

He figures (Fig. 66) a worm working inside an annular worm gear after stating that worm-teeth are drawn as for a rack. If he had made the worm a modification of a Hindley worm, the absurdity would be less profound.

By placing the square wheel of Fig. 100 inside of its mate, it will become evident that the circumferences of both wheels as designed by the author, are *not* equal, as he says they should be.

If a student attempts to get an insight into the theory of gearing by means of this treatise and fails to see how the assertions correspond with the demonstrations, he can certainly not be blamed. There is, indeed, a serious danger that he may become hopelessly confused on the subject of gearing.

H. B.

ELECTRIC BOATS.—M. Reckenzaun believes that on boats of moderate dimensions electricity can be advantageously substituted for steam. The motor should always be ready to act and should occupy the least possible space. The duration of action is of little consequence, since the distances to be traversed are generally small. An electric boat can carry twice as many passengers as a steam boat; consequently it can be smaller, cheaper, and less difficult to drive. Electricity has the additional advantage, especially in pleasure boats, of avoiding smoke, smell, noise, and the inconvenient presence of the boiler. It is not long since a steam canoe carrying fuel sufficient for seven hours' consumption was considered a marvel; electric boats already surpass this limit. During the past autumn an electric canoe made numerous voyages on the Danube, under excellent conditions, and there is reason to expect that even ships of considerable size may be finally driven by electricity.—*Chron. Industr.*, Feb. 3, 1884. C.

PERFECT ELASTICITY OF CHEMICAL SOLIDS.—W. Spring has conducted an extensive series of experiments with the view of determining the possibility of permanently diminishing, by means of pressure, the volume occupied by a given weight of any chemically definite solid body. Prismatic sulphur, when freshly prepared, and plastic sulphur, are changed, under great pressure, into the denser variety of octohedric sulphur; in like manner, amorphous arsenic is partially transformed, under adequate pressure, into denser crystalline arsenic; but in each of these cases there is a change of allotropic state accompanying condensation. Spring therefore concluded that matter takes the allotropic condition corresponding to the volume which it is forced to occupy, and his researches confirm this opinion. Solids behave under pressure like liquids and gases, and the specific weight of a body, when it is pure and free from cracks and crevices, has a significance of the same value as the atomic weights of the elements.—*Bull. de l'Acad. Belg.*, 1883. C.

PROTECTION AGAINST BOILER EXPLOSIONS.—Prof. Melsens in 1871 published some interesting experiments upon heating water in contact with metallic surfaces. Boutigny, in his investigations of the spheroidal state, was led to regard it as the principal cause of the fulminating explosions of