ARMOR FOR VESSELS, FORTS, ETC.

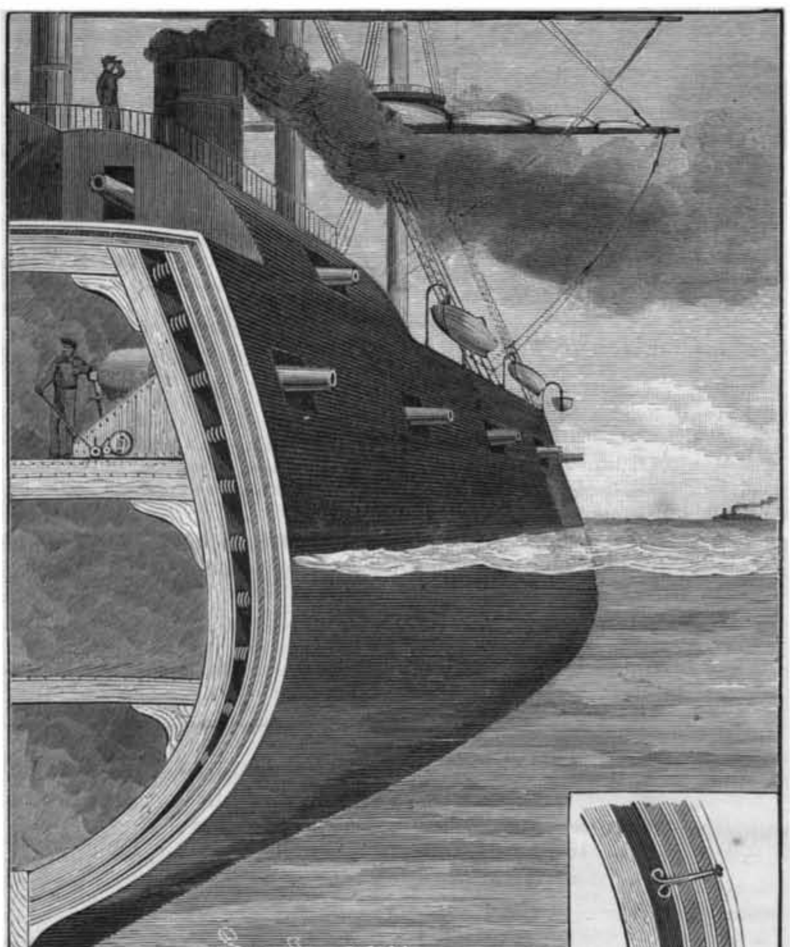
It is known that a shot will not penetrate a yielding obstruction as readily as it will a rigid one, and for this reason springs of different forms have been interposed between the plates and hull of a vessel, or between the plates themselves, to admit of their yielding when struck. The object of the invention herewith illustrated, for which letters patent have been granted to Mr. Wm. N. Le Page, of Gloucester, Mass., is to provide an armor which shall combine the advantages of a yielding, hard, and tough armor, and which is therefore well adapted to protect ships, batteries, and forts against the destructive action of missiles.

The armor can be formed of any desired thickness by alternating one, two, or more layers of plates made of steel or iron with a cement composed of asbestos, glue, hair, and cork, covering the outside with a plate of chilled steel, and interposing springs between the hull and plating thus formed. The engraving represents three layers of plates separated by two of cement or composition. The space occupied by the springs is made air tight, thus forming an air cushion whose elasticity materially assists that of the springs in resisting the shock.

The shot, when striking the chilled steel coating, will glance, the hardness of the metal and the yielding of the armor preventing it from gaining any hold. Striking the armor at right angles, the shot will be seriously obstructed in penetrating the steel coating, and in penetrating the layers of plates beneath it will be more effectually obstructed on account of the cement, which prevents the plates from flying in pieces, and offers great resistance in itself on account of its combined hard, fibrous, and elastic nature. In addition to the resistance thus obtained, the yielding of the outer portion of the armor by the compression of the heavy springs and of the confined air serves to prevent great penetration, and the shot is brought to rest before it reaches the hull of the vessel or face of the fort. The layers of cement prevent the plates from cracking for a great distance when struck, and, in case of boats, prevent the water from reaching the side of the hull through breaks in the outer layers of armor.

The small sectional view shows a modification in which the spiral springs—shown in the large view between the wooden and outside plating—are replaced by bolts, the heads of which are covered by the thick outside plating of chilled steel, and the shanks are split and then curved to form spiral springs, which press against the inner plate. This construction is designed to more surely bind together the plates and their separating material, without in any degree affecting the strength or elasticity of the structure, as the springs tend, after the plating has been struck and bent, to force the plates back to their original position.

It is claimed that this plating can be advantageously applied to the forts of this country, the walls of which would serve merely as a foundation upon which to secure the plates. The springs, by serving to distribute the shock over a large area, would render unnecessary the rebuilding of the walls, which, to serve this purpose, now possess ample strength. It is also claimed that, considering the results to be obtained by rendering the now useless defenses useful, this method could be more economically applied than any other.



LE PAGE'S ARMOR FOR VESSELS, FORTS, ETC.

Tall Chimneys.

The Mechernich Lead Mining Company completed last year a chimney stack of the following leading dimensions: The height is 134·6 meters (440 feet 6 inches). The foundation, dressed stone masonry, is 36 feet square and 11 feet 6 inches high. The base, a cube of 32 feet 9 inches, and the octagonal plinth of the shaft are both built of annular kiln bricks. The circular shaft is formed of radial bricks. It is 24 feet 6 inches outside and 11 feet 6 inches inside diameter at the base. At the top, it is 11 feet 6 inches outside diameter and 9 feet 10 inches inside diameter. The Port Dundas (Glasgow) chimney is 488 feet from the foundation to the highest point of the lightning conductor, or 468 feet from foundation to cope stone.

A FIRM which makes a specialty of the erection of shafting states that its experience teaches that the loss of power due to improper conditions in the line shafting amounts to fifty per cent of the engine power employed, and that the defects most commonly found are as follows: Shafting too light for the duty, crooked shafting, hangers too far apart, hanger bearings too short, pulleys too heavy and not properly balanced, hangers which are not adjustable and not self-adjusting, and sometimes filled with spurious Babbitt metal, and improper proportion between two pulleys connected by the same belt.

A Sound Trademark Decision.

Judge Brown, in the United States Court (Detroit district), recently rendered a decision upon a question in which every maker of a proprietary article is interested. In an action brought by the Royal Baking Powder Company against the "Coral Baking Powder," for using a label and package similar to that of the complainant, there was no claim that the name of the "Royal" Company had been used, but it was alleged and proved that the cans were like those used by that company, and that the labels, in color, design, and general arrangement, were substantially similar. The defense insisted that the plaintiff's right in its trademark was limited to the name. The court held otherwise, deciding that the use of labels having the same color and general appearance, with a similar arrangement of words and similar device, was calculated to deceive purchasers into buying one product for the other, and was therefore an infringement of the plaintiff's trademark.

Table Ware from Slag.

A contemporary reports that the slag resulting from the smelting of copper, gold, and silver ores at Argo (Colorado) is now used for the manufacture of beautiful table ware. The colors are a kind of spray of onyx and opal flushed in waves throughout the ware. The colors, it is stated, are under perfect control, the slag containing a larger percentage of material necessary than can be found in slag elsewhere. The slag is melted at an intense heat, then poured into vats of agitated water, then remelted and poured into moulds either with or after an acid mixture that causes the metal to flux pretty generally with added materials. The result is said to be a metallic glass with the strength of light cast iron, which may be moulded into any form of table ware, bowls, cups, tumblers, etc., with the most beautiful sprays of onyx stone colors upon a general background of opal.

Artificial Cocaine.

W. Merck has announced the artificial formation of cocaine, which is probably the first step toward cheapening the production of this important alkaloid. He tells us that cocaine may be prepared by heating benzoylecgonine, with a slight excess of methyl iodide and an equal volume of methyl alcohol, in a sealed tube at 100 deg. C.

This is not, exactly speaking, an artificial formation of cocaine, but the conversion into this base of another substance contained in the coca leaves, which has hitherto been a by-product of little or no value.

Another chemist, Z. H. Skraup, has confirmed Merck's observation just alluded to. He also shows benzoylecgonine to be a by-product in the preparation of cocaine. It crystallizes in transparent prisms. The acetate and sulphate also crystallize in prisms. By the action of hydrochloric acid in sealed tubes at 100 deg. C., it is decomposed into methyl chloride, benzoic acid, and ecgonine. This author also says that benzoylecgonine is converted into cocaine by the action of methyl iodide in the manner described above.

Astronomical Notes.

The new star in the constellation Orion, which was discovered by Lord Crawford's astronomers at Dun Echt Observatory, presents, according to the French astronomer, M. Wolf, some characteristics which completely distinguish it from the two temporary stars which have been discovered since the application of the spectroscope to the study of these bodies. The star T of the Crown, observed in 1866, and that of the Cygnet, which appeared in 1876, both offered at the moment of maximum splendor a spectrum of dark rays on which a number of brilliant lines were seen, those of hydrogen in T, and those of hydrogen, sodium, magnesium, and the green rays of nebulæ in that of the Cygnet. Since then these lines have by degrees disappeared; T of the Crown has a continuous spectrum, and the star of the Cygnet no longer only shows the green rays of a nebula, a singular instance of the transformation of a star into a planetary nebula. The new star in Orion gives a spectrum appertaining to Class III., section *a*, of Vogel; and it is furrowed by a series of black bands on a luminous bottom. These bands, to the number of seven at least, are distinctly ended on the violet side and fade away on the red side. At first sight some in the green and blue seem to terminate in a bright line. The spectrum is also remarkable for the splendor of the red and orange, a fact which accounts for the color of the star, but, contrary to what usually happens in orange stars, the more refrangible part is much prolonged. The sudden appearance of this star cannot be attributed, in M. Wolf's opinion, to an incandescence of gaseous masses in the chromosphere. Its spectrum is, in fact, similar to one of the most marvellous stars of the heavens, namely, Mira Ceti, or *o* of the Whale. M. Wolf concludes that the new star is not a temporary star, but a variable star become visible to us by a sudden increase of conflagration. Even at the moment of its maximum splendor it was hardly visible by the naked eye.

Although invisible to the naked eye, there are at present three comets in the heavens which may be observed with the aid of telescopes. One of them, discovered last year by Mr. Brooks, is about to disappear; but the other two are gradually increasing in brilliancy, and will probably offer a most imposing spectacle to the naked eye in the western sky for several weeks from the third week in April. They will be approaching each other for some time, taking their common course toward the north pole of the firmament until about April 30, when one will reverse its path, sinking finally below the northwestern horizon. This comet was discovered on December 2, last, by Mr. Barnard, and bears at present his name. The other, discovered on December 1, by M. Fabry, of the Paris Observatory, is known by the latter's name. Both comets have this peculiarity, that their individual orbits vary, although they are somewhat similar generally, and that both will be seen very distinctly toward the end of April, close together, every evening between 8 and 9 P.M., below the zenith in a north-northwest direction. Barnard's comet is now close to star α of Aries, and will take its course toward the constellation of Andromeda, so that toward the end of April it will be to the right of star γ, when it will become visible to the unarmed eye. Then it will turn again toward the south, increasing its brilliancy rapidly, crossing the constellation of Aries for the second time, in the direction of Eridanus. It will now become invisible in the northern hemisphere, but may be observed for some time after in the southern part of our globe. Fabry's comet is now to the left of star β in Pegasus, and by April 1 will have wandered to 9° northward, into Andromeda. Then it will turn toward the constellation of Cassiopeia, become visible to the naked eye, enter, in the second half of April, Perseus, and will be of extraordinary splendor at the beginning of May. Its further course, becoming more rapid, will lead past the brilliant star of Capella, so that, toward the middle of May, it will be seen at 10 P. M., low in the western horizon, after which it will gradually lose its brightness in its southward course, and disappear below the horizon.

SOME experiments have been made by Mr. G. Sacheri to test the flow of water through a lead pipe. The length was 3,419 ft.; the gradient for a length of 102 ft. was 1 in 10·5, and for the remaining distance 1 in 142·86. The pipe was quite new, and of a diameter of 25 millimeters (0·984 in.). The head of water was 29·2 ft., and the discharge was found to be 0·02036 cubic ft. per second, giving a mean velocity of 2·338 ft. per second. The high rate of discharge is attributed to the good surface of the new pipe.