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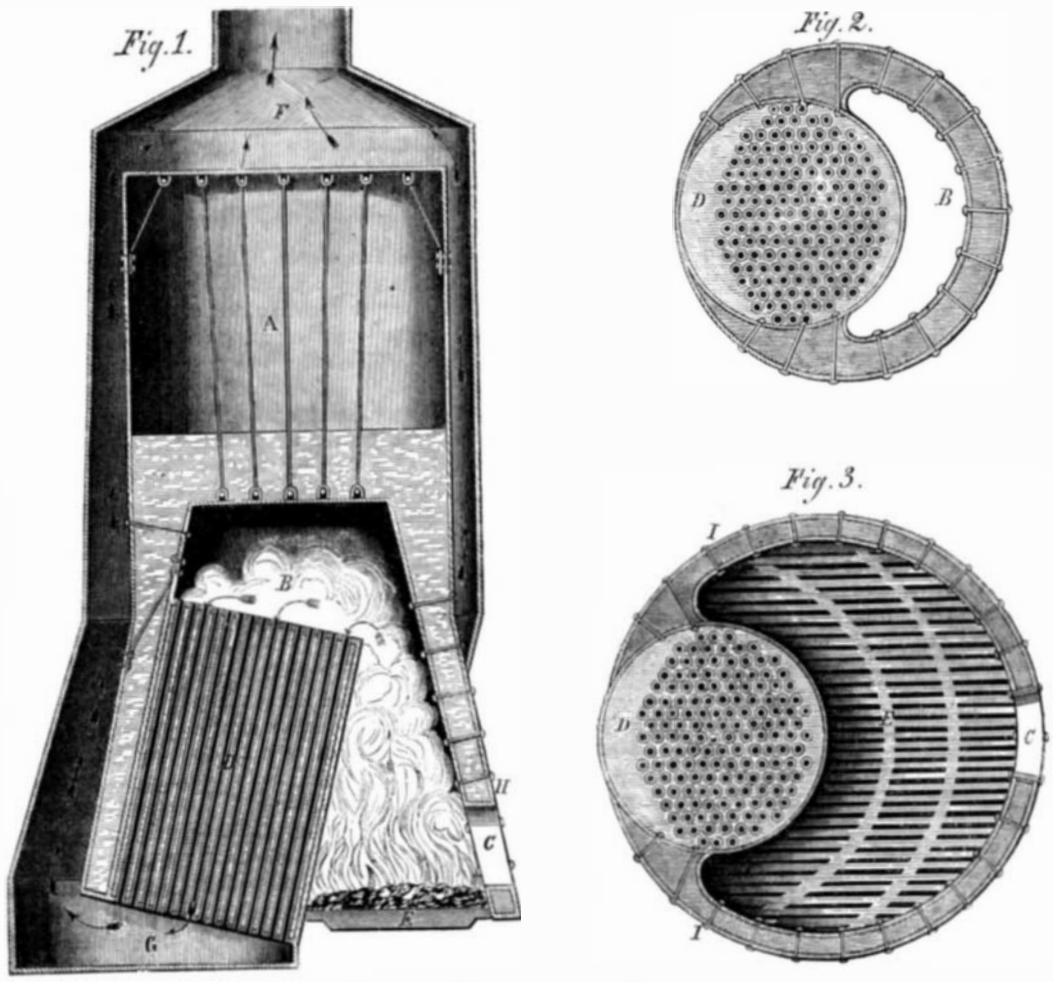
Densmore's Improved Boiler.

The engravings are views of a boiler which since its first introduction, five years ago, has given eminent satisfaction in its qualities for rapidly generating steam, keeping up a constant circulation of water, and economizing fuel. Over two hundred of them are now in use, in all parts of the country, for stationary and steamboat purposes. Its construction appears to be very favorable to perfect combustion, and the facts sustain this opinion.

The lower portion of the boiler is in the form of a truncated cone and the remainder cylindrical. The fire box is of unusually large proportions, conforming to the shape of the lower part of the shell. A represents the shell of the boiler and B the fire box. In this box, on the side farthest from and opposite to the door, C, is a tube cylinder, D. This cylinder is inclined, conforming to the slant of the boiler, a small portion of its circumference forming the outer shell, as seen in Figs. 2 and 3. The lower front portion of this cylinder extends below the grate, E, and the heat of the fuel must impinge on the inclined front of the cylinder as it rises, thus securing a continuous circulation of the water. The arrows show the direction the gaseous products of combustion take. They rise to the space between the top of the cylinder and the crown sheets, then turn, passing down through the tubes —the interspaces between which are filled with water—to the bottom of the cylinder. From thence they rise in the space between the jacket, F, and the shell of the boiler to the smoke stack on the top. If the iron jacket is not used the smoke may escape through the space, G, directly to the chimney.

Fig. 2 is a transverse section across the boiler, taken on a line with the top of the front of the tube cylinder, and Fig. 3 is a similar section just over the grate. It will be seen that the area of the grate is of crescent shape, and that by the inclination of the tube cylinder and the sides of the fire box the space is gradually contracted to the top of the cylinder. This insures a very large grate surface and a correspondingly extended heating surface on the convex front of the tube cylinder, the concave sides of the fire box, and its top.



DENSMORE'S UPRIGHT BOILER.

The steam room above the water line is ample so that only dry steam is delivered to the engine, and the boiler is not liable to foam. For burning bituminous coal this boiler is especially adapted. When built for this purpose the first row of stay bolts above the door at H are hollow, screwed through the outer and inner shell, and upset and riveted. These extend around from point to point marked I in Fig. 3. A strap having holes of corresponding diameter with those in the hollow stays and at the same distance apart, is secured to the outer surface of the boiler and held by lugs as guides, which permit it to slide by means of a lever to act as a damper, covering or uncovering the holes in the stay bolts as may be desired. When uncovered, atmospheric air rushes in in sufficient volume to add oxygen to insure the perfect combustion of the fuel. We have seen these boilers thus arranged and burning bituminous coal, and the smoke issuing from the stack was visible only as a steam-like vapor, having parted with its carbon, which in fine particles usually makes the unconsumed smoke from this kind of fuel so dense and black.

This boiler has more than double the amount of fire box surface to a foot of grate than ordinary boilers, and all of this surface is inclined toward the fire, so that the radiation of the heat is equal on every part of it. The inclined position of the tube cylinder and of the walls of the fire box, allows the steam, as it is formed against these surfaces, to leave them and flow upward against the outer shell, leaving the water solid against the fire plates preventing them from burning. The water is fed in around the bottom of the tubes and the strongest heat being at the upper portion of the tubes the cooler water is not lifted rapidly. This boiler is adapted to any kind of fuel which is used under other boilers. It is made of the best iron and thoroughly stayed in all its parts. It is built of different sizes from fifteen to three hundred horse power. No masonry is required in setting it, the boiler resting on legs.

Patented Sept. 15, 1863. For further particulars address Densmore & Black, patentees and manufacturers, 388 West 43d street, New York city.

THE OFFICIAL CATALOGUE of the products of the United States exhibited at the Paris Exposition is a pamphlet of 172 pages, just published in French, German and English. Forty-three pages are devoted to a statistical and geographical review, compiled, if we may judge from the closing paragraph, by some enthusiastic and patriotic Yankee. The paragraph alluded to exhibits the celebrated truth that as our population was thirty-five and a half millions in 1865, so by the law of nature it must become equal to the population of the globe, in 1900.

DUDDERAR'S TREE PROTECTOR.

The "borer" is one of the worst pests against which the

fruit raiser has to contend. Its operations are comparatively secret, while the catterpillar works in broad daylight. The engraving represents a device calculated to prevent, rather than to remedy, the depredations of the borer. It is intended especially for peach trees, although adapted to other fruit trees.

It is a cylinder of sheet metal pierced with minute holes for the admission of air. It can be opened and placed around the trunk of a tree and secured by a rod passing through ears which project through holes in the outside lap of the cylinder. The cylinder is sunk a few inches in the earth and held by the soil being pressed around it and over the feet or legs secured to it At the top is attached a piece of oiled cloth or painted canvas the top of which is held closely around the trunk by a string. The longitudinal seam is then sewed up or secured by a cord run in, so that all is kept tight below that point. A patent for this device was obtained Jan. 16, 1867, by George W. Dudderar of Unionville, Md., whom address at that place for any additional information desired.

Telegraphs in Europe.

The Swiss telegraph, of which there are 1,130 miles of line, or fourteen miles for every hundred square miles of territory—has been for some years in the hands of the Government. The charge is uniformly one franc, and a quarter franc for every additional ten words, with free delivery by carrier within three miles, or by mail at greater distances. Postal money orders are also transmitted in the same way. The number of telegrams in 1865 was 364,000, and the proportion of telegrams to letters steadily increases. As the lightning travels up and down and through the snows with equal facility, it has a peculiar advantage over the mails in a country like Switzerland.

In Belgium, the telegraph is still cheaper, the uniform charge being only half a franc, or less than one dime for the first twenty words. The system has belonged to the Government since 1850, and every post office is either a telegraph office or an office for forwarding telegrams by messenger or mail as may be desired. There are 2,000 miles of line. Messages are written on stamped paper, and delivered free of further charge for a distance of a mile and a quarter, beyond which they may be forwarded express or free by mail. If the message does not reach its destination as soon as the mail, or is incorrectly sent, the price is returned. In 1860, at a charge of a franc and a half, there were 80,000 telegrams, being one to 218 letters; in 1865, at one franc, there were 332,700, being one to 48 letters. In December, 1865, the charge was reduced to half a franc, the present rate and the cheapest in the world.

In Prussia, the lowest charge by the national telegraph is about 15 cents. In Paris the postal telegraph system has been tried with success, with a uniform charge of half a franc; the number of dispatches having increased tenfold within six months after the reduction from one franc to the present rate.

Microscopic.

Mr. Dancer has executed a very curious and certainly minute sort of inquiry into the composition of furnace dust, *i. e.*, the extremely fine powder which accumulates in flues from the burning of coal, apart from sooty or carbonaceous accumulations. He washed the dust carefully, to separate the purely mineral ingredients, and by placing it on a slightly inclined glass, made the spherical particles to separate themselves from those of irregular shape, by rolling down the incline. These, examined under the microscope, were found to be quite interesting objects. Many of them appear to be perfectly spherical though less than $\frac{1}{100}$ of an inch in diameter, solid or hollow, with a brilliant polish, and in beautiful variety, crystalline, white, yellow, brown, black, agate or carnelian of various shades, and some like rusty cannon balls. Mr. Dancer supposes that these are mostly silicates, or various kinds of glass, colored, when not transparent, with different oxides, carbon, etc. He accounts for their shape by supposing that they have been thrown off in scintillations, of course in a molten state, in which by a law of matter they assume a spheroidal form. Many of them appear to be ferrous oxides or "iron ore," probably formed by the action of heat on the iron pyrites in the coal, and afterwards, in many cases, found to have been reduced to metallic iron and encased with an enamel of silicate. Hence the proportion of iron in the coal dust is much greater than is revealed by the analysis of coal ashes.