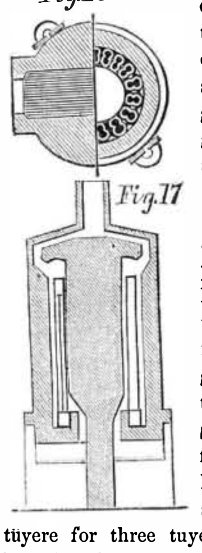
HOT-AIR OVENS FOR IRON FURNACES.

[Concluded from page 252.]

Figs. 16 and 17 show a further improvement of the round oven, representing one constructed in 1857, with an internal core, C, at the writer's suggestion, by Messrs. Perry, of Bilston, for Messrs. Holloways' iron-works, in the Forest of Dean. This arrangement has been found to be a valuable improvement, increasing the heating capacity of the round oven to the extent of one-third, with a smaller consumption of fuel. The advantages of a core consist in affording a greater amount of reverberatory surface, in making the temperature more uniform by absorbing any excess of heat and giving it out again on any diminution of temperature, and in occupying the large vacant space in the center of the oven, thereby compelling a much larger amount of the heated gases to come into contact with the pipes. The area of fire-grate in this oven is 33 square feet, and the area of the direct heating-surface in the pipes 850 square feet, or 280 square feet per tuyere for three tuyeres; it is capable of heating the blast for three tuyeres to a temperature of about 800° Fah.

Fig.16

Fig.17



Shortly before this last form of round oven was erected, Josiah Smith, of Dudley, who had paid great attention to the subject, and to whom, in a great measure, the previous improvements in the setting of the round oven were due, finding that he required rather more heat than one round oven would afford, and not wishing to go to the expense of erecting two, devised the plan of elongating the semi-circular mains of the round ovens by the addition of a straight length of pipe at the extremities of each, thus forming an oval main, and increasing the number of pipes from 24 to 32 in each oven, and, at the same time, affording a considerable additional space for the fire-grate. This was found to be so great an improvement on the ordinary round oven that, in the next one constructed, the mains were further elongated so as to hold 18 pipes each, or 36 per oven, with a proportionate increase of fire-grate; at the same time, a middle partition wall was built between the two mains, whereby the oven was divided into two distinct compartments, so that one-half could be cleaned out at any time without interfering with the other.

In the next example of oval oven, the middle wall was overhung on each side by course over course being gathered over, thus forming a core, which was found to produce the same striking improvement as in the round oven before described. An oven on this occasion, with 56 square feet of grate area and 1,350 square feet of direct heating-surface, is now heating the blast supplying seven tuyeres to a temperature of 800° Fah., at the writer's works, at the Parkfield Furnaces. In some recently-erected ovens, shifting grate-bars have been used with advantage.

From a consideration of all the circumstances and requirements of a good hot-blast oven, those constructed as shown in Figs. 16 and 17 appear to the writer to be far superior to any other. The best oven is that which, for the longest period without leakage, will bear the greatest amount of blast to the highest temperature with the smallest consumption of the cheapest fuel; and, in all these respects, the round or oval ovens with internal cores are to be preferred.

In regard to the economical consumption of fuel, it is difficult to compare one oven with another, whether they be of nearly similar construction, or whether built on different principles, but of nearly the same heating capacity. The difficulty arises from the differences in the construction, burden and working of the furnaces to which the ovens are applied; and also from the differences in the temperature of blast, the quality of slack used for the oven, and the care of the stoker, all of which must independent of the construction of the oven, less affect the yield—that is, the quantity of slack consumed by the oven per tun of iron produced from the furnace, consumption of fuel. It is also a mistake to look to the a test of the efficiency of a hot-blast oven, as it is quite possible for one oven consuming six cwt. of slack per tun of iron to be a more economical one than another consuming only five cwt. per tun; the blast in the first case being kept more uniformly at a higher temperature, and the furnace yield, perhaps, showing several hundred weight of coal per tun of iron in its favor.

Mr. Sampson Lloyd having been connected with the first introduction of hot-blast into Staffordshire, and the earliest manufacture of hot-blast iron in that district, had witnessed the whole progress of the invention from the commencement, and thought the paper just read gave a comprehensive account of the successive improvements that had taken place. It also pointed out, in a clear and useful manner, the difficulties that had been met with and the causes from which they arose. There was an almost inconceivable prejudice at first against the use of hot-blast in iron furnaces, so much so that it was at first nearly impossible to sell a single pig of hot-blast iron; and several years elapsed before the consumption of hot-blast iron was anything to be mentioned; while, at the present time, the hot-blast was almost universally adopted wherever iron was made. A remarkable circumstance was, that, at that time, the ordinary make of iron was only about 50 to 60 tuns per week from each furnace, which was considered a good yield; but at the present time, with the extended use of hot-blast, the yield was increased to over 200 tuns per week from the same sized furnaces, thus showing the enormous increase of production effected with the same outlay of capital by the employment of hot-blast and other improvements in the furnaces.

Mr. W. Smith thought the paper that had been read was one of much interest, giving a valuable historical account of the successive steps in practically carrying out the system of hot-blast; and the large increase in yield of the furnaces, that had been referred to, marked the introduction of the hot-blast as a stop of the greatest importance. The prejudice against the use of hot-blast iron was, however, still entertained; and he had noticed, in a recently-published report on marine-engines for the navy, by the government commissioners, a recommendation that hot-blast iron should not be used in their construction, which was a conclusion much at variance, he thought, with the results of general experience in the use of best hot-blast iron. It was a question of the quality of the ore from which the iron was made, and the care in its manufacture, rather than a question of hot or of cold-blast.

AGRICULTURAL MECHANICS.

A correspondent of the Philadelphia "Farmer and Gardener" pictures the careful and intelligent farmer as follows:—

"A neighbor of mine is a plain unassuming man—one of that class who never intrude their opinions upon others unsolicited. He is an intelligent man with a smalt library of well selected books, the majority of which treal of subjects connected with agriculture. He is of an investigating turn of mind, always debating a subject well with himself and through undoubted authorities, before he is prepared to take sides. He is not the first man in the neighborhood to take hold of an improvement, nor is he the last. If satisfied that it is the thing he requires, he purchases it, not otherwise. He is a considerate man, and is willing to admit his own imperfections. Consequently, if an accident happens to any of his machines, he does not rail out against the manufacturer until he first inquires whether the accident was not the result of his own negligence. But accidents are not frequent with him. Why? Because he understands the principles of mechanics so well that he provides against their occurrence. When he is prepared to take the field with his plow or his mowing-machine, you may rest assured of the fact that it is all in perfect order. His wrench, oil-can, screw-driver, hammer, &c., always go with him, so that tf he has occasion to use them they are always convenient. Now, what is the secret of his success? It all lies in the simple fact that he has made agricultural mechanics a subject of close study. When he goes to purchase a machine, his knowledge of mechanics enables him, almost at a glance, to determine whether it is as well or better adopted than others to the purposes for which he wishes it. If upon trial, difficulties present themselves, you rarely see him hastening to the blacksmith or manufacturer for help. Here again his knowledge of mechanics befriends him. He readily discovers the cause and, generally, is ready with the remedy."

SYMMES' GAS VALVE.

We illustrate here a most original and ingenious device for shutting off the gas in street burners by means of one stop-cock in the main at the gas-works, without interfering materially with the burners in houses.

Fig.1 Fig. 2

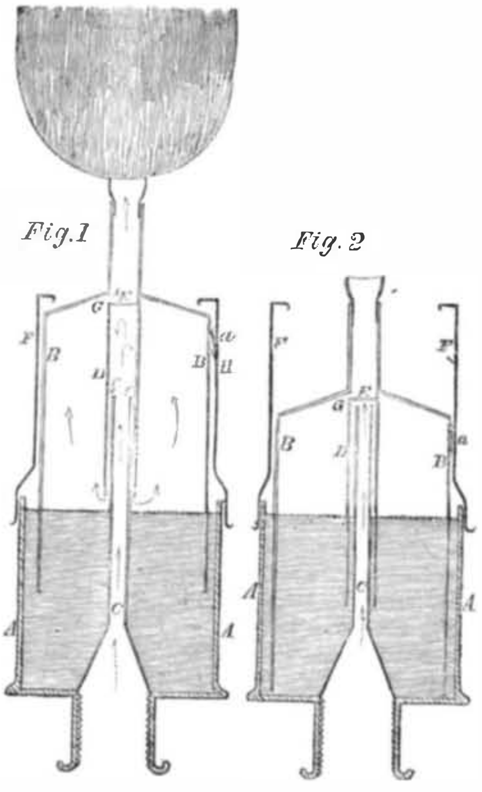


Fig. 1 represents the valve open so that that the gas is flowing through it, and Fig. 2 represents it closed. A is a cylinder or cup of mercury over which the cup, B, is inverted, its edge dipping into the mercury as shown, the cup, B, being suspended by the pendulum, *a*, falling into the barb, H. In this position the gas comes from the main through the pipe, C, and, flowing in the direction indicated by the arrows, passes out to the burner. The inverted cup, B, is made of such weight that it may barely overcome the ordinary pressure of the gas, and in order to shut off the gas, the stop-cock in the main at the gas-works is suddenly opened for an instant more widely than common, so as to increase the pressure of the gas by a sudden puff. This lifts the cup, B, and draws the pendulum, *a*, from the barb, H, and when the pressure is again instantly reduced, the cup, B, falls, submerging the lower end of the tube, D, in the mercury and cutting off the flow of the gas. This position is shown in Fig. 2.

One of these valves must be supplied to each one of the street lamps, and it may be connected with the burner as shown, or the valve may be placed at any convenient distance from the burner, in which case the cup, B, is made tight at the top without any orifice, and a pipe leads from it down through the mercury and away to the burner.

By a slight modification of the apparatus the valve may be closed by a sudden and brief reduction of the pressure instead of an increase. In this modification the pendulum, *a*, and the barb, H, are dispensed with, and the weight of the cup, B, is so balanced that the pressure of the gas against the whole area of its top will keep it suspended with the bottom of the tube, D, above the mercury, so that the gas may flow through the valve. When it is desired to shut off the street burners, the stop-cock at the gas-works is suddenly nearly closed and immediately opened again to its ordinary width. The sudden reduction of the pressure drops the cup, B, into the mercury, closing the lower end of the tube, D, and stopping the flow of the gas. On the restoration of the pressure, the cup, B, is not lifted from the mercury, because the gas only presses against the small area, E, of the top of the tube, D. The hooks, F F are provided to prevent the cup, B, being raised so far that its edge will be above the mercury and thus permit the escape of the gas.

The patent for this invention was issued to H. K. Symmes, of Newton, Mass., on the 4th inst. Inquiries for further information in reference to it may be addressed as above.