

mixture of the carbonic acid and azotic gases resulting from the combustion of the carburetted hydrogen in atmospheric air, and more lives are destroyed by this than by the violence of the fire-damp.

To guard against these accidents, every precaution is taken that prudence can devise, in conducting and in ventilating the mines. Before the pitmen descend, wastemen, whose business is to examine those places where danger is suspected to lurk, traverse with flint-mills\* the most distant and neglected parts of the workings, in order to ascertain whether atmospheric air circulates through them. Large furnaces are kept burning at the up-cast shafts, in aid of which, at Wall's-end colliery, a powerful air-pump, worked by a steam-engine, is employed to quicken the draft: this alone draws out of the mine 1000 hogsheads of air in a minute. A kind of trap-door, invented by Mr. Buddle, has also been introduced into the workings of this colliery. This is suspended from the roof by hinges, wherever a door is found necessary to prevent the escape of air. It is propped up close to the roof in a horizontal position; but in case of an explosion, the blast removes the prop, whereby the door falls down and closes the aperture.

*Sandstone* is termed *post* by the miners of the *Coal-measures*; but when the bed is very hard it is termed *whin*; which therefore is not applied to basalt only, though most frequently. A bed 66 feet thick crops out at the hill called Gateshead Fell, on the south of Newcastle, and is quarried for grindstones which are of good quality. Great Britain and even the Continent are supplied chiefly from this place. The softer parts of the bed are used as filtering stones. There are about 25 beds of sandstone in the *Coal-measures*; the greater part of them are thin.

The beds of *shale* in the *Coal-measures* amount to about 32 in number. Shale is called *metal* or *metal-stone* by the miners; thus they have *grey*, *blue*, or *black* metal, according to the colour of the shale; when very indurated it is called *whin* by the Newcastle colliers. The beds of shale are usually thinner than those of the sandstone with which they alternate. Both the sandstone and shale form the roof and floor of the coal-beds; but the latter much more frequently than the former. Each is to be seen in immediate contact with the coal, without the smallest sensible alteration in its properties. But a hard bituminous shale often forms the floor of the coal-beds, which is used by the manufacturers of fire-bricks.

\* An apparatus for producing light, without the danger of inflammation, by the friction of flint, now generally superseded by the safety-lamp.