Science and Art.

Enameling Iron.

The articles to be enameled are first subjected to a full red heat for half an hour in an annealing furnace, and then allowed to cool slowly, after which their surfaces are scoured clean and bright, and freed from all grease, when they are ready for the first coat of enamel. This is composed of six parts, by weight, of flint glass, three of borax, one of red lead, and one of oxyd of tin. These are pounded together in a mortar, and then kept at a strong red heat in a reverberatory furnace for three or four hours, during which period they are frequently stirred, to effectually mix them, and expel all volatile matter. When partially vitrified the whole is withdrawn in a pasty state, dropped into cold water, and is then easily ground to powder, which is called "frit." With one part of frit is mixed two of calcined bone dust, which is ground in a mill until perfectly fine and soft, and of the consistence of thick cream, when it should be strained through a fine cloth. The article to be coated is now held over the vessel containing the semi-liquid, and a suitable quantity poured over it; some articles may be dipped in the enamel. When drained, and sufficiently dry as no longer to run they are placed in a japanner's stove, kept at a heat of 180°, until all moisture is expelled; defective places may be filled up with a brush. When perfectly dry they are placed in the vitrifying furnace at a glowing red heat, and when the coating is partially fused and it adheres firmly to the metal they are withdrawn and laid on a flat iron bench to cool. When cold they are wetted with a sponge, a second coating given, dried, and fired as before—a different composition being used. This consists of thirty-two parts, by weight, of calcined bone, 16 of China clay, and eight parts of potash dissolved in water, mixed, baked, and ground in powder. To five parts of this powder is added sixteen parts of flint glass, five and one-half of calcined bone, and three parts of ground calcined flint. In this second firing the articles must be kept in the furnace until the second coat is thoroughly incorporated with the first.

The articles having been twice coated are again treated with another composition, consisting of four parts, by weight, of felspar in powder, four of white sand, four of carbonate of potash, six of borax, one of oxyd of tin, one of nitre, and one of whiting; these are fritted, ground, and made into a creamy paste, as before described. In firing the articles for the third time they must be subject to such a heat as thoroughly to vitrify the glass, to spread over and become entirely incorporated with it, so as completely to glaze the surface. A fourth coat may be given, if thought desirable, to give a full and rich enamel covering. By these several processes, and by varying the materials of the compositions iron articles may be made to represent the best china, either pure white or ornamented in colors and gold, or merely covering with a pure transparent coating. In the first attempts to enamel iron arsenic formed an ingredient in the formation of the enamel, but was found highly injurious.

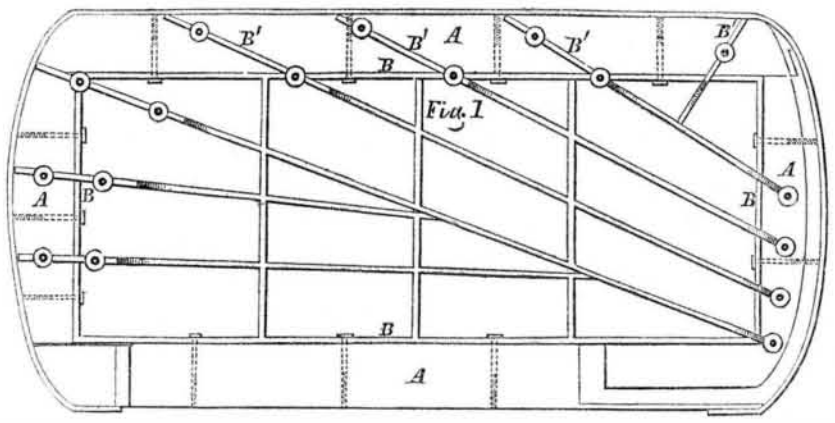
Guano.

As our farmers are now intent on providing food for the crops of this season, and as vast quantities of guano are now used for this purpose, it behoves them to be very careful in purchasing it, because its price is high, and because it is not easy to judge of its quality by the sense of sight or smell.

The substances to be looked for in good guano are, 1st. Water, ammonia, ulmic, uric, and humic acids, which are volatile; also organic matter, separable at a low red heat. 2nd, Fixed alkaline salts, such as sulphate of soda, chloride of sodium (common salt,) and alkaline phosphates, separable by boiling water from the ash of No. 1. Third, earthy salts, consisting of the carbonates and phosphates of lime and magnesia, separable by hydrochloric acid from the residue of No. 2. 4th, and last, sand or silica—which is insoluble.

How to Analyze Guano—Take 100 grains of guano, and place it in a capsule and submit it to a low red heat, until all the black particles are burned away, and a white ash left; weigh this. That which has passed off should be about from 60 to 70 per cent. of volatile organic matter; the remainder left is No. 2, above. This is now digested in boiling water, which dissolves the alkaline salts. The clean liquor is then poured off, and all the water evaporated. The powder is then weighed. Good guano should contain about from 4 to 6 per cent. of these alkaline salts. That part remaining undissolved in the water, is No. 3, above. This is now taken and submitted to hot hydrochloric acid for about twelve hours, when it is filtered, washed, and weighed. The matter thus taken up and held in solution, consists of carbonate and phosphate of lime and magnesia, which is precipitated by ammonia as a gelatinous precipitate, which, on being dried, should amount to at least from 15 to 25 per cent. of the guano. The remainder of the matter undissolved by these processes is sand, and in good guano should not exceed four per cent. Farmers should be careful not to pay for sand instead of guano. From 50 to 70 per cent. of good guano should dissolve in a hot solution of caustic potash, with a strong smell of ammonia.

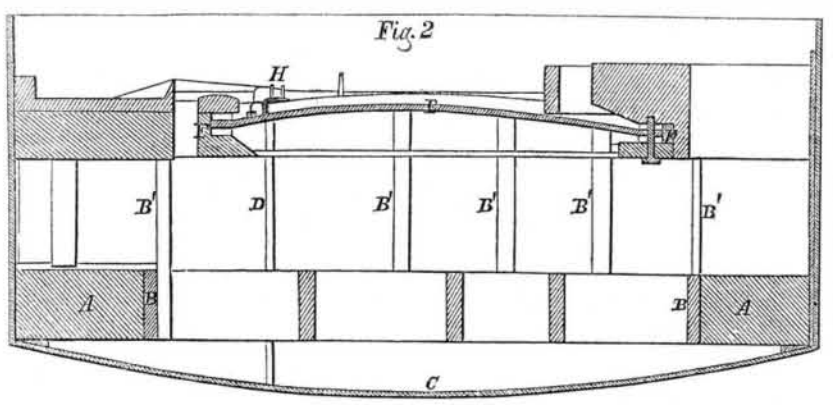
IMPROVEMENT IN PIANOFORTES.



Improvement in Pianofortes.

The accompanying engravings illustrate the recent improvements by Mr. Spencer B. Driggs, of this city, whereby the musical powers and tone of the piano is greatly improved, and the time required in the construction is much abbreviated.

Fig. 1 is a top sectional view, and fig. 2 a transverse enlarged section. The inventor dispenses altogether with the thick bottom planks of the case which consume so much time and labor in their production; he also does away with a large portion of the block work connected with the case, so that the case may be made quite thin. In lieu of the bottom planks, blocking, &c., he employs a strong frame of wood, A, on to which the open iron frame, B, is bolted; some of the ribs, B', of this frame run in the same direction as the strings, and extend over on to the wooden frame, A, where they are separately secured. The wrest plank is supported upon the outer ends, B', of the ribs, which at this point are made high for that purpose. The two frames, A and B, constitute the bed upon which nearly all the working parts of the instrument are supported; they are thus isolated, as it were, from the case. Advantage is taken of this isolation to introduce an extra sounding board, C, (fig. 2,) which covers the entire bottom of the instrument; this sounding board is connected with the upper sounding board, E, by means of the post, D; every vibration of the upper board, E, is thus transmitted to C, leaving the instrument encased in a huge sonorous shell, as sensitive to musical vibrations as the case of a violin. It is almost needless for us to add that these improvements greatly increase the sounding power and quality of the instrument.



The upper sounding board, it will be observed, is arched or convex, which form is given by making it a little larger than the iron pawl, F, in which it is held, and then pressing it into the frame. The arch form permits the use of much lighter and more sensitive material. In ordinary pianos the sounding board is flat, and is strengthened with extra ribs.

The inventor has provided an ingenious metallic saddle, H, through which the strings pass; resting upon the metal they are less liable to get out of tune, for the heavy strain of the strings pressing constantly upon wood, as in the present mode of manufacture, indent it quite sufficiently to throw them out of unison, while the metal surface offers more resistance, and is, consequently, less liable to wearing; the string is also enabled to receive a stronger blow, the vibrations still being direct and without any disturbing influence. Among other advantages gained by the present method of construction are compactness, and unyielding strength of the iron frame, which, bearing the whole strain of the strings without any assistance from the wood, can neither shrink nor warp, so that when the strings have once settled to their proper tension the instrument will, we are informed, remain in tune at the proper pitch for many months. In the ordinary piano the real strength depends, to a great extent, upon the thorough seasoning of the wood; and how many are made of mere green and worthless stuff need not be mentioned here. Mr. Driggs ignores all strength derived from that source, relying solely upon the compact and unyielding iron frame, which will neither spring nor give.

The thin upper sounding-board is rendered stiff and convex by means of its iron frame; the thin lower sounding-board or bottom is rendered concave and stiff by being pressed into the scantling frame. The sounding-post passing from the lower to the upper sounding board, thus connecting the vibrations, and the thin, shell like case surrounding and combining all, present a new combination of vibratory agents never before used in the manufacture of pianoforte. Like the violin, this piano is entirely free from incumbrance inside. There is not a single block of wood—except the rest-plank for turning pins—nothing, in short to absorb or muffle the vibration or detract from the power and purity of the tone evolved from the strings.

These results, it is said, are made appreciable to the hearer by a purity and richness of tone, which is vocal and sympathetic in the highest degree, and an increase of power, which is not merely additional noise caused by a violent concussion of the hammer, but an additional greatness of sound, the tone being preserved at the same time in all its purity, brilliance, richness, and depth.

Instruments exhibiting these improvements may be seen at No. 505 Broadway, N. Y., where further information can be obtained.

Government Ships and Fire Arms.

Horace Greely in the New York *Tribune* says:—"The Federal Government—so far as I can now recollect—prosecutes but two branches of manufacture—the building of ships and the making of fire arms. In my judgment these are two national mistakes. If we had never built a national vessel in a navy yard nor made a musket at a public armory, but simply gone into the open market whenever we needed either, and bought our ships, or hired them built by the best ship-builders just as any great shipping house does in a like contingency, and so issued proposals for one hundred thousand muskets, rifles, or revolvers, as the case may be, leaving each bidder at liberty in his bid to vary the model in such manner as to secure increased efficiency or value in any respect, we should not only have obtained our ships and our arms much cheaper but have advanced the arts both of ship-building and gun-making."

We quite agree with our neighbor in the above remarks. It would be a national benefit if all our navy yards were at once abolished and their contents sold off at auction. Government could then take its choice of vessels and materials, accepting none but the very best.

A Cold March.

During the past month the highest temperature in this city was 47°—much lower than it has been for fifteen years. There has been only two showers of rain since the 26th of December, 1855.

We are indebted to Hon. Erastus Brooks for a printed copy of his excellent speech on an Agricultural College for the State of New York, delivered in the Senate Feb. 12, 1856.