RENEWING WORN BANK-NOTE PLATES.

A clean, crisp, comfortable bank-note is not a luxury to be indulged in every day by the majority of mankind; nevertheless, most people are familiar with its appearance. Its production involves no small amount of labor, although by subdivision and distribution a very large number are now produced in a very short time. Much care and nicety have always been bestowed upon it, and are especially demanded in the present day, when the means of imitation are so well within reach of the designing and unscrupulous. The chief object in the manufacture of bank-notes is to render forgery impossible, or at least easy of detection. This is sought to be effected by peculiarity of paper, design, and printing, or by a combination of these means, as is done in the Bank of England, and other banks. The mechanical design, however, has chiefly been relied on for security. It has been the constant aim to make the impression such as to render the genuine note readily distinguishable by the public for its high art, and to the bank officials by secret peculiarities in its execution. A further security was formerly afforded against forgery by a self registering machine, which was contrived by the Messrs. Oldham. By this machine each note was impressed with a distinctive mark known only to the bank authorities. Until about 1837 copper-plate printing was the only process in use for bank-notes. In that year, however, Messrs. Perkins and Heath effected their valuable improvements in practical engraving. This was the reproduction of designs by the mill and die by mechanical pressure, and which, when applied to calico printing, was attended with such extraordinary results. This invention simply consisted in engraving the pattern on a soft steel plate, which was afterward hardened, and the pattern transferred by pressure to a soft steel roller. The pattern was, of course, produced in relief on the roller, which was hardened to reproduce the pattern on the plate from which the printing was to be done. In 1855 electrotype printing was introduced in the Bank of England by Mr. Smee, and since that time the notes have been produced by surface printing by the electrotype.

In the bank of Ireland the plates are prepared according to Perkins and Heath's method. The separate designs forming the complete bank-note are first engraved by hand on separate steel blocks, which are afterward hardened, and are preserved as permanent patterns not to be printed from. These engravings are transferred to the steel rollers under heavy pressure, the rollers being afterward hardened and used as dies to impress the engraving upon the printing plates. The engraved plates for printing the bank-notes are made of soft steel, and are never hardened after being engraved. Being of large size—20in. by 16in.—they would most probably lose their flatness in hardening. Another reason for not hardening the plates lies in the fact that when worn, the soft plates are easily repaired again by means of a special arrangement, designed for the purpose by Mr. Grubb, the engineer to the Bank. By this arrangement the rollers are applied again to the plates with perfect accuracy for renewing the impression. The printing plate, when receiving its first impression from the master roller or die, is fixed upon the table of a strong press, from which a pressure of 5 tuns can be obtained, the pressure being regulated as required by means of a weighted lever. The position of two register points in the plate is accurately noted by means of micrometer microscope, and registered in a book kept for the purpose. The master roller is then passed over the plate by the machine under the heavy pressure, being very steadily guided by a special parallel motion arrangement. The table is provided with complete adjustments of peculiar delicacy, and the pressure of the engraving roller upon the plate is not produced by the roller descending upon the plate, but by the table being raised up to the roller.

Being of considerable weight, the table is balanced so that its vertical movement is effected with a force equal to a few pounds only. It is provided with two separate lever arrangements, for light and heavy pressures, whereby any pressure, from a few pounds up to 5 tuns, can be put upon the plate. When a plate requires renewing it is again fixed upon the table in the same position as before by means of the micrometer microscope and the register of its position; the roller being passed over it deepens those parts of the impression which the continuous printing has worn away. The renewal of plates is effected with the utmost accuracy; indeed, so perfect is the process that the finest lines in the engraving are preserved without becoming perceptibly coarser even after a plate has undergone many renewals. Thus, the most delicate engravings are restored as often as required in plates, when worn by the process, of printing, with the greatest certainty and facility. Should it be necessary to bring up the impression on any special portion of the plate, even this can be done. It is effected by a delicate adjustment in the bed of the table, by which the plate can be slightly tilted transversely to the direction of the motion of the roller, and thereby increasing the pressure at any particular point. In order to obtain this tilting motion the bed is made with a convex cylindrical segment lying within a concave one, the plate being in the center of motion. The movements for adjustment are effected by screws so finely set that they will adjust to a thousandth part of an inch.—*Mechanics' Magazine.*

The "Nautilus."

A trial has recently been made of a new principle of motion, as applied to vessels, called the Hydraulic Porpeller, Ruthven's patent. The *Nautilus*, to which the power has been applied, was built expressly to show that it can, with less horse power than ordinary river boats, equal them in speed. The *Nautilus* at the trial started from Vauxhall Bridge pier at eleven o'clock in the morning, and ran up and down the Thames in company with the *Citizen* and other river steamers, and held way with them steadily, gaining a little on some. She ran between Vauxhall and Westminster Bridges with the wind and tide in 4 min. 26 sec., and against in 8 min. 22 sec., being at the rate of 13·5 and 7·2 miles per hour respectively, or at an average speed of 10·35 miles per hour—say 10½. She then steamed down the river, and when off the Tunnel pier, with both strong wind and tide in her favor, going at full speed, was made to stop suddenly by reversing the valves. She stopped dead in less than ten seconds and in about a quarter of her length. Her Majesty's ironclad gunboat *Waterwitch*, now being built, is to be fitted with the new propeller, which is nothing more nor less than water taken in under her bottom and set in motion by simple machinery worked by a steam engine. The water is discharged in a heavy stream on both sides of the vessel; consequently there is nothing outside the vessel to be injured by any accident. Another important novelty is that the vessel is quite independent of her rudder, and is worked under the complete control of the master, officer of the watch, or man on deck, without any communication with the engine. The *Nautilus* is also fitted with Ruthven's steering apparatus—an invention which gives a large amount of power to the rudder.—*Mechanics' Magazine.*

[This principle has been repeatedly tried in this country, but to use a common expression, the boats so fitted have been unable to "get out of their own way."—EDS.

Pneumato-Electric Organ.

Electricity has been very ingeniously and effectively applied to form a connection between the keys of an organ and the valves which permit air to pass to the pipes. Complicated mechanism is thus got rid of, an extremely simple arrangement, whatever the distance between the keys and the pipes, being substituted. Its mode of action is easily understood. According to the *Scientific Review*, when any key is depressed by the finger, a small communicator under it completes communication with a galvanic battery by dipping its lower ends into minute cups of mercury. Electricity then passes along a wire to a small electro-magnet, that immediately becomes excited, and, attracting a keeper, opens a valve, allowing air to pass into the organ pipe, which sounds at once, and continues to do so as long as the finger presses down the key. It is clear, that, however powerful the organ or distant the pipes, the fingers are not in the slightest degree distressed in playing. The battery used is simple, inexpensive, and permanent in its action. It consists of glass vessels, arranged on the upper surface of the bellows, and each containing a solution of sulphate of mercury; into the latter plunges a plate of zinc, which is placed between two plates of gas retort graphite, when the bellows is raised by the action of blowing. No effect, therefore, is produced, except when required, which prevents waste of battery power.

SPECIAL NOTICES.

Jesse S. Lake and David Lake, of Smith's Sanding, N. J., have petitioned for the extension of a patent granted to them on the 20th day of July, 1852, for an improvement in grass harvesters, and re-issued in four several divisions, dated 1st day of January, 1861, and numbered respectively 9, 10, 11, and 12; this petition being for the extension of each of these reissued patents.

Parties wishing to oppose the above extension must appear and show cause on the 2nd day of July next, at 12 o'clock, M., when the petition will be heard.

Eliakim B. Forbush, of Buffalo, N. Y., has petioned for the extension of a patent granted to him on the 20th day of July, 1852, for an improvement in grain and grass harvesters, and reissued the 25th day of May, 1865 in four several divisions, numbered respectively 1,972, 1,973, 1,974, and 1,975, this petition being for the extension of each of these reissued patents.

Parties wishing to oppose the above extension must appear and show cause on the 2nd day of July next, at 12 o'clock, M., when the petition will be heard.

French Iron-clad Navy.

In an account of British and French Navies, Furnished by Mr. Donald McKay, of Boston, to the *Herald* he appends the following statement of the French ironclads at the present time, said to have been made up from personal inspection of the vessels:—

Magenta and Solferino.—Displacement, 6,750 tuns; 1,000 horse-power mean draft, 26 feet; length of load line, 280 feet; breadth, 57 feet; wooden hull; 4½ inch armor plating; weight of armor, 900 tuns; speed in smooth water—*Magenta* 13½ knots; *Solferino* 14 knots.

Couronne.—Displacement, 6,000 tuns; 900 horse-power; mean draft 25 feet. length of load line 260 feet; breadth 55 feet; iron hull 4½ and 3 inches armor plating; weight of armor 700 tuns; speed in smooth water 13 knots.

Gloire.—Displacement, 5,650 tuns; 900 horse-power; mean draft 25½ feet length of load line, 255 feet; breadth 56 feet wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water, 13¼ knots.

Invincible.—Displacement, 5,525 tuns; 900 horse-power; mean draft 25½ feet length of load line, 255 feet; breadth 56 feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water 13½ knots.

Normandie.—Displacement, 5,650 tuns; 900 horse-power; mean draft 26 feet; length of load line, 255 feet; breadth 56 feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water 13½ knots.

Flandre, Gauloise and Guyenne.—Displacement. 5,700 tuns; 1,000 horse-power; mean draft 25 feet; length of load line, 260 feet; breadth 56 feet, wooden hull; 6 inch armor plating; weight of armor, 1,000 tuns.

Heroine.—Displacement, 5,700 tuns; 1,000 horse-power; mean draft, 25 feet; length of load line 260 feet; breadth, 56 feet; iron hull; 6 inch armor plating; weight of armor 1,000 tuns.

Magnanime, Provence, Revanche, Savoie, Surveillante, and Valeureuse.—Displacement. 5,700 feet; 1,000 horse-power; mean draft 25 feet; length of load line, 260 feet; breadth 56 feet; wooden hull; 6 inch armor plating: weight of armor 1,000 tuns. The *Provence* has made 14 knots in smooth water.

Taureau.—Displacement 2,450 tuns; 908 horse-power; mean draft 16 feet; length of load line 200 feet; breadth 47½ feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns.

Belliqueuse.—Displacement 3.350 tuns; 909 horse-power; mean draft, 19½ feet; length of load line, 230 feet; breadth, 40 feet; wooden hull; 6 inch armor plating; weight of armor 100 tuns.

Paixhans and Palestro.—Displacement, 1,540 tuns; 150 horse-power; mean draft, 8½ feet; length of load line, 156 feet; breath 40 feet; wooden hull; 4½ inch armor plating; weight of armor 275 tuns; speed in smooth water, 7 knots.

Peiho.—Displacement, 1,500 tuns; 150 horse-power; mean draft 10½ feet; length of load line, 150 feet; breadth, 45 feet; wooden hull; 4½ inch armor plating: weight of armor, 275 tuns; speed on smooth water, 7 knots.

Saigon.—Displacement 1,500 tuns; 150 horse-power; mean draft, 10 feet; length of load line, 156 feet; breadth 46 feet; wooden hull; 4½ inch armor plating; weight of armor, 275 tuns; speed in smooth water, 7 knots.

Embuscade, Impregnable, Protectrice and Refuge.—Displacement, 1,225 feet; 150 horse-power; mean draft, 9½ feet; length of load line 130 feet; breadth 51 feet; iron hull, 5½ inch armor plating.

Arogante, Implacable, Opiniatre.—Displacement. 1,340 tuns; 150 horse-power; mean draft 8½ feet; length of load line, 145 feet; breadth 48 feet; iron hull, 5½ armor plating. The *Implacable* has made 7½ and the *Opiniatre* 8 knots per hour, in smooth water.