Suppose the distance to be half an inch, and the door eight feet high ; you thence find that your room requires an en­trance for air equal in area to ninety-six half inches, or for­ty-eight square inches, or a passage of six inches by eight. This, however, is a large supposition, there being few chim­neys that, having a moderate opening and a tolerable height of funnel, will not be satisfied with such a crevice of a quar­ter of an inch. Dr. Franklin found a square of six by six, or thirty-six square inches, to be a pretty good medium that will serve for most chimneys. High funnels with small and low openings may indeed be supplied through a less space ; because, for reasons that will hereafter appear, the force of levity, if one may so speak, being greater in such funnels, the cool air enters the room with greater velocity, and con­sequently more enters in the same time. This, however, has its limits ; for experience shews, that no increased ve­locity so occasioned has made the admission of air through the key-hole equal in quantity to that through an open door, though through the door the current moves slowly, and through the key-hole with great rapidity.

It remains then to be considered how and where this ne­cessary quantity of air from without is t» be admitted so as to be least inconvenient ; for if at the door, left so much open, the air thence proceeds directly to the chimney, and in its way comes cold to your back and heels as you sit be­fore your fire. If you keep the door shut, and raise a little the sash of your window, you feel a similar inconvenience. Various have been the contrivances to avoid this, such as bringing in fresh air through pipes in the jams of the chim­ney, which pointing upwards should blow the smoke up the funnel ; opening passages in the funnel above, to admit air for the same purpose. But these produce an effect con­trary to that intended ; for as it is the constant current of air passing from the room through the opening of the chim­ney into the funnel which prevents the smoke from coming out into the room, if you supply the funnel by other means or in other ways with the air which it requires, and especial­ly if that air be cold, you diminish the force of that current, and the smoke in its efforts to enter the room finds less re­sistance.

The required air must then indispensably be admitted into the room, to supply what goes off through the open­ing of the chimney. M. Gauger, a very ingenious and in­telligent French writer on the subject, proposes with judg­ment to admit it above the opening of the chimney ; and to prevent inconvenience from its coldness, he directs that it may be so made, that it shall pass in its entrance through winding cavities made behind the iron back and sides of the fire-place, and under the iron hearth-plate ; in which cavi­ties it will be warmed, and even heated, so as to contribute much, instead of cooling, to the warming of the room. This invention is excellent in itself, and may be used with advan­tage in building new houses, because the chimneys may then be so disposed as to admit conveniently the cold air to enter such passages. But in houses built without such views, the chimneys are often so situated as not to afford that convenience without great and expensive alterations. Easy and cheap methods, though not quite so perfect in them­selves, are of more general utility ; and such are the following.

In all rooms where there is a fire, the body of air warmed and rarefied before the chimney is continually changing place, and making room for other air that is to be warmed in its turn. Part of it enters and goes up the chimney, and the rest rises and takes place near the ceiling. If the room be lofty, that warm air remains above our heads as long as it continues warm, and we are little benefited by it, because it does not descend till it is cooler. Few can imagine the difference of climate between the upper and lower parts of such a room, who have not tried it by the thermometer, or by going up a ladder till their heads are near the ceiling. It is then among this warm air that the requisite quantity of

outward air is best admitted, with which being mixed, its coldness is abated, and its inconvenience diminished so as to become scarcely observable. This may be easily done by drawing down about an inch the upper sash of a window ; or, if not moveable, by cutting such a crevice through its frame ; in both which cases it will be well to place a thin shelf of the length to conceal the opening, and sloping up­wards, to direct the entering air horizontally along and un­der the ceiling. In some houses the air may be admitted by such a crevice made in the wainscot, cornice, or plaster­ing, near the ceiling and over the opening of the chimney. This, if practicable, is to be chosen, because the entering cold air will there meet with the warmest rising air from be­fore the fire, and be soonest tempered by the mixture. The same kind of shelf should also be placed here. Another way, and not a very difficult one, is to take out an upper pane of glass in one of your sashes, set it in a tin frame, giving it two springing angular sides, and then replacing it, with hinges below, on which it may be turned to open more or less above. It will then have the appearance of an internal sky-light. By drawing this pane in, more or less, you may admit what air you find necessary. Its position will natu­rally throw that air up and along the ceiling. In England some have of late years cut a round hole about five inches diameter in a pane of the sash, and placed against it a cir­cular plate of tin hung on an axis, and cut into vanes ; which, being separately bent a little obliquely, are acted upon by the entering air, so as to force the plate conti­nually round like the vanes of a windmill. This admits the outward air, and by the continual whirling of the vanes, does in some degree disperse it. The noise only is a little inconvenient.

2. A second cause of the smoking of chimneys is, *their openings in the room being too large ;* that is, too wide, too high, or both. Architecte in general have no other ideas of proportion in the opening of a chimney than what relate to symmetry and beauty respecting the dimensions of the room ; while its true proportion respecting its function and utility depends on quite other principles ; and they might as properly proportion the step in a staircase to the height of the storey, instead of the natural elevation of men’s legs in mounting. The proportion then to be regarded, is what relates to the height of the funnel. For as the funnels in the different storeys of a house are necessarily of different heights or lengths, that from the lowest floor being the highest or longest, and those of the other floors shorter and shorter, till we come to those in the garrets, which are of course the shortest ; and the force of draft being, as already said, in proportion tn the height of funnel filled with rare­fied air, and a current of air from the room into the chim­ney, sufficient to fill the opening, being necessary to oppose and prevent the smoke from coming out into the room ; it follows, that the openings of the longest funnels may be larger, and that those of the shorter funnels should be smaller. For if there be a larger opening to a chimney that does not draw strongly, the funnel may happen to be fur­nished with the air which it demands by a partial current entering on one side of the opening, and leaving the other side free of any opposing current, may permit the smoke to issue there into the room. Much, too, of the force of draft in a funnel depends on the degree of rarefaction in the air it contains, and that depends on the nearness to the fire of its passage in entering the funnel. If it can enter far from the fire on each side, or far above the fire, in a wide or high opening, it receives little heat in passing by the fire, and the contents of the funnel are by those means less different in levity from the surrounding atmos­phere, and its force in drawing consequently weaker. Hence, if too large an opening be given to chimneys in upper rooms, those rooms will be smoky. On the other hand, if too small openings be given to chimneys in the lower rooms,