erected independent of the main building. The whole area has been excavated, and the space under the planked yard will store several hundred tons of coal. The foundations have been laid with the greatest care, the soft nature of the subsoil rendering the driving of piles necessary. Over 300 large cedar piles have been sunk some seven feet below the foundations, great cedar floats laid upon them, the interstices filled with stone chips and mortar, and upon this solid and indestructible bed is laid the first course of the foundation, consisting of huge limestone blocks, five or six feet in length and width, and 15 or 18 inches thick. From the precautions taken with this essential part of the building, the massiveness of the remainder may be inferred.

The front of the building is to be of cut stone, and is designed to possess great strength, and at the same time to give as much light as possible to the work rooms, for which purpose the piers and columns are made light, and heavy projections on the cornices are avoided. The first and second storeys of

the rear elevation are built of cut stone piers and the balance of the height as well as the end walls are of brick work.

A stack of brick safes are carried up in the centre of the building from the basement to the fourth story.

The building will be 5 stories high or 71 feet from pavement to top of main cornice. The first storey will be divided into four compartments, three of which are already rented as retail stores and the fourth will be used as the public office of the Company. The four upper storeys and the basement will be devoted entirely to the business of the Company.

On the roof will be erected the photographic room, 25 x 30, mainly of iron and glass, at a height where the dust of the street and the shadow of neighbouring houses will not interfere with the clear expanse of eastern sky.

The building is to be of the strongest and most substantial character throughout.

The contractors for the several works are: D. Dufort, for mason's work; A. Wand, for brick work; J. Luckwell, for carpenter work; W. J. Cook, for plasterer work; ——— for painting and glazing; James & Son, for roofers' work; W. Chalmers, for iron work.

The total cost will be about \$30,000. Messrs. Hutchison & Steele, are the architects, and Mr. Kennedy superintends the erection. Should all the contractors make as good progress, and do as good work, as the stone masons, we have no doubt that we shall be able in the fall to give a detailed description of the Company's works in the building, and invite our friends to come and see a model printing and publishing office.

NEW PRUSSIAN GUNS.

On page 237 we illustrate two of the new types of Prussian cannon, one a cast steel gun of 9 centimetres and the other a steel gun of 8 centimetres. These guns have just been issued to all the Prussian artillery regiments, and they are said to be much superior to the guns used in the campaign of 1871. The smaller gun is exclusively for use in horse artillery, but the larger type will be used in all batteries. They are both furnished with the celebrated Krupp cylinder-prismatic breech-loading arrangement, an important feature in which is the gas-check ring, commonly called the "Broadwell ring," and which is now the subject of some discussion as to its original invention. The official description and the results of the trials of these guns are not yet made public, but it is believed that for lightness, handiness and length of range, they are superior to the guns of any other service.

IMPERFECTION OF THE HUMAN EYE.

Prof. M'Leod, in lecturing on this subject at the Physical Society, spoke of the chromaticity of the eye, and said there was abundant evidence of the defects of the organ in this respect. For instance, to short-sighted persons the moon appears to have a blue fringe. In using the spectroscope the red and blue ends of the spectrum cannot be seen with equal distinctness without adjusting the focusing glass. A black patch of paper on a blue ground appears to have a fringed edge if viewed from even a short distance, while a black patch on a red ground, when observed under similar conditions, has a perfectly distinct margin. Professor M'Leod then explained that the overlapping of images in the eye produces the mental impression that there is no want of achromatism. It is interesting to note that Wollaston considered that the coloured bands of the spectrum were really divided by the black (Fraunhofer) lines, and his statement that the red of the spectrum does not appear to have a boundary line — because the eye is not competent to converge the red rays properly — shows that he had very nearly, if not quite, discovered the achromatic defects of the eye. Dr. Young ascribes to Wollaston the merit of having observed that when a luminous point is viewed through a prism, the blue appears to be wider than the red, the eye being incapable of recognising that the spectrum has the same width throughout its entire length. An experiment was exhibited to show the relative distinctness of a dark line on grounds of various colours. A string or wire was so arranged that its shadow traversed the entire length of the spectrum, which was thrown on a screen by an electric lamp. When viewed from a short distance the edges of the shadow appeared to be sharp at the red end, but gradually became less distinct, until at the blue end nothing but a blurred line remained.