ment. Possibly a turncap might have been serviceable, but it was not tried.

With all the science, however, that a man shall suppose himself possessed of in this article, he may sometimes meet with cases that shall puzzle him. “ I once lodged,” says Dr. Franklin, “ in a house at London, which in a little room had a single chimney and funnel. The opening was very small, yet it did not keep in the smoke, and all attempts to have a fire in this room were fruitless. I could not ima­gine the reason, till at length observing that the chamber over it, which had no fireplace in it, was always filled with smoke when a fire was kindled below, and that the smoke came through the cracks and crevices of the wainscoat, I had the wainscoat taken down, and discovered that the funnel which went up behind it had a crack many feet in length, and wide enough to admit my arm; a breach very dangerous with regard to fire, and occasioned probably by an apparent irregular settling of one side of the house. The air entering this breach freely, destroyed the drawing force of the funnel. The remedy would have been, filling up the breach, or rather rebuilding the funnel ; but the landlord rather chose to stop up the chimney.

“ Another puzzling case I met with at a friend’s country-house near London. His best room had a chimney in which, he told me. he never could have a fire, for all the smoke came out into the room. I flattered myself I could easily find the cause and prescribe the cure. I opened the door, and perceived it was not want of air. I made a temporary contraction of the opening of the chimney, and found that it was not its being too large that caused the smoke to issue. I went out and looked up at the top of the chimney: Its funnel was joined in the same stack with others, some of them shorter, that drew very well, and I saw nothing to prevent its doing the same. In fine, after every other examination I could think of, I was obliged to own the in­sufficiency of my skill. But my friend, who made no pre­tension to such kind of knowledge, afterwards discovered the cause himself. He got to the top of the funnel by a ladder, and looking down found it filled with twigs and straw cemented by earth and lined with feathers. It seems the house, after being built, had stood empty some years before he occupied it; and he concluded that some large birds had taken the advantage of its retired situation to make their nests there. The rubbish, considerable in quantity, being removed, and the funnel cleared, the chimney drew well, and gave satisfaction.”

Chimneys whose funnels go up in the north wall of a house, and are exposed to the north winds, are not so apt to draw well as those in a south wall; because, when rendered cold by those winds, they draw downwards. Chimneys en­closed in the body of a house are better than those whose funnels are exposed in cold walls. Chimneys in stacks are apt to draw better than separate funnels, because the fun­nels that have constant fires in them warm the others in some degree that have none.

*Smoke-consuming.* In manufacturing towns, where a great deal of fuel is used, it is of the utmost consequence to prevent, if possible, the production of smoke, so as not only to get quit of a great source of annoyance, but also to prevent the injury which it occasions to buildings ; indeed to prevent the deterioration of property which in general occurs. Hence the clauses in acts of Parliament and in many police bills, compelling proprietors of steam engines, &c., to consume their smoke, if practicable ; as also the numerous attempts which have been made to accomplish this object. Of course, if it could be done without an extra expenditure of fuel, so much the better ; if with a saving of fuel, then the advantages to be gained are im­mense.

Numerous methods have been recommended, and many patents have been secured for accomplishing this desirable object. The principle of most of them depends on causing the smoke, immediately when given off from the coal, when fresh put on the fire, to pass over the half-burned or charred fuel, and thus be consumed.

Smoke is merely carbonaceous matter evolved from fuel ; for when the whole of the inflammable gaseous product is not brought into contact with air at a proper degree of heat, it is not burned, and therefore escapes in the state of smoke. Now it is evident, that if that smoke or carbonaceous par­ticles, as it flows over the burning fuel, be supplied with air, it also will be burned, provided they are brought toge­ther at a high temperature ; but this is not done in the usual way of combustion, because the air passing up from the ash pit through the fuel, is almost entirely deprived of its oxygen before it reaches the upper part of the furnace. In addition to the air, therefore, which is requisite for the combustion of the fuel, air must also be admitted *above the fire* for the consumption of the smoke.

The most common method in practice for consuming smoke is, instead of throwing the fuel back into the furnace, to place it always on the dead plate or charring plate at the mouth, gradually pushing it on upon the bars, as it is charred, or deprived of its bituminous principle, and again supplying more on the dead plate, which is in general in­clined, so as to allow the fuel placed on it to fall, and come into contact with that on the bars. For the success of this process, air must be admitted into the furnace, above tile fuel, so as to mix with the flame and smoke ; but this is attended with disadvantage, for being cold, it not only acts injuriously, as in lessening the production of steam, but by bringing down the temperature, prevents the action on the smoke itself, which is consequently not all destroyed. Hence the practice of heating the air to be thus admitted. When this is done by an additional fire, though the smoke may to a certain extent be consumed, yet it is attended with ex­pense; but this is obviated in a great measure by the in­troduction of tubes into the flues or chimney, one end com­municating with the atmosphere, the other terminating in the furnace, over the fuel, by which the air that passes through them derives a part of that heat which is otherwise carried up the vent.

This method of preventing smoke has not been attended with the success at first expected from it, as is proved by its not having come into general use. Perhaps one source of failure is the difficulty of getting the firemen to supply the coal carefully on the front of the furnace ; and hence it has been recommended to employ hoppers, by which the coal is always thrown on the dead-plate ; but even when these are used, the consumption of smoke is not complete. As to the heating of the air, by passing it through tubes in the chimney or vent, one great objection to them is the powerful influence they have over the draught. It is well known, that when cold air is allowed to rush into the chim­ney, the draught is instantly diminished. Now these tubes must operate in the same way ; for though the air does not mingle with that in the vent, yet by withdrawing heat from it, it must reduce its temperature, and thus prevent it from being forced up.

By far the most effectual method of consuming smoke is that lately recommended and patented by Ivison. It con­sists in throwing steam into the fore-part of the furnace, *above the fuel,* by means of a fan-shaped distributor, in the front of which are small apertures, varying in size and num­ber, according to the width of the furnace and the pressure of the steam. In general they are from five to eight or ten in number, and about an eighth or a twelfth of an inch in diameter. The quantity of steam thus admitted is very trifling ; and by its passage through the flame and smoke given off from the coals on the charring-plate, it instantly causes the disappearance of the smoke, and accordingly none whatever escapes from the chimney-top, except just when