[For the Scientific American.]

ECONOMY IN PATTERN WORK.

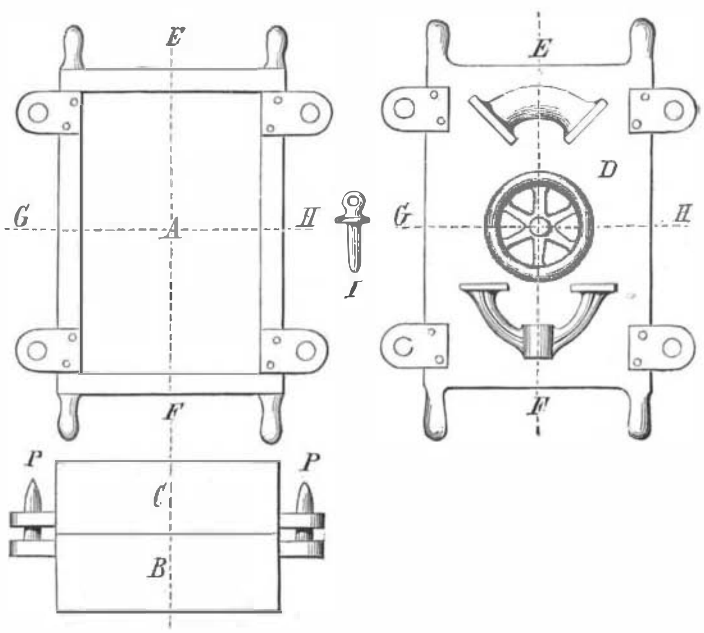
It is often a source of considerable dissatisfaction that a person cannot obtain a cheap casting without a costly pattern. Many shifts are made to avoid this expense and the attendant delay; for instance, if a casting breaks, the pieces are sometimes temporarily united and made to serve as a pattern. Sometimes what is termed a skeleton pattern is given to the moulder—a mere outline of the thing desired; or, perhaps, even only a portion of it. I do not wish to enter into details or offer examples of these shifts and contrivances, and only mention the practice to show that a want is felt for cheap patterns, especially when only a few castings are required. Let me now, therefore, call the reader's attention to a contrivance which may satisfy that want to a certain limited extent.

Let the iron or brass founder use one or more flasks of the kind shown in the engraving at A, B, and C. A is a plan of the flask; B and C are end views, showing the two parts, nowel and cope, placed together. This flask does not differ from that ordinarily used except in one particular, namely, the centers of the pins, P, in the nowel, B, and the centers of the holes in the cope, C, must be equidistant from the center lines, E F and G H. Let a strong board be made similar to that shown at D in the engraving, battened on one side to keep it straight, the other side being planed true and free from curve or twist. Let four iron lugs, with holes in them similar to those usually screwed to the cope part of a common flask, be fixed in like manner to this board, and let the centers of the holes be at equal distances from the center lines, E F and G H, making those distances the same as those adopted for the flask. It is now evident that the board, D, may be so applied to the nowel, B, that the four pins in B shall fit into the four holes in D, and that it will be retained in position by them; in like manner the board may be applied to the cope, C, so that the four holes in the one shall exactly coincide with those of the other. When so applied it is only necessary to place two or more pins, such as shown at I in the engraving, in the holes, and the board will be retained in its position with reference to the cope.

Things being so arranged, we are prepared for business. Any article whose parts are symmetrically disposed about a center line (and there are hosts of such) may be made from half a pattern. Herein is the economy, for it is presumed that half a pattern costs less than a whole one. Let the half patterns of any such articles be placed upon the board, D, so that the center line drawn upon the pattern falls exactly upon that drawn upon the board. Our engraving shows three different kinds of half patterns so placed, a bend, a wheel, which has perhaps a rim round or oval in section, and a hanging bracket, sufficient to fill the flask, and all to be moulded at the same time. The half patterns having been placed as required, they must be retained in their respective positions by pegs passing through from the back of the board and fitting easily into holes made a short distance into the patterns. Place the nowel, B, upon the board with its pins in the holes, and clamp it there; ram it with sand and turn the whole over; lift off the board and draw the patterns. Replace the patterns on the board and apply the cope, C, to it, passing at least two pins through the holes to hold the board and cope in position; ram the cope and make provision for ventilation and the admission of metal, continuing the process as before directed for the nowell. The cope and nowel, when placed together, will now form a perfect mould.

The author has seen this arrangement carried out for a piece of work where hundreds of pieces were required. It gave perfect satisfaction. The half patterns, once placed upon the board correctly and pegged, are good for any number of pieces, and all the rest goes easily. It is immaterial whether close or snap flasks are used; the arrangement holds good for all machine framing which is symmetrical, such as brackets, bends, elbows, tees, straight pipes, wheels with an even number of straight arms or without any, etc. We may even go a step farther, for if the piece is in its main parts symmetrical but has upon one side a hub or branch of some sort not required upon the other, then if such hubs or branches are attached by easily fitting pegs they may be retained when ramming the nowel and removed when ramming the cope, or *vice versa*.

Unlike the makeshifts for economy's sake alluded to, the arrangement here recommended throws no extra labor upon the moulder. There is simply the expense of a few flasks—and let me ask the question, If four pins have to be attached why may they not be placed in a certain position? So that it only amounts to this, that every flask of the same size should have its pins or holes in the same place, so as to accommodate if necessary the same board. It is not, however, imperative to proceed to this extreme.



PATTERN WORK.

How to make Stearine Pictures.

This stearine relief process depends upon the property which bichromate of potash, mixed with gelatine, has of becoming insoluble by light. If a glass plate be covered with this mixture, and exposed in the ordinary way, in its after manipulation in water those parts not touched by the light will swell up, while those acted on by it, and consequently insoluble, remain flat; in fact, a relief is formed from which any number of impressions in stearine can be taken. These stearine impressions are afterwards rubbed with silver powder, stuck on blue paper, and the effect is something charming. They are produced in the following manner.

When the impression has been taken, the relief must be finished on a flat, stiff surface—a glass plate, for instance. Consequently, no transfer can take place, on which account the half tones are in no way injured in washing. The exposure must be from behind, which, naturally, can only be done if the gelatine layer is spread on the negative itself, and this is no very great difficulty. The collodion used should be a good portrait collodion, if possible containing a little water; it is also improved by the addition of a little castor oil. Moreover, the use of crown glass may be recommended, and, before collodionizing, flood with a solution of albumen, and let it dry.

After the negative has, in the ordinary way, been exposed, developed, fixed, and well washed, it is then either placed in rather hot water, or flooded with it for some minutes, the temperature about 25° to 30° R. This preliminary warming is on account of the future pouring on of the chrome gelatine solutions, and is very important.

1 { Nelson's patent gelatine........ 75 grammes
  { Distilled water................ 1 kilo.

and then—

2 { Bichromate of potash... ...... 10 grammes.
  { Distilled water...............100 "

The commercial gelatine usually made from calves' feet is absolutely useless for employing in this proceeding, it not giving sufficient relief.

The gelatine of better quality, which I have mentioned above, is produced by Nelson, and is prepared from algæ, or moss, and answers excellently for this process.

From mixture No. 2 add a small quantity in drops to the gelatine solution, keeping it continually stirring, estimating the mixing at about 3 drops to the 100 cb. m. (Of course,both solutions must undergo careful filterings.) From this warm mixture a small quantity should be poured on the now wet and warm negative, carefully avoiding air bubbles, and spreading it equally in all parts. This is only preliminary, and serves to produce an isolated layer between the original and the relief, and prevents, in after washings, the dark parts of the negative relief layer, which are under, from being washed out.

After having treated the negative in the manner described, this gelatine solution, mixed with the bichromate of potash, is run off at a corner, and the plate then placed for a short time in the light to dry, and any superfluity of the mixture removed with gentle washing. Now the second—the real relief producing liquid—can be employed.

Beforehand it is well to surround the plate glass (which it is advisable to have somewhat thick) with a margin of cardboard, which can be either stuck on or tied firmly round it, so as to form an edge about five millimeters high. This edge serves to prevent an overflow of the gelatine solution. Into the dish thus formed is poured the gelatine solution, which, by the addition of the bichromate of potash, has been rendered sensitive to the light, and the negative covered to a height of some three or five m. m. One must anxiously avoid air bubbles. Afterwards thoroughly dry in a horizontal position in a warm room. Then it can be exposed, taking it carefully, in such a way that the negative (the gelatine side downwards) is placed on a board covered with black cloth, and for some hours exposed to the diversified rays of the daylight. By proper exposure, the gelatine layer assumes a yellow brown appearance.

The development of the picture is comparatively easy. Pour into a dish some thoroughly hot water, into which the plate should be once dipped. The temperature of the water employed varies according to the quality of the gelatine used. As a working rule, it may be observed that the higher the temperature of the water the greater the relief obtained, as it rises energetically. Bubbles are not to be feared if a good gelatine be employed.

As observed, nearly every quality of gelatine has its own temperature at which it swells most readily. To find this out is a matter for investigation—still, soon arrived at; in any case, it is preferable to use a gelatine that always gives the same results. With Nelson's gelatine the temperature at about 50° R. is the best.

On the application of the warm water the relief comes up quickly, those parts unaffected by the light swelling rapidly up, while those acted on should remain flat and solid. We can now perceive over the thick places of the negative a partial solution of the gelatine spreading itself under the isolated layer—in other words, a bas relief forming on the sensitized gelatine plate, in which the lights, and especially the light parts, lie deeper than the shadows.

On the contrary, if a diapositive be covered in the manner described, with the sensitized gelatine mixture, and afterwards exposed, the light parts would let much light through, by which the gelatine layer would be affected to a considerable depth. By the manipulating in hot water afterwards the insoluble parts remain, and we obtain high relief.

In most cases the production of the bas relief is to be preferred, which can be regulated according to the flooding.

The gelatine should be then prepared with a layer of a well concentrated solution of white shellac dissolved in alcohol; the stearine melted over a gentle fire, and then poured, carefully avoiding air bubbles, over the gelatine. On its drying, turn up the plate, and a few taps on the back will remove the impression.

In conclusion, rub the impression over with silver bronze, and mount on a piece of blue paper or card. A great improvement on this process is to be arrived at by carefully mixing marble or alabaster powder (such as can be obtained from sculptors' studios) with the stearine. Melt the stearine over a gentle fire, and add in small quantities the powder, carefully stirring and watching the mixing. In pouring into the mould, the powder sinks, so that the top layer of the stearine impression presents the appearance of finely sculptured marble.

In conclusion, it is well to remark that in producing reliefs of persons with light or golden hair, it is well to powder the same; otherwise, as in photography, the gold comes out black, and the hair in the stearine impression appears too sunken.—*Photographisches Wochen-Blatt.*

The Conditions of Invention.

The recent discovery of the liquefaction of the so-called permanent gases is only a practical application of principles long known. Berthelot and Andrews long ago indicated the conditions under which this probably could be accomplished, and Dumas even calculated the density and other characteristics of liquid oxygen. Moreover, that these gases were susceptible of liquefaction has always been a corollary of the modern thermo-dynamic theory; and to assert to the contrary has always been admitted as the expression of a paradox.

Substantially the same is true of the flying machine. The conditions of mechanical flight are all well settled. The first requirement is the condensation of the maximum of power into the minimum of space, and the anatomy of the bird virtually tells the rest. That the correlation of gravity with the other natural forces will be discovered is probably only a question of time. Faraday announced his belief of the possibility, and cleared the way for the application of the principles which ultimately may lead to its detection. There are abundant opportunities for invention and discovery which involve simply the application of the elementary principles of physical science, which should form a part of every one's education.

The Nordenskold Expedition.

To aid the expedition of Professor Nordenskold in the Arctic regions, having for its object the demonstration of the practicability of navigation in the Polar Sea north of Asia, the Navy Department has collated much material in the shape of charts, etc., produced from the surveys of the United States North Pacific and Arctic exploring expeditions (1853–56) and reports of Rear Admiral John Rodgers, the commander of that expedition, who in the month of August, 1855, proceeded through Behring's Straits (which Professor Nordenskold expects to penetrate) into the Arctic Ocean as far north as latitude 72° 2′ north, longitude 174° 37′ west, and then westward as far as latitude 70° 45′ north, longitude 176° 47′ east of Greenwich, which will no doubt make his reports and charts very welcome to the Professor, as they contain many details of the atmospheric conditions during that month, as well as of the depth of the water, magnetic variations, force and direction of the currents, etc., which cannot readily be obtained from any other source.

The Phylloxera and American Vines.

It has been discovered that several kinds of American vines withstand the ravages of the phylloxera, notably the "Clinton." A vineyard at Montpellier, France, is now largely planted with stocks of the Clinton grape, on which the French Aramon vine is grafted. The grafting is necessary to obtain grapes whose wine has a satisfactory taste. A work recently published at Bordeaux describes the American vines best suited for stocks, and specifies the French vines that can be grafted on them to advantage. For awhile it was hoped that German stocks would have answered the purpose, but they are found unable to resist the insect pest.