tain adjustable guides, by means of which the roller is readily made to press harder and harder as it advances, and thus taper down the iron beneath. The above is an excellent improvement.

Blind Slat Tenoning Machine.—By John H. Palmer, of Elmira, N. Y.—Two small cutter heads are arranged upon the extreme ends of a pair of mandrels which have a horizontal lateral movement. The slats being introduced between the cutters, the latter are moved up and operate on the slats. Two round tenons are simultaneously produced, one at each end of the slat. This is a very rapid machine. The special novelty consists in cutting both tenons at once, the common machines being only capable of operating upon one end of the slat at a time.

Hemming Apparatus.—By S. P. Chapin, of New York City.—This contrivance is an attachment to sewing machines, and its object is to fold over the edges of the cloth into the proper condition for hemming, while the cloth is being fed into the machine. There are a great many species of garments and articles made by the aid of sewing machines, on portions of which some hemming is required. The invention here noticed is capable of a variety of applications, and is a highly useful improvement.

Improvement in Temples for Looms.—By R. Reynolds, of Stockport, N. Y.—That portion of the weaving loom called the "temple" is a contrivance for stretching and keeping the sides of the cloth stretched, as fast as it is woven. But for the temple the cloth would shrink up and impede the movements of the loom.

The subject of this patent belongs to the class commonly known as jaw temples, and is intended to be attached to the breast beam of the loom in such a way as to be capable of moving forward thereon. The first improvement consists in extending the upper jaw so as to form a lever, and giving the forward extremity such form, that, by its contact with a roller upon the breast beam, the temple may be retained in a proper position to gripe the cloth as near to the last filling thread as is desirable; the temple is also allowed to slide forwards under the said roller, when struck by the lay near the termination of every beat, and is thus caused to release the cloth. When the shuttle is arrested or retarded so as to be caught between the temple and reed, the temple is arranged to move forward with its jaws open, and thus prevent injury either to the reed or web.

The second improvement consists in the introduction of an elastic or yielding medium between the jaws of the temple, for the purpose of holding the cloth more securely, and at the same time protecting the selvedge and all that part of the cloth which is griped by the temple, from injury.

Machine for Making Ship Thimbles—By Corliss and Harris, of Providence, R. I.—The thimbles here mentioned are the iron rings or eyes which mariners use in the rigging of vessels to prevent the chafing of ropes when attached to hooks, staples, bolts, and the like. The surface of the thimble is concave, and the rope is bound around it.

The iron from which these thimbles are made is commonly rolled out into flat bars, cut to the proper length, and bent up into circular form. The flat ring thus made is then placed upon a peculiar shaped mandrel and the pressure of rollers applied, in order to produce the required convexity of the thimble. The operations of bending, rolling, and removing the thimble from the mandrel are comparatively slow and expensive.

The present improvement consists in the use of an anvil, having a convex surface, upon which a pair of hammers, operated by steam power, are made to fall in such a manner that if flat bars of iron are fed in upon the anvil they are quickly hammered up into complete thimbles ready for use. The operation is much more rapid than the old plan, and the quality of the work is superior.

Note.—The foregoing inventions were patented on the 19th inst. The claims of the patentees are published in the official list in another part of this paper.

Improvement in the Manufacture of Iron—Mr. J. Harrison, of St. Louis, President of the Co. owning the great Iron Mountain of Mo., has made a valuable improvement in charging boxes, for iron furnaces. The box is of the same size as the furnace, cylindrical in form, with a movable bottom. In use, the charge of coal, ore, and limestone, is placed in the box, rolled on a railroad, immediately over the top of the furnace, and then discharged through the movable bottom. In this manner the charge is thoroughly spread out and intermingled; the result, Mr. Harrison tells us, is an increase of between five and ten per cent. in the production of iron. This is an important gain. The old method is to dump in the charge from barrows; but when thus thrown it falls in a heap in the center of the furnace, where the ingredients cannot so readily melt and combine.

Improvement in Garments—By Amasa S. Thompson, of Springfield, Erie Co., Pa.—This is a method of making a seamless sack coat out of a single piece of cloth. By a few changes in the loops and buttons the garment may be converted into a cloak, and then into another formed garment called a talma. These changes are all made with rapidity. One piece of cloth is thus caused to serve several different purposes. The expense is no greater than for a common sack coat.

Incrustations in Steam Boilers.

Notwithstanding we have published a great deal of information on the subject of boiler incrustations, we very often receive letters asking for more light on the subject. We have now before us a letter from J. T. Milton & Co. of Coeymans, N. Y., which contains the following :—

"We are using a new locomotive boiler of about 65-horse power, which is fast becoming covered with scale, and we have tried various substances to prevent it, but without success. The water used is hard limestone water. We will pay one hundred dollars to any person who will inform us of any substance we can use that will effectually prevent the formation of scale, without injury to the boiler."

In a letter from Mr. Van Dalsem, of Lexington, Ky., he says :—

"What is the best remedy to remove limestone formations in high-pressure steam boilers. Some persons here use molasses, blocks of hickory, charcoal, bones, &c. Is there anything better than these substances? if so, information of the same will be very useful to us here. Our water comes off limestone rock."

We may not be able to give our first correspondents the precise information that would merit the requirements of their proposition, but we will give such information on the subject as will not only be useful to them, but to all our readers who employ "hard water" in steam boilers.

What is the scale or incrustation which forms on the inside of steam boilers? It is a crust of stone, deposited on the metal of the boiler from the water which has been evaporated. This crust is a non-conductor of heat; it therefore presents a constant resistance to the heat penetrating from the fire in the furnace to the water; hence it is a "fuel waster." But how is this scale or crust formed from evaporated water? Water is a great solvent of earthy matters. Rains enter the earth and dissolve some of the saline matter of the soil and rocks with which they come in contact, and carry them in solution into wells, streams, rivers, and lakes. The waters of some springs and streams contain less earthy matter than others; and owing to the geological character of a country so is the water impregnated with different saline matters. The crust which forms on the inside of the steam boiler of Messrs. Milton, from water in Coeymans, N. Y., is different in its nature from that formed from the water in the boiler of Mr. Van Dalsem, at Lexington, Ky. The crust in the former boiler, we judge, should be composed of silica, (sand material,) alumina, (the basis of clay,) oxyd of iron, some chloride of sodium, (common salt,) and carbonate of lime. The crust —judging from the geological character of the country—will be of a light brown or buff color. On the other hand, the crust which forms in the boiler at Lexington will be composed principally of the carbonate of lime, the carbonate of magnesia, some silica, and perhaps traces of iron. If the latter is present, the color of the crust will be buff, if not present it will be whitish. It is very evident that the same substance which might prevent crust forming in one boiler, or which may remove it, may exercise little or no effect in preventing or removing the crust in other. This is the reason why blocks of oak and various kinds of saw dust have prevented scale forming in some boilers, while they have utterly failed to do so in others which were fed with a different kind of water.

A gallon of pretty hard water contains about 40 grains of saline matter in solution. Some waters do not contain more than a fourth of this amount. But allowing the water used at Coeymans to contain this amount, it being 65-horse power, it must evaporate 3900 gallons per day, (ten hour's work) thus leaving 156,-000 grains of solid matter behind, which, if not removed, and has any electrical affinity for the iron will soon adhere to it, and form a scale of 27 lbs. per day, 162 lbs. per week, and 2106 lbs.—nearly a tun, in three months. We can thus easily conceive how soon a crust of greater weight than the boiler itself may be formed within it. And allowing the water to contain only ten grains to the gallon it will form a crust of nearly 7 lbs. weight every day. Let Messrs. M. weigh on fine accurate scales, a clean copper or iron vessel; then measure a gallon of water and weigh it; then evaporate the whole very slowly, and then weigh the vessel, which will contain the earthy matter of the water adhering to its sides and bottom; the increase in the vessel's weight after evaporation will indicate the quantity of saline matter held in solution by the water, and will give them a correct idea of its stony nature.

There is a well-known and effectual remedy for preventing scale in all steam boilers. What is that? Don't use hard water. Or if you use such water, remove all the earthy or saline matter from it before you admit it into the boiler. If Messrs. Milton would make large reservoirs and use rain water for their boiler, and exhaust the steam into a tank, and thus use the same water over and over again they would never be troubled with scale. This would be a sure preventive, and every person who uses a steam boiler, if he has room to construct and use large rain reservoirs, should do so.

But those who cannot build such reservoirs for want of room or any other cause, and who are compelled to feed their boilers with hard water, have a remedy for scale by precipitating the saline matter in the water before it enters the boiler. The patent apparatus illustrated on page 113, this Vol. SCIENTIFIC AMERICAN, will accomplish this. Another plan to effect the object for limewater (and which will also be effectual, in a measure, for the water at Coeymans) is that furnished to us by J. H. Balsley, of Dayton, Ohio. He says:—"We have been running an engine four years, using boilers 40 inch. diameter and 22 feet long, 15 inch flues, running ten hours per day. We exhaust into a box that is 8 feet high, and of an area of 20 square inches—a narrow rectilinear box. The feed water enters at the top of this box, and finds its way down through a pack of wood shavings to the bottom, and then goes to the feed pump. The uncondensed steam passes out at the top of the box. About half a peck of lime is taken from this box every week. We put a pint of molasses into the water of the feed pump twice a week, and have been doing this for two years. We clean out the boiler every three months, and find about half a bushel of brown mud in it, but no scale. Some scale had formed in the boiler before we commenced using the molasses, but it has now nearly all fallen off. Before we commenced thus to use the filter and the molasses, we had to clean out our boiler every six weeks; the pipes then used to be choked with lime, but now we have no trouble of the kind. There are four or five persons here who have used molasses for five years with the same results."

Here, then, we have positive testimony respecting a method of preventing limestone scale in steam boilers. The action of exhaust steam on the incoming feed water is to disengage the lime matter, because it is held in solution by carbonic acid, which is easily driven off by heat. The effect of the molasses is to envelope the moleules of other saline matters not removed by filtration, hold them in solution, and prevent them adhering to the boiler.

If scale is already formed on the inside of a boiler, of gypsum (sulphate of lime) and carbonate of lime, (chalk,) the introduction of some salammoniac into the boiler will dissolve it, and also prevent scale arising from the water. The salammoniac decomposes the sulphate and carbonate of lime, forming sulphate and carbonate of ammonia and the chloride of lime—all very soluble salts. About one pound of salammoniac is sufficient for about 50 cubic feet of water. The great objection to the use of salammoniac is that the carbonate of ammonia formed, is liable to pass off with the steam and rapidly corrode any copper or brass fittings on the engine. The useful effects of molasses, glucose, and gallic acid in preventing scale forming in boilers have long been known. Potatoes, wheat bran indian meal, &c., have been used with effect in furnishing glucose; molasses for furnishing saccharine matter, and blocks and saw-dust of oak, mahogany, logwood, &c., for furnishing gallic acid. The objection to the use of oak and mahogany saw-dust is stated to be an injurious action on the metal of the boiler; that to the use of bran, indian meal, and potatoes is, "they cause *priming* in the boiler;" and molasses, when freshly introduced, is said to do the same. By coating the interior of a boiler with a composition of tar, linseed oil, and plumbago, scale will be prevented forming for a long time; but this is a troublesome method.

Having said this much on the cause of boiler incrustations and the remedies, the climax of the whole matter is, that scale can be prevented forming in steam boilers by four methods. One is to use soft or rain water only; the other is, to purify hard water before it is used; the third is, to use the mixed process of filtration and molasses; and the fourth method is, the use of extraneous substances in the boiler to keep the saline matters in solution, and to *blow out* these frequently. The subject of incrustations in boilers is a most important one when we take in consideration the fact that the water of all wells, streams, and lakes, contain some salts in solution, and that incrustations are liable to be formed in nine-tenths of all the boilers used in this country. We have no doubt but incrustations cause the loss of some millions of dollars every year, just in the waste of fuel alone, not counting injury to the metal and loss of time in cleaning out, &c.; besides scale is a most formidable objection to the use of the best boilers—the tubular kind.

Those who can, should use pure water, like rain, in preference to every other kind. But when this is impossible, the hard water should be purified before it is admitted into the boiler, and a little molasses insures safety in case perfect deposition is not effected in the filter. We do not counsel the use in the boiler of any of the extraneous substances named; but in many cases, if discreetly used, they may be employed advantageously both in removing and preventing incrustations.

Cooper's Torpedo.

Peter Cooper, Esq., of this city, describes in the *Express* a nautical torpedo for destroying enemies vessels' laying off the coast. All that is new about it is simply the guiding of it from the shore by strong wires attached to two rudders, these wires to be reeled off a windlass when the torpedo is going out, and reeled on it when it is coming back. Regarding the method of raising the steam to drive its engine, he says :—

"This torpedo (a peace-maker as I will call it) was a small vessel with a rotary steam engine driving a screw propeller. The steam was generated by a mass of red hot iron placed in a cavity answering to a fire-place in the boiler, which caused steam to generate with great rapidity."

All persons unacquainted with the science of steam entertain such ideas regarding the raising of it with wonderful rapidity by means of red hot iron. But when the Cooper Institute is finished and in full operation, Mr. Cooper will, no doubt, learn from some of the scientific professors employed there that his plan to generate steam is a scientific method to do so in the slowest manner possible, owing to the spheroidal condition which the water assumes when exposed to red hot surfaces.