

**IMPROVED STEAM HEATER FOR DWELLINGS.**

We illustrate in the accompanying engraving a new low pressure steam heating apparatus, for which is claimed the advantages of high efficiency, reduction of first cost, safety, and simplicity of management. It is, besides, self-regulating, and is so constructed that a constant circulation of the water in its steam-generating space is maintained.

The steam and water drum, A, surmounts an annular series of tubes, B. The latter are of peculiar construction inside, as shown in Fig. 2, to which we refer more particularly further on. Within the ring of tubes is the fuel magazine, C, which is fed from the top by removing the cover, so that a constant fire is maintained in the grate below. The magazine also serves as a deflector for the heat, directing it against the tubes. At D is a ball safety valve, placed so as to blow off at five pounds steam pressure, and at E is the delivery pipe for the steam, conducting the latter to the radiators in other apartments. Condensed water is returned to the boiler by the pipe, F, by which the feed water is also supplied. The smoke pipe is shown in the rear. The grates of the shaking and dumping pattern, and can be easily removed without disarranging other portions of the heater. G is a deflector, the object of which is to prevent the heated gases taking a direct course to the smokepipe. It is made by setting one course of bricks close to the tubes.

The boiler is set in brickwork eight inches in thickness, the outer course being built up square, while the inner course is made circular to conform in shape to the firepot and boiler. A space is left between the bricks and the steam drum, which forms a flue to the stack. The apparatus shown at H is a fire regulator, so constructed and poised that, when the steam falls, the weighted arm of the lever is lowered and the ash pit door opened, thus admitting a draft under the grate. On the steam rising above the limit, the weight arm rises, opening the furnace door and so cooling the fire.

A section of one of the tubes enlarged, shown in Fig. 2, exhibits an inner tube, about which is coiled a spiral guide dividing the interior of the outer tube into a continuous spiral channel. When the fire is started, the water contained in the last mentioned portion, becoming heated, rises, and its place is taken by the cold water which descends in the inner tube. By this arrangement a constant circulation is maintained in both tubes, in the directions indicated by the arrows. Tubes thus constructed, we are informed, have been in successful operation for seven years. Each tube, in fact, is a separate boiler, and each being fastened by its upper end only, is free to expand and contract independently of all other portions of the boiler, so that any undue strains from this cause are avoided. They are secured to the water and steam drum, by taper screw threads, and when once made tight they will remain so. They may be readily removed, however, in a few moments when desired.

Patented through the Scientific American Patent Agency. Application for additional improvements is now pending. For further information address the inventors and manufacturers, Messrs. Messrs. Kafer & De Lacy, Trenton, N. J.

**METHOD OF SECURING FISH PLATES TO RAILWAY JOINTS.**

In the annexed engraving we illustrate a new method of securing rails in the fish plates, which is so constructed that the injurious strains, occurring at the joints by the passage of trains over the rails, are obviated. The arrangement is also such that the bolts are prevented from turning or working loose, which is another important feature. In Fig. 1 the invention is shown in place, in Fig. 2 the various parts are separated.

The fish plates are secured as represented, on each side of the joint. In one of the plates are formed a series of sockets, A, in which rubber rings, B, Fig. 2, are inserted. Through these rings pass the bolts, C, which are secured on the opposite side of the other fish

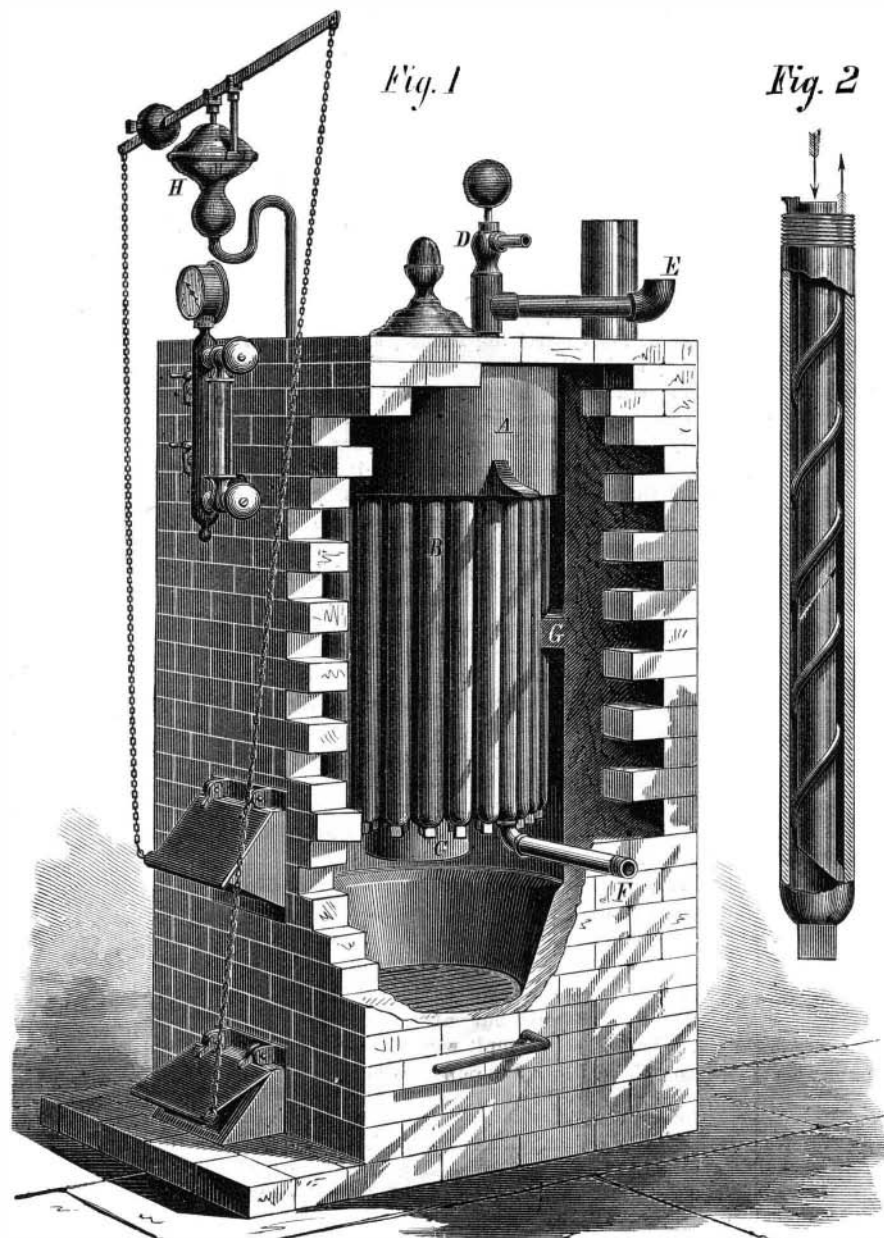
plate by nuts. As the head of each bolt impinges upon the elastic rubber, it is claimed that, through this means, the strains on the fish plate bolt and nut are prevented.

To keep the bolt from turning, two small wings, D, Fig. 2, are formed on the shank near the head. These are deep enough to enter the oval recess, E, of the fish plate when the bolt is drawn into place tightly by the nut. This construction rigidly secures the bolts in position, so that there is

no danger of their turning. The various parts are firmly bound together, and the rubber further serves to take up the yield of the bolt under strain, and thus prevents the turning of the nut on the thread.

The invention tends to considerable economy in the construction of railroads, as it obviates, in some degree, the frequent replacing and repairing of worn connections; and at the same time it adds to the safety of the road, especially under high speeds of travel.

Invented by Mr. Caspar Dittman. Patent recently allowed.

**KAFER & DE LACY'S STEAM HEATER FOR DWELLINGS.**

For further information address the Star Nut Lock Company, Leacock P. O., Lancaster county, Pa.

**The Teller Refrigerating Machine.**

We recently examined with much interest a Teller refrigerating machine which has just been erected and is now in operation in a large brewery in 47th street in this city. The operation of the apparatus is based on the alternate expansion and compression of methylic spirit vapor, the former producing intense cold and the latter reducing the vapor to a liquid form, ready for new vaporization. The cold gas is carried through a series of large plates in a cooling chamber, over and under which plates a powerful air current is driven by a fan blower. This current, which showed by the thermometer a temperature of 32° Fah., is conducted directly to the cellar or other locality to be cooled. The principle ad-

practical scientific value; especially as this machine embodies the very latest improvement in the process of the artificial production of cold, adaptable to so many important manufactures and preserving processes.

**New Smoke Condenser.**

At the Queen Louisa coal mine, near Zabrze, in Upper Silesia, there are two pairs of Cornish boilers, each 21.5 feet long and 5 feet in diameter, placed in boiler rooms off the main drawing level, about 120 yards below the surface, for the purpose of driving a 44 inch Tangye pumping engine, and a double cylinder horizontal engine for drawing coals from the dip workings. The smoke from these boilers was at first conveyed to an upcast shaft through a drift only partially protected by a lining of masonry, until the deposit of finely divided soot, often in a state of ignition, was so constant as to give rise to a fear of the ignition of the coal. It was therefore decided to adopt a means of cooling the smoke before admitting it into the flue drift. The condenser consists of an upright cylinder of boiler plate, about 14 feet high and of 5 feet internal diameter, with twelve horizontal diaphragms placed at equal distances apart. Each of these diaphragms is made of a double thickness of sheet iron, perforated with a great number of round holes 0.2 inch in diameter. They are of the same size as the internal diameter of the tube, but from each a segment about 1 foot in breadth is cut off, the cut edge being placed alternately opposite to those of the adjoining plates above and below, so as to form a serpentine passage for the smoke, which is admitted at the bottom through two circular orifices of about 2 feet in diameter, one for each pair of boilers. Water from the top falls through the plate in a fine shower, and is discharged through an 8-inch pipe at the bottom. The upward current of smoke is maintained by a Schiele's exhauster of 13 inches diameter, the distance traveled, owing to the obstructions caused by the diaphragms, being about 51 feet. The aperture for the discharge of the cooled smoke is about 12 inches in diameter. The supply of water for the condenser is taken directly from the discharge main of the pumping engine, and afterwards flows off by the side. The apparatus works well, no soot now being deposited in the flue drift; but the resistance to the current is greater than was estimated, and the exhauster and its 5 horse power engine, being insufficiently powerful to maintain the flow at a proper speed, are to be replaced by another of 15 horse power. The exhaust steam from the engines is discharged into the smoke drift, and contributes something towards increasing the draft. The experi-

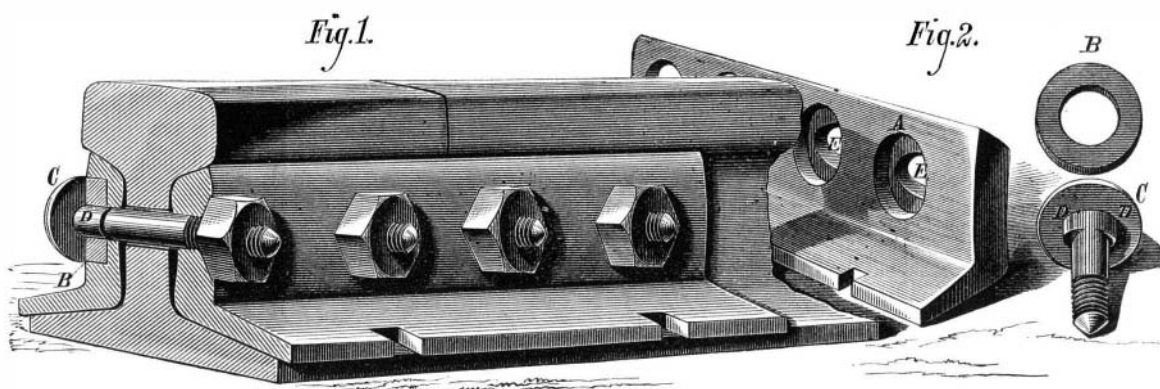
ments up to the present time show that the efficiency of this class of condenser is dependent chiefly on the power of the exhauster, on the distance traversed by the smoke, and the perfect division of the water, and not to any great extent on the quantity of water employed.

**A New Elevated Railway.**

A party of gentlemen, including several well known engineers, recently visited the works of Messrs. Clarke, Reeves, & Co., at Phoenixville, Pa., in order to witness trials of a new project for an elevated railroad, designed by General Roy Stone for rapid transit purposes in this city. About 800 feet of track, raised on posts, had been constructed, and this included a curve of 90 feet radius. The engine and car rests on a single rail, and are steadied by wheels bearing against two rails placed below, so that there are really three tracks.

The locomotive was driven by two rotary engines. The car had two tiers of seats, and accommodated 60 passengers. The operation over the short space was satisfactory.

The objections to the plan are obviously to be found in the difficulty of arranging the switches, and of causing one line to cross another at the same level. The advantages are its low cost, about \$100,000 per mile of single track, its safety—for it is impossible for the vehicles to run off the track—and the fact of its occupying a comparatively small portion of the street. These taken into consideration, the plan is perhaps one of the

**DITTMAN'S METHOD OF SECURING FISH PLATE AND RAILWAY JOINTS.**

vantage of the machine is its economy, there being practically no waste of the vapor, and it being possible to make from 6 to 8 tons of ice per day of 10 hours by the aid of pumps of from 5 to 7 horse power. Both the principle and the operation of the apparatus are very interesting, and as we expect shortly to publish a fine large engraving, together with a complete description of the entire apparatus, our readers may anticipate something of more than ordinary

best of those based on the elevated principle. The inventor, we learn, is endeavoring to obtain the consent of the authorities of this city to build an experimental section of some 500 feet in length along the street which crosses the City Hall Park on the north side of the post office.

THREE times the weight in pounds per fathom equals the working load in hundredweights of good hempen rope