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SCRAPING SURFACES TO FIT.

There is no planer that planes planes. The best it can do is make a series of minute corrugations nearly parallel and nearly level. When a job of iron work comes from a planer, its planed surface is a series of longitudinal ridges traversed by cross chatter marks. Except in degree this description applies to all work done on the planer, whether the tool used was a roughing tool with rank feed or a finish tool with fine feed. Two planed pieces of cast iron laid face to face would present surfaces of contact very much like the plowed fields of clay soil, except in a less degree.

The first preparatory work to the scraping of surfaces to fit is testing with the straightedge, both longitudinally and across, to determine if the surface is out of wind. Inequalities are coarsely reduced by a float or mill file and afterward with a finish file, the straightedge being the guide. The finish file must be used with great care, for it is not its office to remove all the marks of the coarser file, or even to obliterate those of the planer tool; for both may present surfaces looser in texture than untouched portions, and thus be too quickly and unevenly cut away. All this preparatory work is to be done under the guidance of the straightedge—the surface plate has no part in it; the straightedge determines the lines of level, the truth of the surface, while the surface plate shows the quality of the surface.

A wash of spirits of turpentine put on with a rag is better than red lead to show surface. Soon as this is put on, place the surface plate on the surface of the filed work, and rub it back and forth. This will show the condition of the surface, which will be in blotches and dots. All these bright blotches and dots should be scraped down, the finer dots and lines less proportionally than the broader blotches, and another trial with turpentine and surface plate made, to be followed again by judicious scraping. It is not expected that working surfaces are to be as perfect as those of the test straightedges and the surface plates; the surface of the work should be even, without elevations or depressions, and should test to a straight line in all directions.

Scraping to fit is a slow, patience-demanding job; but it does not require the absolute exactness of the testing tools. Some of the tests for these are remarkable. When two surface plates, thoroughly clean, are laid together, one may be moved over the other at a mere touch, as though there was a film of ice between; the reason is that there is really a film of air between the surfaces, and it requires some force and movement to displace this air layer, when the plates will adhere so that one may be lifted by raising the other. Let one straightedge be laid on another, face to face, and then move one end of the upper one transversely back and forth as though it was mounted on a pivot. After a few attempts a pivot will be found at a point about two-thirds or three-fourths of the entire length of the straightedge from the moving hand. But if these surfaces are left in contact for a while, they require force to separate them. A test was made of balancing a straightedge three feet long and weighing thirteen pounds on a human hair. It was placed on another straightedge, and the hair introduced between the two faces near the center. The upper one was moved on the hair as a roller until the proper point was reached, when it remained balanced perfectly, so that light could be plainly seen the entire length of the straightedge between the two surfaces, except where the hair separated them at the middle of their length.

HANDLES FOR COLD CHISELS.

The cold chisel is the crudest tool used by workers in the metals, albeit one of the most effective; it is a bar of cast steel with a wedge edge, varying from a parallel blade to a gradual thickening from edge to stock. Its work is always by percussion, and the material of the hammered head and the driven edge is the same, only that the latter is hardened and tempered. And yet, for some purposes, the cold chisel should have a handle of material differing from that of the bit or cutting portion. When the chisel is entirely of steel the blow is transmitted, with all its direct energy, to the edge. In many instances this blow "stunts" the edge, and leaves the thinner portion in the cut. Every "chipper" knows that much of his success depends on his skill in preventing this mishap. Yet for most of the ordinary work of the chipper the solid steel chisel is the best; on cast iron especially, and for starting and driving a keyway in wrought iron. But for the final chip, the finish, especially in yielding metals, as brass, wrought iron, and soft steel, is better done with a chisel that softens the blow before it reaches the cutting edge. This can be accomplished by means of a wrought iron chisel with cast steel bit, the two being welded together. With such a tool, light, thin, smooth shavings can be taken, leaving the work almost free from the chatter marks that necessarily accompany the use of the solid steel cold chisel. These chisels were tested many years ago, and were proved to be excellent for the finish work on a job. They have not come into general use, probably because of the trouble and cost of making and relaying the chisels.

For very delicate work, even wooden handles are—or have been—successfully used. The channeling of some small steel dies for working soft sheet brass could not be done by the solid chisel, but the work went well when the chisels were inserted in solid wooden handles. The handles which were fitted with screw jaws for holding the shanks of awls, small wood chisels, screw drivers, and similar tools, proved to be excellent for these light purposes. These wooden handles were fully as effective in chiseling by blows on copper and hard brass, when the solid steel chisel lodged in the metal or broke its edge if the blow was not in a direct line with the chisel.

The Only Foreign Policy Wanted.

We know of a vigorous foreign policy to which there is no possible objection. It is a policy of peace which misses no opening for an increase of trade between the United States and other countries. It affords scope for the largest statesmanship and for the freest employment of all the arts—save that of war. This is a policy loved by the people more than by ambitious rulers. It is devoid of noise, fuss, and pretension. We have seen it manifested within a year in the building of a railroad between the United States and the heart of Mexico. This one American enterprise, popular in its inception and completion, has done more to promote good will and quicken trade between the two countries than all the legislation of Congress since the Mexican war. Among its incidental interesting results is the movement for a meeting at St. Louis of the Mexican and American survivors of the war of 1846-47. This is the first assemblage of the kind ever convoked. It would not be possible but for the truly friendly relations which have sprung up between the veterans of Palo Alto, Monterey, Chepultepec, Contreras, and Cerro Gordo on both sides of the boundary, in direct consequence of the new railroad communication.

Private citizens can do much in this line of reciprocal kindnesses, but they cannot do everything. The tariff barriers which divide us from Mexico cannot be leveled except with the consent of our Government. Here now is an auspicious occasion for bringing into play a vigorous foreign policy that can hurt nobody, that will cost this country nothing, and will bind Mexico to our interests as tightly as if she were annexed as the result of an expensive war with her. There is no "jingoism" about this. There is no necessity for waiting of a new President, Republican or Democratic, to put this practical and feasible idea into execution. It can all be realized by the passage of the bill reported from the Ways and Means Committee to carry the Mexican treaty into effect. There is political capital in it for both parties; and Republican and Democratic members of Congress should gladly unite in the good work.

When this is accomplished, it will only remain to apply a similar policy of reciprocal trade to all the States in Central and South America. And lo! the dream of our destiny will have been practically realized without the loss of a single drop of blood.—*N. Y. Jour. Commerce.*

Explosion of a Cannon Mould.

At the South Boston Iron Works on the 9th of July a remarkable explosion took place during the casting of a gigantic cannon. Fortunately no lives were lost.

For three weeks these works have been manufacturing guns for the United States Government. The order was for five cannons of the largest bore, and three of them had been made.

Early in the afternoon the process of casting was begun on the largest gun. Three furnaces, each containing forty tons of melted ore, furnished the metal. The spectators had just left the room, and the firemen were filling up the cavities caused by the cooling of the metal. The men were standing a short distance from the pit when the explosion occurred, sending a column of molten iron to the roof, a height of sixty feet, and scattering it in all directions. The men fled, and fortunately escaped. The building was set on fire, but only the roof was destroyed. The cause of the explosion is a mystery. The company will not lose over $6,000. The building, pit, and machinery were put in by the Government in 1881, and the pit was forty-one feet below the surface. The gun if perfected would have been a twelve-inch rifle bore breech loader, and of the Rodman pattern. It would have been 38 feet 6 inches long, and would have weighed 120 tons. It was 3 feet 7 inches across the muzzle, and 4 feet 9 inches across the breech.

Grinding by Machinery.

For some time past a machine has been at work in Sheffield which has effectually solved the problem whether grinding can be done by machinery. It is the invention of James Mitchell. Not only can the machine do the work of five or six men, but the quality of the grinding is said to be superior to that produced by hand labor. It is almost automatic in its action, and it does its work so easily and satisfactorily that a boy is sufficient to attend to it. The machine is altogether unlike what had been expected. There is no large revolving stone like those to be seen in grinding mills; but its place is taken by segments or blocks of stone, fixed by wedges and screws into the ribs of a hollow disk. These stone blocks are set with their faces toward the object or objects to be ground; and they are so fixed that they can readily be moved outward as the face begins to wear. When the machine is set in motion, the disk rapidly revolves at right angles to a bed or bedplate. To this bedplate the objects to be ground are secured. It has a backward and forward movement, and as it moves the articles secured to it are brought into contact with the stones on the face of the disk. The rapidity with which the machine does its work in comparison with the results of hand labor is very striking. But not only is it capable of grinding flat surfaces, and truing up edges; it grinds concave or convex, and bevels and angles equally well. It will thus be seen that the machine can be used upon a variety of objects.