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**THE SCIENTIFIC AMERICAN SUPPLEMENT**

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**SOLDERING ON CAST IRON.**

There are cases where brass requires to be united to cast iron, and drilling and riveting would either make a clumsy job or would weaken the parts. Soldering, if effective, is incomparably the better way. By many mechanics it is supposed to be either a trade secret or a skillful trick to make solder adhere to cast iron, but it is not so. The process differs but slightly from soldering on an already tinned surface, as sheet tin.

If the cast iron is white iron, or a thin casting that has become chilled in the casting—iron not amenable to the file—it should be cleaned from surface impurities by scraping, or scouring and washing in potash water. Then dip it for an instant in clear water, and wash it quickly with undiluted muriatic acid of the ordinary commercial strength. Go over it at once with powdered rosin, and solder, with the soldering iron, before the surface has had time to dry.

Another plan, and a better one especially for soft gray iron castings, is to file the surface clean, wash as before, wipe it over with a flux made of sheet zinc dissolved in muriatic acid until it is surcharged, or is a saturated solution, and has been diluted with its own quantity of water. Then sprinkle powdered sal ammoniac on it, and heat it over a charcoal or clear hard coal fire until the sal ammoniac smokes. Dip at once into melted tin, remove, and rap off the surplus tin.

**RAW HIDE WHEELS.**

In 1860, just before the war, the writer was employed to start a manufactory, one of the exactions being the construction of a machine for drawing and flattening fine brass wire. The connections of parts were first made by pulleys and belts—they did not hold; gears of necessarily very fine cogs broke their teeth; some were made of steel and hardened, but did not stand. The requisite appeared to be resistance and toughness of material. Raw hide was suggested, and some gears made of that material did their work well. Since then the use of this material has been noticed under similar conditions. Lately hydraulic compressed raw hide has been favorably mentioned as material for friction rolls and pulleys, for skate rolls, and as facings for friction wheels. There is no question of its advantage as a material for small pinion gears where much strain comes on each tooth; if not exposed to the continuous action of oil—animal oil especially—these wheels will bear a deal of rough usage. One of the useful qualities of raw hide is its yielding to a shock or sudden strain without breaking and without giving a permanent backlash. Steel and the best of Norway iron will break under strains to which compressed raw hide will only slightly and temporarily yield. The teeth of raw hide blanks can be cut in the gear cutting engine as well as those of iron or steel, and the material can be more readily turned in the lathe. If a lubricant is required in the working, clear water is the best.

**CANCER.**

Any disease which is acknowledged by all to be full of danger, is sure to be associated with quackery. Unprincipled men take advantage of the popular ignorance of medical remedies to make money. In respect to no disease is this more true than in the case of cancer. And the success of imposition is made easier from the fact that the name is constantly applied to tumors of various kinds, which have nothing of a serious character, which will disappear of themselves if they are only *let alone*. If, however, the name of *cancer* has been suggested, and then either a "cancer doctor" has been called, or without any such addition some one of the boasted remedies has been employed, when the tumor gradually diminishes and eventually disappears, the case is heralded as a "cancer cure," and the delusion is greatly strengthened thereby. For instance, the common red clover has a great reputation in some parts of the country for curing cancer, and to attempt to convince the believers in its efficacy that they are under a mistake is perfectly useless. The case of this one and of that is quoted in proof, whereas no one of them doubtless had ever the least reason for fear or the slightest sign of cancer.

The simple fact is that cancer is not at all a local disease. It affects the entire system; the change of tissues which constitutes what is recognized as the "cancer" is only the local manifestation. Hence the well known truth that removal of the ulcerated part, the tumor, is constantly only a temporary relief; the disease returns to its power, and commonly is soon fatal. Hence the universal dread of "the knife," and hence the readiness to flee to those who give the comforting promise that they will "draw out the cancer by the roots;" and beyond question such men will be encouraged in their imposture by continued applications for the use of their *skill*. If they treated only cases where true cancer exists there would be but comparatively small evil done, for there is too much reason to believe that the disease is of its very nature fatal, and that its progress to a painful death is sure and steady despite the utmost reach of human skill; but harmless tumors are constantly submitted to their care. Everything with them is invariably a "cancer," and it must be drawn out. The applications which are made destroy the tissues, for how can they draw the cancer out without it? That which was harmless becomes a source of suffering and even of danger, and if the patient recovers after the "doctor" has taken all the money available, it is paraded as a *cure*, whereas no cure was needed.

The domestic remedies, such as the clover above noted, are commonly harmless, and while they do no good they serve to pacify the patient. If cancer is there, it goes on its evil way unchecked; if a simple, non-malignant tumor is involved, it either disappears or remains stationary in progress, and presently clover or perhaps cancer root (*Conopholis Americana*) is in greater repute than ever.

**The International Electrical Exposition, Philadelphia.**

(THIRD PAPER.)

The number of visitors daily arriving in incoming trains shows a steady increase, and the great hall, which, during the very hot weather of two weeks ago, was but sparsely filled, is now, at certain hours of the day, almost crowded. At night there has been, ever since the opening, a large attendance; at times reaching the respectable figure of 7,000 visitors

Crossing the wooden bridge which separates the main hall from the annex, and descending to the ground floor, the visitor has his attention attracted by a circular railway with miniature locomotive and cars. This is the exhibit of a switch and signal company, and is constructed in exact imitation of a section of railroad. The general plan of this system is not new, but novel features have recently been introduced which do much to make a perfect safeguard against ordinary accidents. Experience has shown that no one person, however trustworthy, should be intrusted with the signaling of swift moving trains; and this automatic signal system, never tired, requiring no sleep, and not subject to sudden attacks of disease, is designed to operate railway signals with unfailing certainty It is operated by a current of electricity transmitted along the rails, showing the customary red targets when trains are in dangerous proximity, and white targets when all is clear.

The trouble with this class of signals heretofore has been that when, by one of those accidents to which electric currents are subject, the flow of electricity is stopped, the warnings cease. Not so, however, with this one. A stoppage of the current causes the dropping of the danger signal, and not until the circuit is again complete will the safety signal be shown.

An eminent authority, who has looked carefully into the matter of electric signaling, insists that the normal condition of the signals should be "danger," and that the agency through which they are worked should at all times be active when "safety" is shown. The apparatus should be free from atmospheric influences, simple, strong, and not easily disarranged.

These conditions seem to be present in the apparatus described. Move the miniature locomotive along the same track on which another car rests or is moving, and, when it reaches the same section, the engineer is confronted with a series of red danger signals. He can follow another train if he will, but he cannot get into its immediate vicinity without being warned, not once, but frequently.

The track is, in fact, only used for a part of the circuit. There is a secondary or telltale signal; the switches are all automatically locked and fitted with a circuit breaker. To illustrate the working of this system, let us take a section of the track, insulated at the ends of the section from the adjacent rails. At one end of the section there is a battery consisting of a single cell, one pole being attached to each rail, while at the other end of the same section there is placed an electro-magnet with one wire attached to each rail. Here we have established a complete metallic circuit from the battery, through the rails and magnet, back again to the initial point.

The electric current, seeking the point of least resistance, flies along the rails, for they have great conductivity. Thus, even during storms of rain and snow, the magnet is supplied with electricity. Now the magnet holds the signal at "safety;" but when there comes into the same section another train, the wheels, being better conductors than the small wires of the magnet, effect the short circuiting of the current, and, demagnetization taking place, the signal "safety" is permitted to drop, and in its place appears the warning "danger." The projectors say that in order to insure perfect reliability of working, reliable metallic continuity must be had throughout the whole length of the signal section. The fish-joints, they say, make ordinarily electrical connection between adjacent rails, but this connection cannot be relied upon; sometimes the splice will be loose, and often the rust and dust between the rails and splice bar will interfere with a continuous circuit. To make the circuit entirely reliable therefore at the rail joints, adjacent rails must be connected by wire. The ends of this wire are wrapped around the heads of stout rivets and soldered thereto; holes are then drilled in the flanges of the adjacent rails, and the rivets firmly driven into the holes, thus making an entirely reliable electrical connection from rail to rail. They thus explain the insulation of the track. Plates of fiber about one-eighth inch thick are placed between the bottom of the rail and the chair, and between the forelocks and the rail. There is also placed a piece of the same material, of the shape of the rail section, between the ends of the connecting rails, to prevent an electrical contact being made by the creeping or expansion of the rails. The latter are insulated by using a wooden splice bar on the outside of the rails, a divided fish-bar on the inside, and a piece of fiber between the ends of the rails. It should be added that a single cell battery will operate the signals of this system through a mile section of track.

It seems somewhat odd that in an otherwise automatic system, the weights which operate the "danger" and "safety" signals should be required to be wound up by hand. To the average student of human nature, it would seem as easy