air that would force it open : then, when the plate is drawn out, the door will be forced open by the in- creaſed pressure of the outward cold air endeavouring to get in to ſupply the place oſ the warm air that now passes out of the room to go up the chimney. In our common open chimneys, half the fuel is wasted, and its effect loſt ; the air it has warmed being immediately drawn off.”

9. Chimneys which generally draw well, do nevertheleſs ſometimes give ſmoke into the rooms, *it being driven down by strong winds paſſing over the tops oſ their funnels,* though not deſcending from any commanding eminence. This caſe is moſt frequent where the funnel is ſhort and the opening turned from the wind. It is the more grievous, when it happens to be a cold wind that pro­duces the effect, becauſe when you moſt want your fire you are ſometimes obliged to extinguiſh it. To un­derhand this, it may be conſidered that the riſing light air, to obtain a free issue from the funnel, muſt puſh out of its way or oblige the air that is over it to riſe. In a time of calm or of little wind this is done viſibly ; for we ſee the smoke that is brought up by that air riſe in a column above the chimney : but when a vio­lent current of air, that is, a ſtrong wind, passes over the top of a chimney, its particles have received ſo much force, which keeps them in a horizontal direction and follow each other ſo rapidly, that the riſing light air has not ſtrength sufficient to oblige them to quit that direction and move upwards to permit its issue.

*Remedies.* In Venice, the cuſtom is to open or widen the top of the flue rounding it in the true form of a fun­nel. In other places the contrary is practiſed ; the tops of the flues being narrowed inwards, ſo as to form a slit for the issue of the ſmoke, long as the breadth of the funnel, and only four inches wide. This ſeems to have been contrived on a ſuppoſition that the entry of the wind would thereby be obſtructed, and perhaps it might have been imagined, that the whole force of the riſing warm air being condenſed, as it were, in the nar­row opening, would thereby be ſtrengthened, ſo as to overcome the reſiſtance of the wind. This, however, did not always ſucceed ; for when the wind was at north-east and blew freſh, the ſmoke was forced down by fits into the room where Dr Franklin commonly ſat, ſo as to oblige him to ſhift the ſire into another. The poſition of the flit of this funnel was indeed north-eaſt and ſouth-weſt. Perhaps if it had lain acroſs the wind, the effect might have been different. But on this we can give no certainty. It ſeems a matter proper to be referred to experiment. 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 wainſcot ; I had the wainſcot taken down, and diſcovered that the funnel which went up behind it had a crack many ſeet 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 breech 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 flop 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 had a fire made there, and found it as he ſaid. 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 flood 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 neſt 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 incloſed 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-Jack.* This ingenious machine is of German extraction ; and Meſſinger, in his *Collection oſ Mechani­cal Performances,* ſays it is very ancient, being repreſented in a painting at Nurenbergh, which is known to be older than the year 1350.

Its conſtruction is abundantly simple. @@An upright iron ſpindle GA (fig, 5.), placed in the narrow part of the kitchen chimney, turns round on two pivots H and I. The upper one H passes through an iron bar, which is built in acroſs the chimney ; and the lower pi­vot I is of tempered ſteel, and is conical or pointed, reſting in a conical bell-metal ſocket fixed on another croſs bar. On the upper end of the ſpindle is a circu­lar fly G, consiſting of 4, 6, 8, or more thin iron plates, ſet obliquely on the ſpindle like the ſails of a windmill, as we ſhall deſcribe more particularly by and by. Near the lower end of the ſpindle is a pinion A, wſhich works in the teeth of a contrate or face wheel B, turning on a horizontal axis BC. One pivot of this axis turns in a cock fixed on the croſs bar, which ſupports the lower end of the upright ſpindle HI, and the other pivot

@@@[mu] Plate CCCCLXXI.