Fire Engineers' Convention.

The ninth annual convention of the National Association of Fire Engineers assembled in Richmond, Va., September 13, President Green, of Boston, in the chair. The officers elected for the ensuing year were: President—G. Watt Taylor, of Richmond. Vice-Presidents—One from each State. Secretary—Harry Hill, of Cincinnati. Treasurer—A. C. S. Hendrick, of New Haven, Conn.

LIME-EXTRACTING HEATER AND FILTER.

Where the feed water is pumped directly into the boiler without being purified, the heat soon frees the impurities, which are precipitated upon the inner surfaces of the boiler shell and upon the flues, to which they cling in the form of scale, which is a non-conductor of heat, and being interposed between the water and the boiler shell, allowing the fire to act injuriously on the iron, rapidly deteriorating it, soon weakening the boiler, and incurring the dangers of explosion and the expense of frequent repairs. Stoppages and delays in cleaning boilers, as well as priming or foaming, which carries grit over into the engine to its great injury, must be reckoned among evils resulting from impure feed water.

The actual cost and damages sustained from these more prominent evils, together with many minor ones unmentioned, all of which directly and inevitably result from the presence of scale in boilers, if summed up and expressed in dollars would greatly astonish steam users.

Much thought, time, and money have been expended in experimenting with reference to the nature and effects of boiler incrustations. In an able paper on "Incrustation of Steam Boilers," read before the American Association for the Advancement of Science by Dr. Joseph G. Rogers, he says: "The evil effects of scale are due to the fact that it is relatively a non-conductor of heat. Its conducting power as compared to that of iron is as 1 to $\frac{37}{56}$. This known, it is readily appreciated that more fuel is required to heat water through scale and iron than through iron alone. It has been demonstrated that a scale of one-sixteenth of an inch thick requires the extra expenditure of fifteen per cent more fuel. As the scale thickens the ratio increases; thus, when it is one-fourth of an inch thick, sixty per cent more is required; at one-half of an inch, one hundred and fifty per cent, and so on. To raise steam to a working pressure of ninety pounds the water must be heated to 320° Fah. This may be done through a one-fourth inch iron shell by heating the external surface to about 325°. If a one-half inch scale intervenes the boiler must be heated to 700°, almost a low red heat. The higher the temperature at which iron is kept the more rapidly it oxidizes, and at any temperature above 600° it soon becomes granular and brittle from carbonization or conversion into the state of cast iron. Weakness of boilers thus produced predisposes to sudden explosions, and makes expensive repairs necessary."

Ordinarily there will have accumulated in a new boiler after four months' use one-sixteenth of an inch of scale; after eight months' use, one eighth of an inch of scale, and so on. Now, if Dr. Rogers' theory is correct, it necessarily follows that after one month's service a boiler will consume three and one-fourth per cent more fuel than at first; after two months' service, seven and one-half per cent more, and so on, making an average for the year of over twenty per cent more fuel than it would have consumed if using pure water.

The difficulty of this scale formation can be overcome in three different ways:

First.—Picking the scale off by mechanical means.

Second.—Purging the boiler by means of the chemical compounds known as boiler powders. This is dangerous, chiefly from the fact that an acid or other chemical strong enough to eat off the scale will not stop there, but will go ahead and eat the boiler shell as well.

Third.—The use of pure water. The simplest and surest way is always the safest and best. If the water is purified from scale forming material before entering the boiler, certainly no scale can form.

This brings us directly to a consideration of the means acknowledged by competent engineers as the best in use for the prevention of this formation by the furnishing of pure water, and this is exactly what the Stilwell heater accomplishes. The water enters the heater at the top, and in its downward passage traverses a large area of heating and depositing surfaces, arranged in the form of removable shelves, having alternate openings. As the thin sheet of water passes over these shelves, all of which are very hot, and descends from shelf to shelf, it is met in its downward course and constantly acted upon by an ascending current of steam which enters the heater at the lower port. The action of this lower current of steam completes the separation and precipitation of the foreign particles which is begun when the water enters the heater. The construction of the heater is such that not a drop of water can pass down through it without being thoroughly boiled. The lime, magnesia, sulphur, iron, silica, etc., which this process of boiling sets free from the water, are deposited in a crystallized state upon the entire series of shelves, the deposit always being heaviest upon the upper shelf and diminishing in quantity as it approaches the lower shelf. From this lower shelf the water passes through the filtering chamber, which completes the purification, and it is then fit to enter the boiler.

In this heater the escape steam from the engine is utilized, and the volume used enables the purifying of large quantities of water, while every particle of the water is boiled thoroughly.

The arrangement of the shelves and the case with which they can be handled and withdrawn for cleansing.

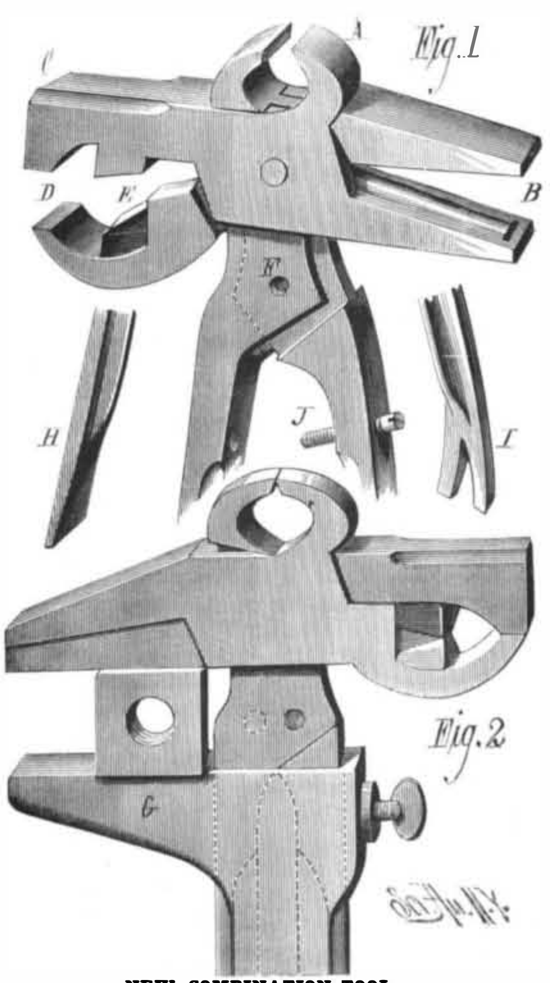
The filtering system, the leading point in which is that the water passes upward through the filtering chamber on its way to the discharge pipe and not downward or sideways, as is usually the case.

STILWELL'S LIME-EXTRACTING HEATER AND FILTER.

These heaters have been tested abundantly during the past ten years, and we are informed that there are to-day over three thousand in active use. They are manufactured by the Stilwell & Bierce Manufacturing Company, of Dayton, Ohio.

IMPROVED COMBINATION TOOL.

The engraving shows a new implement combining many useful tools in a compact and handy form. It forms a pair



NEW COMBINATION TOOL.

of nippers, A, a pair of pliers, B, which are provided with a rib in one jaw and a corresponding groove in the other jaw for the purpose of crimping the ends of stove pipe to facilitate putting the lengths together.

The end opposite the pliers is formed into a hammer head, C, against the under side of which the jaw, D, closes. This jaw and the adjacent surface of the hammer head are recessed, forming a holder for the nail, enabling the user to start and drive a nail with one hand.

The two halves of the tool are perforated at F, at the joint, to form a wire cutter, and an adjustable jaw, G, is fitted to the handles, forming a monkey-wrench.

A screw, J, in one of the handles, and a corresponding hole in the opposite handle, forms a punch and die for making holes in metal.

The end of one of the handles forms a tack puller, and the end of the other a screwdriver.

Fig. 1 shows the head of the implement and the end of the handles.

Fig. 2 shows the implement with the wrench jaw attached.

This invention was lately patented by Mr. John Straszer, of Manchester, Mo.

Eruption of Mount Lapwai, Idaho.

The recent report of a volcanic eruption in Idaho Territory is confirmed by a correspondent of the *Eagle*, of Butler, Pa., who visited the volcano about the middle of August in company with a representative of a Walla Walla newspaper.

As seen from Camas Prairie the column of smoke rising from Mount Lapwai was like that of a steamer beyond the horizon at sea. The mountain is two days' ride from Camas Prairie. Omitting unimportant personal details, the correspondent's account runs as follows:

"About 500 feet below the cone a large column of smoke sprang into the air hundreds of feet and then folded over to the east. Flames shot up to a great height, and a seething flow of lava was at that time rushing down into a small valley to the west and emitting a strong, sickening sulphuric odor, which made it impossible to remain by it any length of time. The lava had moved a distance of one mile from the mountain and was gradually making its way toward the Salmon. The neighboring hills were covered with ashes."

The visitors were informed by a Lapwai Indian that the lava flow is intermittent. With the wind at their backs they climbed the cone when the crater was quiet, though greatly disturbed and sickened by the sulphurous odors. The crater was about 500 feet below the rim of the cone, and appeared to be about an acre in extent. When the flow ceased the visitors went down to the edge of the crater, after covering their faces with rubber folds and their eyes with glasses. The heat was great. On one side it was possible to descend twenty feet into the crater without being nauseated, thanks to a favorable wind. The lava poured into the crater from the sides, and, when it was full, bubbled over and ran into the valley. The surrounding country is volcanic, and the Indians reported a recent eruption of Mount Idaho, a large peak a few miles from Mount Lapwai.

The visitors spent twenty minutes in the crater. At 5:45 P.M. the flow began again, and they hastily retreated. Scientific parties were fitting out at Portland, Oregon, toward the end of August, to visit the volcano. Mount Lapwai is one of the Blue Mountains, a low range crossed by the Snake River.

New Steamer for Oregon.

The new iron steamship, Walla Walla, the seventh vessel built by John Roach & Sons for the Oregon Navigation and Improvement Company, is now taking in cars and railroad material for the company, preparatory to her voyage to Oregon. The Walla Walla is 336 feet in length, 40½ feet beam, 23½ feet depth of hold, and of 5,000 tons displacement when loaded. She is constructed wholly of iron, with seven water-tight compartments, with one complete iron deck, and the second deck is three-fourths iron. As she is constructed for the purpose of carrying coal between Seattle, Puget Sound, and San Francisco, and will probably return without cargo, she is fitted with three water-ballast tanks to retain the center of gravity on line with the keel, when the vessel is discharged of cargo. All the deck houses are built of iron, and a handsomely furnished cabin and staterooms aft afford accommodations for thirty first-class passengers. The vessel is fitted with compound engines of 2,000 estimated horse power, and has six cylindrical boilers, and her estimated speed when fully laden is twelve knots an hour. She is schooner rigged, with a square sail forward, and upon her arrival at San Francisco will take her place on the regular route with the two other colliers recently built—the Willamette and the Umatilla.

Battery Carbon.

A useful method of preparing cheap carbon poles for voltaic batteries has been devised by M. Mauri. It consists in taking finely powdered graphite mixed with an equal weight of sulphur free from carbonate, and heating the mixture in a crucible until all the sulphur is fused. The temperature, however, should not be raised over 200° Cent. When the mass is fluid it is poured into a suitable mould of metal, and a stout copper wire is inserted to serve for an electrode. When the mass is cool and solid it is ready for use. Its conductivity is practically as good as that of the best retort carbon, and as it is more electro-negative than simple carbon, the electromotive force of the cell is higher. By increasing the proportion of sulphur in the mixture a highly resisting composition may be obtained which can take the place of copper or platinum silver coils for telegraphic or electric lighting purposes.