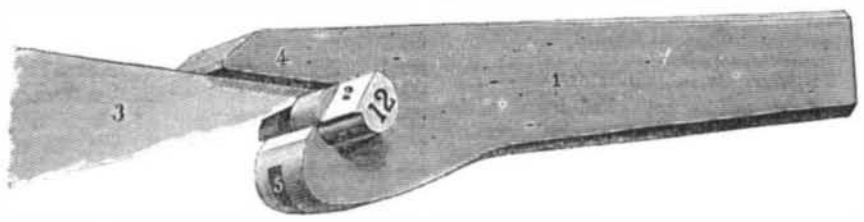
EMERSON'S SWAGE FOR SPREADING AND SHARPENING SAW TEETH.

No tool in the mechanic arts is more useful than the saw, and any improvement in the saw, or in the manner of keeping it in order, will be of interest.

The new tool here illustrated is intended to spread the points of the teeth, bring them to a proper cutting edge, and make them all of uniform width at the same operation. Fig. 1 shows the body of the swage or upset; Fig. 2 the sliding swage pin; Fig. 3 the saw tooth; Fig. 4 the long jaw or guide of the swage; Fig. 5 shows a slot to allow the swage to be used on a fine-toothed saw.

The faces of the guide, 4, and the sliding pin, 2, are hardened. In the pin, 2, is a slot cut the exact shape and width of the point of the tooth as it



should be. The sliding pin, 2, is made to fit exactly in the swage, so that the point of the tooth coming in the joint will be left with a proper cutting edge without filing. By placing the point of the tooth, 3, in the die, as shown in the engraving, and striking on the end of the swage with a light hammer, repeating the blows till the point of the tooth is brought to a propor width and shape, a better cutting edge is obtained than can be made by filing.

This simple, cheap, and effective tool was patented through the Scientific American Patent Agency, June 6, 1866. For further information address the American Saw Company, sole manufacturers, No. 2 Jacob street. New York, or Trenton, N. J.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

[From the London Mechanics' Magazine.]

NEW METHOD OF OXYDIZING LIQUIDS.

Mr. James Hargreaves, of Widnes, has recently devised an apparatus for the oxidation, by air alone, of bodies dissolved in water, which constitutes a novel and very ingenius application of the injector principle. It was devised for use in the soda manufacture, for the oxidation into sulphate of the sulphide of sodium contained in the complex solution obtained by the lixiviation of "black ash." This oxidation had previously been effected by means of nitrate of sodium, which is a very costly material, the necessity for the use of which, for the purpose in question, Mr. Hargreaves's contrivance entirely obviates. Mr. Hargreaves puts the crude liquor into a vessel furnished with a false bottom, which false bottom is perforated with numerous small holes, and has inserted in it, at its center, the lower end of a pipe which passes up to a little above the top of the vessel, and terminates at its upper end in a throat, immediately above which is fixed a jet connected with a boiler, the steam in which should be kept at a pressure of about 40 lbs. per square inch. Steam from this jet rushes into the funnel-shaped throat and then down the pipe, carrying with it into the space between the bottom of the vessel and the false bottom very large quantities of air, which then issue through the holes in the false bottom and rise through the solution, "causing," says Mr. Hargreaves, "an intense commotion," and coming into contact with so large a surface of the solution as very rapidly to oxidize all oxidable matters contained in it. The heat communicated to the solution by the steam greatly facilitates this process of oxidation. Mr. Hargreaves states that a large charge of crude soda solution may have all the sulphide in it completely oxidized by this method in from four to five hours.

THERMO-ELECTRIC PROPERTIES OF MALLEABLE AND CAST IRON.

It has been well known for some little time that a thermo-electric pile, constructed of malleable iron and bronze, deflects the needle of the galvanometer to the left, whereas a similar pile constructed of cast iron and bronze deflects the galvanometer needle to the right. This curious fact, showing that malleable iron and cast iron have opposite thermo-electric properties, has lately suggested to M. Arnould Thenard, the idea of constructing a thermo-electric battery having cast iron for one element and malleable iron for the other, and that gentleman has found that a very powerful battery may be constructed in this way. A comparison of the electro-motive force of a malleable and cast-iron battery with that of a malleable iron and bronze battery, and that of a cast-iron and bronze battery, all three batteries being of the same size, showed that the electro-motive force of the malleable and cast-iron battery was equal to that of the cast-iron and bronze battery and that of the malleable iron and bronze battery put together.

PRODUCTION OF COLD BY METALS.

Dr. Phipson has found that when 207 parts of lead, 118 of tin, 284 of bismuth, and 1,617 of mercury, are mixed together, the air being at the temperature of + 17 deg. Centigrade, the temperature of the mixture falls to —10 deg. Centigrade. The mercury in such a mixture being readily recoverable, for use over again, by distillation, Dr. Phipson is of opinion that the production of cold by this method is susceptible of numerous useful applications.

THE "MIANTONOMOH" AT QUEENSTOWN.

The arrival, after a very successful trip across the Atlantic, of one of our monitors, seems to have given a new idea to our English cousins. Only a short time ago they were endeavoring to disparage our monitors as sea boats, while reluctantly admitting their possible value as harbor defenses. The performances of the *Monadnock*, a twin ship to the *Miantonomoh*, in passing Cape Horn, did not receive full credit, on the supposition that, instead of doubling the "stormy cape," she might have "crept through the Straits of Magellan." But the *Engineering* now says (issue of June 22d):—

"Our own advices from America leave no room for doubt that the *Monadnock* weathered Cape Horn, instead of going through the Straits of Magellan, on her most successful voyage to the Pacific."

The subsequent performance of the *Monadnock* in her run to San Francisco is additional evidence of her merits as a sea-going vessel.

In regard to the *Miantonomoh* the *Engineering* says:—

We are not dependent, either, upon interested or exaggerated American testimony as to her performance, for Captain Bythesea, R. N., who has been in America for some time on Admiralty service, came across in her in company with Mr. Fox, the Assistant Secretary of the United States Navy, and if the gallant captain did not himself write the *Times* account of the ship and her voyage, we may be sure it was written upon the best authority. "Crossing the Bay of Fundy, she encountered weather which, without amounting to a gale, was considered very boisterous, but she rode through it easily. On the voyage to Queenstown, the indicator marked no greater rolling than 7°, while 2° is stated to be the average. Her paddle wheel consorts, on the other hand, rolled to a maximum of 18° and 24° respectively."

The monitors, therefore, are not only seaworthy but comfortable. They are such ships as a crew can live in without want of light, air, or shelter, in at least a summer voyage across the Atlantic or around Cape Horn. And yet in Mr. Fairbairn's work on iron shipbuilding, published only a few months ago, and to which we refer for very clear plates of the double-turreted monitor, *Chickasaw*, and the single-turret, light-draught, twin-screw monitor *Nauset*, we find this conclusion: "As regards armor-plated sea-going vessels, the Americans have not made much progress. During the war they were not requisite, as the Confederates had nothing to compete with them; and hence followed a description of monitors which can only be admired as floating batteries or well-shaped rafts, calculated for the destruction of forts and a similar description of craft in smooth water." This was no more than the general belief, a few months ago.

The *Mechanics' Magazine* after saying that she made the run from St. Johns, Newfoundland, in ten days and ten hours. remarks:—

On the whole, her speed was at least respectable while, if her peculiar build be taken into consideration, we may even call it surprising. Taking, then, the general circumstances of the case we cannot consider this first voyage of a monitor otherwise than satisfactory, and as exhibiting the triumph of engineering skill as applied to naval construction. At the same time this successful visit must be suggestive to our Admiralty of dangers we are little prepared to face. The Federals have much larger classes of monitors, and if the *Miantonomoh*, which only represents one of the smaller, has been able to cross the Atlantic, is it not obvious that a squadron of powerful monitors can at any moment visit our shores? This monitor is on her way to Cronstadt, whereshe will meet with a flotilla of ships constructed much on the same principle. It follows that a junction of an American and a Russian fleet might eventually be made in our waters, and consequently, since it is given to no one to foretell events, it is the duty of Government ever to be prepared for the worst.

WHY NOT?

The *London Spectator* says that a firm in Manchester bound themselves by a trust deed to divide their profits, over fifteen per cent. on the capital invested, among their workmen:—

"The first result was a sudden decrease in waste, the men not seeing why they should waste their own property any more than any other master's; and waste is, perhaps, next to bad debts, the greatest source of manufacturing loss. The next was an immense advance in the pace of the work done, the men putting their hearts into it as hired people will not do, and scolding each other for neglect, as if each man was overseer. The last was a great increase of orders, every man being as anxious to obtain work, and profitable work, or, as he himself expressed it, to 'carry some'ut to bonus,' as if he had been the sole master. The result was a first dividend at the rate of fifteen per cent per annum, and four or five per cent over for division among the men."

Why would not the plan work well generally? A man who places his money at interest, by investing in loans, is satisfied with the regular and uniform percentage of profit. Why could not the dividends on manufacturing stocks be limited to the stockholders, and the surplus be divided among the employés? Indeed, we cannot see that the stockholders could lose much by such an operation, and it is certain the workmen would be great gainers. In a measure, they would become joint owners in the stock, at least they would feel jointly interested with the stockholders, and manifest a degree of interest in the success of the concern impossible to be realized when their profits did not so much depend upon the contingency of application. care, and economy. Such an arrangement would greatly reduce the liabilities of failure.

The Great Trial of Agricultural Machines.

Many of our readers may not be aware that a special trial of the principal reapers and mowers, is to take place at Auburn, New York, on the 10th instant. In view of the important interests connected with the trial, both agricultural and manufacturing, we shall dispatch a special reporter to the trial who will give a faithful and impartial account in detail.

The amount of premiums offered is very large, and the celebrity obtained by the best machine will be very wide.

The Atlantic Cable.

Our foreign files come filled with the all-absorbing subject in English circles of the Atlantic Cable. Want of space compels us to delay the publication of some interesting facts until another issue. The *Great Eastern* was to have left on the 8th instant, so that we shall soon know whether this third attempt is successful.

Unparalleled Success.

A telegram to the Associated Press announces that Commissioner Theaker will issue, this week, 202 patents. Of this number ONE HUNDRED AND FOURTEEN are for the clients of the Scientific American Patent Agency. The business of this office has rapidly increased during the past year.

PROF. HODGKINSON has shown that strains, however feeble, if long applied, produced some permanent elongation or contraction in bars of iron.