tures. Should the escape of the noxious gases into the room be suspected, the furnace-door and air-apertures must be opened, and a draught established through the stove, by kindling some wood shavings in it, the door and win­dows of the room being at the same time thrown open. This attention to back-draught is of course more necessary when charcoal or coke is used instead of coal, the products of combustion being then entirely free from smoke. When coal is used in stoves, the vent-tubes are apt to become choked with soot ; but this may in a great measure be pre­vented by giving for a short time every day a brisk draught, by which the soot will be burned.

To prevent the injurious or disagreeable effects of the first kind of stoves, and at the same time to secure their ad­vantages, numerous modifications have been proposed, not only with the view of preventing the too great heat of the ex­ternal surface, but also of avoiding unnecessary expenditure of fuel. Perhaps the most important of these is *Arnott's stove;* the principle of which consists in allowing the fuel to burn very slowly, the admission of air for the combustion being regulated by an adjustment connected with the stove, and influenced by the degree of heat produced. Nu­merous forms and modifications of this stove are now in use, but in their general structure they are the same. The stove consists of a square or cylindrical box of iron, gene­rally lined inside with a thick layer of fire-clay, and hav­ing a grating near the bottom, on which the fuel is burned ; or the fuel may be contained in a small fire-box within the stove. Sometimes the fuel is burned within a hollow cy­linder of fire-clay, in which case the stove is not lined with it. There is an ash-pit below for the reception of the ashes, and the products of the combustion are, as usual, carried off by a vent.

The principal feature of this stove is the contrivance by which the air is admitted for the combustion. When the stove-door or ash-pit door is open, the combustion is lively, and the fuel is soon consumed ; but when these are shut, and they ought to be so made as to shut quite close, then air must be admitted otherwise, and this is done by the air-tube, furnished, as already stated, with a regulator.

The annexed figure represents the stove of its simplest form. ABCD is the outer casing of iron, in which there is the fire-box E, with its grating. Over the fire-box there is a dome, *k,* with a funnel to car­ry the products of combustion into the chimney ; *h* is the stove-door, and *g* is the *thermometer regulator,* or adjust­ment by which the air is admitted for combustion. A great variety of these regulators has been described. Per­haps the best of these is represented by the annexed cut. ABC is a glass tube, shut at A, containing air from A to B, and filled with mercury from B to C. On the mercury at C is placed a float, from which there proceeds an upright rod D, kept steady by passing through a support at H. From this upright wire there descends another, FGH, terminated by the plate-valve F. LE is the air-tube of the stove. When the heat within is great, the air in the shut limb of the regulator at A is expanded, and forces up the mer­cury at C, raising the rods and plate-valve F, and thus bringing it near to, or in contact with, the mouth of the tube, by which more or less air is admitted to the stove, according to the heat within. If the combustion is pro­ceeding too slowly, then the air in the tube A is not much expanded, consequently air is allowed to enter the stove more

freely ; but when, owing to this, the combustion becomes lively, and the temperature too high, then, by the elevation of the plate-valve, air enters in smaller quantity, and the temperature is moderated. Instead of the flat plate a coni­cal valve is sometimes used, which, passing more or less into the mouth of the tube, allows the passage of less or more air ; and sometimes this contrivance is re­sorted to. *ed* is the wire raised by the move­ment of the mercury ; *ab* is a plate hung on an axis within the air-tube, and acting like a throttle-valve. When the edge of the plate is turned to the current, air is admit­ted freely ; but when the heat becomes high, then the mercury rises and makes the plate revolve, by which more and more of

the area of the tube is shut, and consequently less and less air is admitted. Perhaps the simplest of these regulators is that here represented, *abc* is a bent tube shut at *a,* where it contains air, and open at *c,* where it is cup­shaped. The bent part at *b* is occu­pied by mercury. From c there pro­ceeds a bent tube to supply air to the stove. When the heat within is great, the air in *a* is expanded, and forces the mercury up in *c,* and thus, bringing it in contact with the mouth, prevents the free admission of air to the stove. Nu­merous other contrivances of a similar nature have been recommended, all acting in the same way. Instead of these, the admission of air is sometimes regulated by a semicircular slide over the mouth of the air-tube, which may be placed so as to admit to the stove a greater or smaller quantity, as occasion requires.

The principle on which this stove operates, whatever modification of it may be used, is merely the slow combus­tion of the fuel, by which the stove itself is warmed ; and there is thus a reservoir of heat to be communicated to the air in the apartment. As the quantity of fuel consumed is small, there is no necessity for frequent supply. When one of the ordinary dimensions for a room is in use, it will re­quire to be supplied morning and evening, supposing that it is kept constantly burning, and the ashes removed once a day. These, instead of falling into the ash-pit, may be re­ceived in a box placed there for the purpose, which is taken out and emptied, so as to avoid dust in the apartment.

The quantity of fuel consumed must of course depend on circumstances. During the severe winter of 1836-37, Dr Arnott kept his library at a temperature varying from 60° to 63° of Fahrenheit, by about six pounds of coal a day ; which, supposing the coal to be twenty shillings per ton, is at the daily expense of less than a penny.

Though the Arnott stove answers well the purpose for which it is intended, that is, economy of fuel, for most un­doubtedly a room may be kept warm at a very moderate expense, yet it is liable to the objection already stated with regard to the unpleasant feeling consequent on the use of all stoves of the kind, and indeed with it more than others ; for, owing to the very slight expenditure of fuel, there is little or no change in the atmosphere. It is gene­rally allowed that a pound of coal on an average requires about 150 cubic feet of air for combustion ; but as part of the air passes off without being acted on, 200 may be allowed, and this is a large allowance where the combustion is going on so slowly as in the stove. Now suppose the apartment in which the stove is placed to be fifteen feet long by twelve wide and eleven in height, its cubic contents are 1980 feet; and suppose six pounds of coal per day to be the consumption, each pound requiring about 200, that is in all 1200 feet of air for combustion. This quantity must pass through the stove and be carried off by the vent, so