

- III. *In enabling us to accomplish our ends in the easiest, shortest, most economical, and most effectual manner.*
- IV. *In inducing us to attempt, and enabling us to accomplish, objects which, but for such knowledge, we should never have thought of undertaking.*

We shall therefore proceed to illustrate by examples the effect of physical knowledge under each of these heads:—

(36.) Ex. 1. (35.) I. It is not many years since an attempt was made to establish a colliery at Bexhill, in Sussex. The appearance of thin seams and sheets of fossil-wood and wood-coal, with some other indications similar to what occur in the neighborhood of the great coal-beds in the north of England, having led to the sinking of a shaft, and the erection of machinery on a scale of vast expense, not less than eighty thousand pounds are said to have been laid out on this project, which, it is almost needless to add, proved completely abortive, as every geologist would have at once declared it must, the whole assemblage of geological facts being adverse to the existence of a regular coal-bed *in the Hastings' sand*; while this, on which Bexhill is situated, is separated from the *coal-strata* by a series of interposed beds of such enormous thickness as to render all idea of penetrating *through* them absurd. The history of mining operations is full of similar cases, where a very moderate acquaintance with the *usual order of nature*, to say nothing of theoretical views, would have saved many a sanguine adventurer from utter ruin.

(37.) Ex. 2. (35.) II. The smelting of iron requires the application of the most violent heat that can be raised, and is commonly performed in tall furnaces, urged by great iron bellows driven by steam-engines. Instead of employing this power to force *air* into the furnace through the intervention of bellows, it was, on one occasion, attempted to employ the steam itself in, apparently, a much less circuitous manner; viz. by directing the current of steam in a violent blast, from the