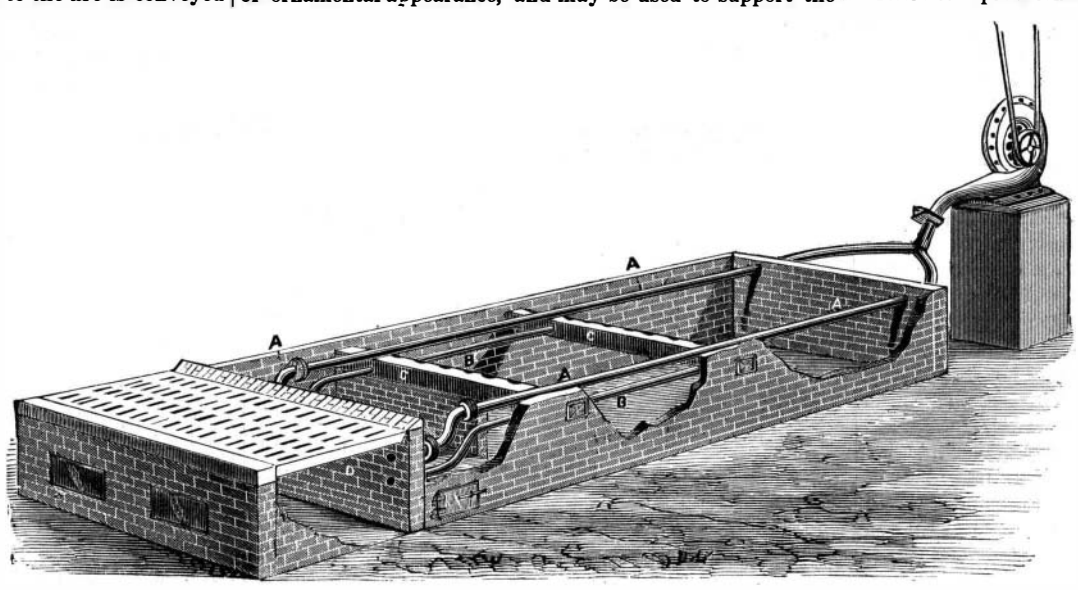
IMPROVED HOT BLAST BOILER FURNACE.

We illustrate herewith a new construction of boiler furnace, the object of which is to save the loss of heat due to waste through grate bars, through imperfect combustion of oxygen with the gases evolved, and through the frequent admission of cold air into the fire chamber. The manufacturers claim that double the number of cubic feet of air is required by natural draft to produce combustion that is necessary when a forced blast is used, because the needful amount of oxygen can be more perfectly combined with the gases at a point in the furnace where combustion is possible. Thus the heat ordinarily expended in elevating the temperature of the surplus air admitted is saved. This is done as follows: All the air admitted to the fire is conveyed from the fan, shown in the rear, through pipes, A A, along the fire bed to the airtight fire chamber, D, and under the grate. It thence passes up through the improved grate bars to the fuel, and is also forced back through the small pipes, B B, to the cross perforated pipes, C C, distributing the heated oxygen at proper points under the boiler, to unite with and assist in burning the escaping gases. The air is obviously heated before it enters the fire, the heat of the cinders, clinkers, and refuse of the furnace being utilized for this purpose, by pushing the hitherto unused material over the bridge wall and into the pit back of bridge wall, where it assists in heating the pipes, A, and, when cool, can be withdrawn at the door shown. It will be observed that there are no ash pit doors to be opened, and that there is no necessity of throwing open furnace doors to check combustion, that end being easily effected by stopping the air blast. Thus the furnace is protected from the injurious effects of sudden changes of temperature. On the improved grate, we are informed, all dust, shavings, tan bark, and other refuse will burn as well as the best lump coal. Besides thus producing economy, through the air arriving at the point of combustion already heated to the proper temperature by heat otherwise wasted, the general construction is such as to insure a cool and pleasant fire room, a condition hardly possible so long as fires are cleaned and hauled through the furnace doors. This furnace can be easily applied to boilers already set.

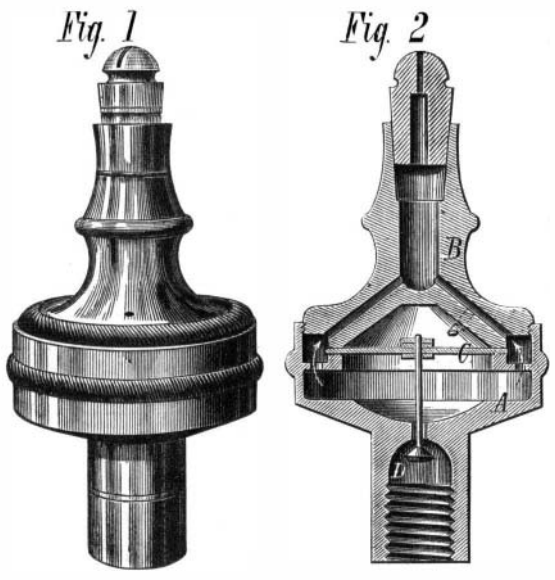


STRIBLING'S HOT BLAST BOILER FURNACE.

A large number of commendatory testimonials are submitted, showing that from twenty to thirty per cent of fuel is directly saved by the invention. For further particulars relative to sale of patent, address the manufacturers, Messrs. U. B. Stribling & Co., Madison, Ind.

MCMILLAN'S SELF-REGULATING GAS BURNER.

It has been demonstrated by experiment, by M. Lemoine, that, in order to obtain the greatest amount of gas light at least cost, the following rules should be remembered: 1. A good burner will produce four times the amount of light that a poor one will, the quantity of gas burnt being equal. 2. The intensity of the light increases with, but in a greater ratio than, the size of the slit. 3. The increase of illuminating power varies with the decrease of pressure. 4. The gas should be burnt at the lowest possible pressure. 5. The pressure should remain constant; and 6, the pipes should be largeenough for the amount of gas carried through them.



In the new gas burner, illustrated herewith, it is claimed that the conditions stated in rules 4 and 5 above given are fully realized, and uniformity of flow and economy in the consumption of gas are combined with a simple, cheap, and durable construction. The engravings represent the device in full size, both exteriorly, Fig. 1, and in section, Fig. 2. The base section, A, forms a cylindrical chamber into which the lower concave part of the tip section, B, is hermetically secured. C is a flexible diaphragm of leather or other suitable material, which is interposed and fastened between the sections; this supports centrally the stem of a valve, D, which opens and closes from below the entrance aperture of the gas, according to the pressure of the latter on the diaphragm. The diameter of the chamber, in A, is larger than that of the diaphragm, so that, concentric with the diaphragm, there is an annular channel into which the gas flows through suitable apertures, as indicated by the arrows. The gas then passes by the inclined channels in the upper section to the delivery tube, and is there fed to the tip at any position of the upper section, without necessitating any special adjustment of the same to the gas-conveying channels, as the communication is established as soon as the sections are united. The flow is thus evenly maintained and is independent of the pressure below the valve. The regulating attachment may be kept within small compass, so as to be of ornamental appearance, and may be used to support the usual glass globe. The pressure at the tip of these burners when in use is stated to be about two tenths of an inch water pressure. It gives full flame with only five tenths pressure on the supply pipe, and will do no more with a pressure of thirty inches. Testimonials are submitted, showing in one instance a saving of twenty-six per cent of gas burnt in a period of eight months.

Patented through the Scientific American Patent Agency by D. D. McMillan, January 26, 1875. For further particulars address E. H. McMillan, La Crosse, Wis.

SCENES AT THE CENTENNIAL.

The extent and variety of the Centennial show afford many interesting and characteristic scenes to the observant visitor. In the upper part of the engraving on our following page is shown one of the entrances with the crowd congregated thereat. The entrance to the Grand Plaza, from Belmont and Elm avenues, is next shown, and a view of one of the stations on the narrow gage railroad that runs all round the grounds, affording much economy of time and labor, is also given.

The lower part of the picture is occupied by a view of a number of the principal buildings erected by the different States for the accommodation of their commissioners and delegations, which we have described so recently that any lengthy details of the structures which are represented in the engraving will not be necessary. The view represented was made from a point near the English government building, looking in an easterly direction along what is known as State avenue, on which most of these buildings are situated. The New York building, shown on the left hand of our picture, is a showy and convenient structure, with ample piazza room. The Governor's room, office, and the ladies' apartments are handsomely furnished and hung with paintings. Massachusetts has erected the building next in the line; it is somewhat oldfashioned in style, but thoroughly commodious in design and arrangement. The Connecticut building stands next; and though small, it is large enough for the purposes for which it is intended. New Hampshire has a plain square structure fifty by fifty-five feet, situated east of Connecticut cottage; beyond it are the headquarters of Wisconsin and Illinois. Indiana comes next, with a building of striking appearance. A little further to the eastward we come to one of the most substantial structures of the State group, that of Ohio. It is built of dressed stone from the quarries of that State.

The engraving is selected from the pages of *Harpers' Weekly*.

Window Ventilation.

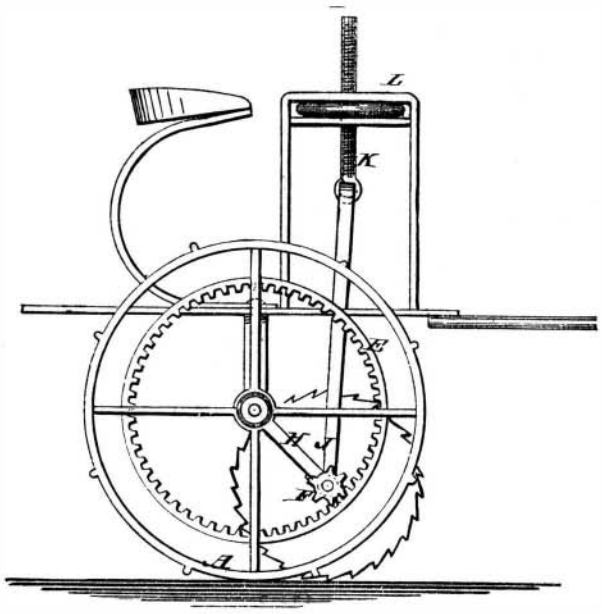
A writer in the London *Sanitary Record* gives the following instructions for making a cheap window ventilator: Take two pieces of board a quarter of an inch thick, one inch wide, and as long as the lower bar of the window; three narrow pieces half an inch thick and one and a half inches long, one end being cut with the bevel of the window stool. Nail these pieces across one of the long slats, one at each end and one in the middle, placing the short side of each piece even with the lower edge of the slat. Nail the other slat on the opposite side of these short pieces, bringing the upper edge of the slat even with the square end of the short pieces. This will make a compound bar with half an inch between the slats, and one slat half an inch higher than the other when the whole is turned upon its edge. Place the whole under the lower window sash, with the higher slat on the outside. The air can then pass under the outer slat, between the two slats, and enter the room over the top of the inside slat, having an upward motion which will cause it to mingle rapidly with the warm air of the room and thus prevent any sensible draft. By thus raising the lower sash, a space will be left between the top of the lower sash and the bottom of the upper sash, through which another thin layer of air may enter the room at some distance from the layer at the bottom of the window. The air must also enter with an upward current, causing it to speedily mix with the hot air in the upper portion of the room. This arrangement is especially adapted to secure safe window ventilation in bedrooms.

Look to your Ice Ponds.

There is a prevalent notion that ice purifies itself by the process of freezing. This is not based on trustworthy scientific observation, and, indeed, is not true. In the recent annual report of the State Board of Health of Massachusetts are given the details of an outbreak of intestinal disorder, clearly attributable to the contamination of impure ice. The malady broke out last summer in one of the principal hotels at Rye Beach, N. H., and, while not attended with fatal effects, extended to a large number of people. After long and unavailing search, the cause of the trouble was found in the pond whence the ice used in the hotel had, the winter before, been taken. The outlet whereby the body of water emptied itself had become obstructed, so that the water was rendered nearly stagnant. At the lower end where the feeding brook entered, and over a space 500 feet long by 150 wide, had accumulated a homogeneous mass of putrescent matter, composed of marsh mud and decomposing sawdust. This foul matter, held in suspension in the water, was conveyed by currents and winds to every part of the pond, and an analysis of the melted ice showed it to be heavily charged with such impurities. It is obvious, from this, that the same care given to wells and other sources of drinking water should be given to the bodies of water from which the usual ice supply is gathered.

A NOVEL CULTIVATOR.

Mr. James C. Stone, of Leavenworth, Kansas, has patented, through the Scientific American Patent Agency, May 2, 1876, a new cultivator, which pulverizes the soil and cuts up weeds by means of a series of circular saws. These are attached and driven in the simple manner represented in our engraving. On the drive wheel, A, are formed toothed gear wheels, E, which mesh the teeth of small gear wheels, F, attached to the saw shaft. The latter rotates in bearings on arms, H, which ride upon the journals of the axle at the inner ends of the hubs of the wheels, A, so as to keep the wheels, F, in gear with the wheels, E, however much the shaft may be raised. The saws are placed upon the shaft at a distance apart of three and a half inches, as may be desired, or as the character of the land to be operated upon may require. To the center of the bail, attached to the saw shaft, is pivoted the end of a screw, K, which passes up through a hand nut, L, swiveled to a bracket, attached to the frame, so that, by turning the said hand nut, the saws may be adjusted to enter the ground to any desired depth, or may be raised from the ground. The axle is suitably bent to accommodate the saws.



THE Belfast ginger ale, which has for the last few summers become quite a popular beverage, may be made as follows Powdered double refined sugar, 16 ozs.: bicarbonate of soda, 3½ ozs.: citric acid, 4½ ozs.: concentrated essence of ginger 1½ ozs.: essence of cayenne 4 drachms: essence of lemon, 40 drops. The soda, acid, and sugar must be carefully dried separately, at a temperature not exceeding 120°: and the sugar before drying must be thoroughly incorporated with the essences, to which a small quantity of caramel as coloring may be added. This forms a powder, a dessertspoonful of which will make a tumblerful of the drink.