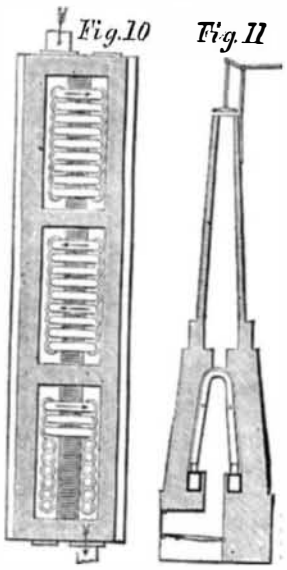
HOT-AIR OVENS FOR IRON FURNACES.

[Continued from page 204.]

With the increasing dimensions of the blast furnaces, and greater consumption of blast, ovens of larger capacity now became necessary. To meet these requirements, the first step was to place two ovens, on the bent tube principle, either "end on" or "side by side," one against the other; the blast being conducted, by means of a "stop," from the hot end of the first oven into the cold end of the second, and after reversing the latter, it entered the furnace. This arrangement, with the double oven, was found to be a great improvement on the original single oven, materially increasing the uniformity of temperature of the blast, yet not involving a fully proportionate increase in the consumption of fuel. In some cases the same plan was further extended, as in Figs. 10 and 11, which show the ordinary Staffordshire long oven first erected about 1837. This may be called a triple oven, having three compartments. Of the two modes, the one called the "side by side" setting was perhaps the better, although, generally, the "end on" mode was adopted, as shown in Fig. 10. In the "side by side" setting, all the flange joints were exposed outside the ovens, and were therefore at once accessible for inspection and repair; and, in addition, all the firing-holes were brought to one end of the oven. There was a little more friction, however, in this case, from the blast having to traverse round a bent pipe in passing from the first to the second oven; whereas, in the "end on" setting, it passed direct into the main of the second compartment.

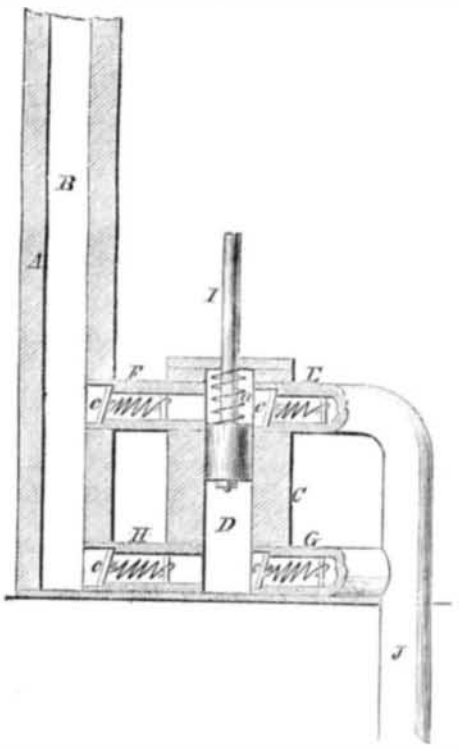


One great drawback, however, to all these ovens was found to be that, as a general rule, the liability to fracture increased in a much higher ration than the mere arithmetical proportion between the number of pipes in the single oven and the number in the double or triple ovens. This may be partly accounted for by the increased temperature maintained towards the hot ends of these ovens, which always increases the liability to fracture, and partly by the much greater number of strains to which the joints and pipes were subject from the greater length of main and the corresponding irregularity of heating. It was further remarked that numerous fractures took place, especially at the hot end of the ovens, during the period of the morning and evening castings, when, for the time, the blast had been taken off the furnaces. For some time this fact was a great annoyance, and its cause a mystery. However, by a careful consideration of the operations going on in the oven, both the cause of the annoyance and the remedy for it were discovered. It will be seen that, up to the period of casting, the blast was rapidly passing through the oven into the furnace, taking up from the inside of the pipes throughout its progress the heat slowly percolating through from the outside. On shutting off the blast, any further abstraction of heat from the inside of the pipes by the passage of the blast ceased; and, in consequence, although the damper of the oven might be closed down, which was not always attended to, a large unabsorbed accession of heat took place in the outer portion of the pipes. The numerous fractures were, therefore, with reason, attributed to the sudden and irregular expansion occasioned in the pipes at that time; and the remedy, which being exceeding simple, was yet not discovered for some years, consisted in removing the escape-valve of the blast-engine from the cold to the hot end of the oven, by which alteration, whether the blast was on or shut off from the furnace, a regular current was maintained through the oven as long as the blast-engine was at work. At the hot end of the oven, a useful addition was also made by fixing a valve which opened inwards when the blast was shut off from the oven or the blast-engine was standing, thus forming a ready vent for the escape of any sulphurous or other gases, which occasionally during those periods are sucked in, and, by their explosion, frequently jar both joints and pipes.

The long oven (Figs. 10 and 11) consisted of 25 pipes, with 1,200 square feet of heating surface, and 126 square feet of fire-grate, and was capable of maintaining the blast for six tuyeres, at a temperature of 600° Fah. In general, however, ovens of this description could not be kept tight for any lengthened period, but required a thorough repair once or twice a year. These frequent repairs necessitated one improvement, till then generally overlooked, but of great practical value, especially where several ovens were at work behind a range of furnaces, namely, the insertion of stop-valves, one at the cold end and the other at the hot end of each oven, whereby that oven could at any time be completely isolated from the general range of repairs, without disconnecting any of the pipes. These valves were originally mere circular disks, turned by a handle fixed on a center spindle, similar to the old-fashioned throttle-valve of a steam-engine; subsequently, at the hot end of the oven especially, slide-valves have been substituted; for, with the great heat and pressure of a heavy blast, the old disk-valves used occasionally to stick or be blown out of shape, and so become leaky; the slide-valves answer admirably. These valves also give a ready and simple mode of testing the state of repair of each oven, from time to time; for, by shutting off each oven alternately, and watching its effect on the speed of the engine, the leakage per oven can be observed with great exactness. In large works, without such a means of detection, leakages to the extent of 500 or 1,000 cubic feet of blast per minute would frequently take place for months without any certain means of tracing them.

[To be continued.]

HARTZLER'S IMPROVED PUMP.



In Paris, there is a class of men who make a living by carrying water up the narrow stairways of the high lodging-houses. They are huge, sturdy fellows, and are famed for the skill with which they wind their way up, without ever spilling a drop of the water in the halls or on the floors of the rooms. In this country we have hundreds of devices for raising water by machinery, one of which is represented in the annexed engraving, and is claimed by the inventor to be the best and cheapest, as it is the latest, of all the plans for this purpose.

I is the piston-rod, and D the inside of the cylinder in which the piston works. J is the pipe which communicates with the well, and B the discharge-pipe. The four valves, *c c c c*, are held in their places by spiral springs. As the piston descends, the valve in G is closed, and the valve in H is opened; and the water is forced from the cylinder, D, through H into the discharge-pipe. At the same time, the valve in F is closed, and the valve in E opened, and the water is drawn from J through E, into the cylinder, D. When the piston ascends, this water is forced out through F, and the cylinder, D, is filled through the pipe, G, thus making a double action, and keeping up a constant flow.

The inventor states that, by attaching a hose, water may be thrown over a three-story house, or to a distance of 100 feet horizontally, at the rate of a barrel per minute. Of course, this would depend on the size of the pump, and the amount of power applied.

The patent for this pump was granted to Enos Hartzler, July 25th, 1859. Persons wanting further information, may address Enos Hartzler & Brothers, Smithville, Ohio.

A NEW AERIAL CHARIOT.

A new candidate for public wonder has appeared in England in the person of Viscount Carlingford, who has constructed a machine for flying, "like an eagle in the air." The form of this machine, or chariot, as the inventor terms it, is something of the shape of a boat, extremely light, with one wheel in front and two behind, having two wings slightly concave fixed to its sides, and sustained by laths of half hollow form, pressing against them, and communicating their pressure through the body of the chariot, from one wing to the other, and supported by cords, whose force acting on two hoops nearly of an oval shape, hold the wings firmly in their position, using a force that cannot be less than 10 tuns, on the principle of corded musical instrument. The chariot is provided with a tail that can be raised or lowered at pleasure, and which serves for giving an elevating or declining position, and worked by a cord that communicates into the interior of the chariot, which is drawn forward by an aerial screw of peculiar construction. The wings of the chariot are covered with a net work, of a lengthened square shape, which produces the effect of birds' feathers when the machine floats on the air, covered with silk, at which time may be seen its progression with the points forward and the same backwards, by which no pocket, as it were, can be formed by the pressure of the silk on the air.—*Philadelphia N. A. Gazette.*

A WORD FOR THE FRANKLIN INSTITUTE.—The Philadelphia *Ledger* says:—"Many of our citizens will regret to learn that the Franklin Institute will not be able to have an exhibition this Fall, owing to the want of a suitable building for that purpose. It was supposed that the institute would have been able to erect a building of sufficient size ere this, for exhibition purposes, in which the large cabinet of the society could be seen to more advantage, and better accommodations be provided for the splendid library, which now numbers from 8,000 to 9,000 volumes, many of them on the arts and sciences, and elegantly illustrated. In architecture, civil engineering, geology, encyclopedias and dictionaries, and antiquities and the fine arts, the library is especially valuable. Some of the works were obtained at considerable cost, and are to be found in but few libraries in the country. That such an institution, possessing so many advantages to our mechanical and manufacturing population, should have been so long—over thirty years—in the small and badly lighted building it now is, does not speak well for the liberality of those most interested. The annual subscription for males is but three dollars, which not only entitles to the use of the library and reading-room, but admission to all the lectures, which are delivered three times a week for twenty-one weeks. They are chiefly on the arts and sciences." From the *Ledger* we also learn as follows:—A stated meeting of the Franklin Institute was held on the 15th inst. at the Hall, Seventh-street, above Chestnut. The Committee on Arts, of the last exhibition, reported an award of a first premium to John F. Mascher for his railway timing clock; also, the same to Messrs. Appleton, Tracy & Co., for American watches made by machinery."

BOOTS AND SHOES MADE BY MACHINERY.—Messrs. Kimball & Robinson, the well-known boot and shoe manufacturers at South Brookfield, Mass., are, as we learn from a correspondent, just completing a new factory for their business, 190 feet long, 40 feet wide, four stories high, and are putting in a 40-horse power engine to drive the different machines used in the factory. This is another of the many remarkable strides which machinery is making in the industrial arts. What would the illustrious shoemaker, Roger Sherman, think, could he but appear once more among the living and behold a boot and shoe manufactory driven by a 40-horse steam-engine? Farewell strap and lap-stone!

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