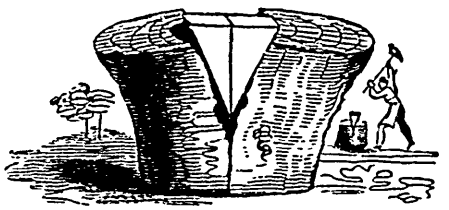
considerable portion of the weight w being supported by the plane s o, and only the residue by the power p.

THE WEDGE.

The *wedge*, which is the next mechanical power, is composed of two inclined planes. Woodcutters sometimes use it to cleave wood. The resistance consists in the cohesive attraction of the wood, or any other



body which the wedge is employed to separate; and the advantage gained by this power is in the proportion of half its width to its length. The wedge, however, acts principally by being struck, and not by mere pressure; the proportion stated, is that which expresses its power when acting by pressure only.

All cutting instruments are constructed upon the principle of the inclined plane, or the wedge. Those that have one edge sloped, like the chisel, may be referred to the inclined plane; whilst the axe, the hatchet, and the knife, (when used to chop or split asunder,) acts on the principle of the wedge. But a knife cuts best when drawn across the substance it is to divide, as it is used in cutting meat; for the edge of a knife is really a very fine saw, and therefore acts best when used like that instrument.

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THE SOLAR SYSTEM.

Sir John Herschel well observes, that it is difficult to convey to one who has not long exercised his thoughts on the subject any adequate impression of the relative distances and magnitudes of those planets which are comprised within our own system. How much more difficult is the conception of the starry heavens—each star a sun, the centre of a system, it may be more extensive and more glorious than our own? We cannot impart to others correct notions on the subject by drawing circles on paper, or "by those very childish toys called orreries." Some general impression may be conveyed by placing a globe two feet in diameter in the centre of a plain or bowling green.—With the sun for a centre, a circle 164 feet in diameter will represent the orbit of Mercury, the comparative size of which plannet may be represented by a grain of mustard seed. Venus might be represented by a pea, moving in a circle the diameter of which would be 284 feet; the Earth also a pea, but on acircle of 430 feet diameter; Mars a large pin's head, and the diameter of its circle 654 feet; Juno, Ceres, Vesta, and Pallas, grains of sand, moving in circles from 1,000 feet to 1,200 feet in diameter; Jupiter a moderate sized orange, in a circle half a mile across; Saturn a small orange, on a circle four-fifths of a mile in diameter; Uranus a large cherry, upon a circle more than a mile and a half in diameter; and Neptune a good sized plum, on a circle about two miles and a half diameter. When we have attained sufficient knowledge of the comparative magnitudes and distances of the heavenly bodies, it becomes matter of astonishment to find how simple, yet how powerful and effectual, are the laws by which they are all governed, so as to keep each one of them them in its predestined orbit, moving for ever at the same rate in the same constant round. It is matter of astonishment that a globe two feet in diameter should, by the simple law of attraction, acting in proportion to their several masses, keep so many other globes, varying in size from that of an orange down to a grain of sand, each circling the central globe without confusion, and some of them at the great distance of two miles and a half from the centre of attraction; but it becomes a matter of far greater astonishment to find as we advance further in our inquiries, that this very sun itself, with all its planetary orbs, is governed by a higher law of the same description, if not by the very same law; for not only is it found, on a more minute investigation, that the sun revolves on its axis, as the earth and planets do, but that the sun does not occupy the precise centre of our system, nor do the planets move in circular orbits, for these orbits are ellipses, of which the sun occupies one or other of the foci, the sun itself moving in an orbit of its own as well as turning upon its axis. Nay, more, it seems all but certain that our whole system has a proper motion as a whole among the fixed stars, tending towards a point in the constellation Hercules; and that the fixed stars themselves, which are only other suns, have all proper motions, if their immense distances and the want of some really fixed object to measure their motions did not preclude our obtaining sufficient data to enable us confidently to affirm it. We may, indeed, at length rest assured that some parallax has been detected in the nearest fixed stars, but so small as not to amount to a second. This parallax would give the enormous distance of twenty billions of miles from the earth as that of the nearest fixed star; and, consequently, make each of those stars to be at the same immense distance from its nearest neighbour. And when it is considered that the milky way is so thickly paved with stars that Sir W. Herschel was led to conclude that fifty thousand had passed under his review, in a zone two degrees in breadth, during a single hour's observation, the mind of man fails in attempting to grasp such distances as would result from summing up the number of stars in the whole range of observation during 24 hours, each separated from each by at least 20,000,000,000,000 of miles. Some parts of the heavens are even more thickly clustered with stars—as many of the nebulæ, especially a vivid oval mass in Sagittarius, about six degrees in length, four degrees in breadth, so excessively rich in stars that a very moderate calculation makes their number to exceed one hundred thousand. Some of the nebulæ are even denser than this, appearing like globular spaces filled full of stars. "It would be a vain