understood by a logical demonstration may be seen in his *De generatione animalium*, Lib. II. cap. viii.

Logical presumption. A Wolffian term for synthetic reasoning, that is, induction and analogy; for hypothetic reasoning was not recognized as reasoning at all. The uniformity of nature is called the *principle of logical presumption.*

Logical division. Division into logical parts.

Logical distinctness. That distinctness which results from logical analysis.

Logical actuality. Kant, in the *Logik* by Jäsche (Einleitung, vii), defines logical actuality as conformity to the principle of sufficient reason, consisting of the cognition having reasons and having no false consequences; and he makes this, along with logical possibility, to constitute logical truth, which is thus used in its second sense. But in the *Critic of the Pure Reason*, in discussing the functions of judgments (1st ed., 75), he says that an assertoric proposition asserts logical actuality (Wirklichkeit, which Max Müller wrongly translates 'reality'), and makes this phrase synonymous with logical truth (which is thus used in its third, and proper, sense).

Logical definition. A strict definition by genus and specific difference. Ockham and his followers objected to the designation on the ground that the logician, as such, had no occasion to define any ordinary term, such as man (*Tractatus logices*, Pt. I. chap. xxvi). (C.S.P.)

Logical Diagram (or **Graph**): Ger. *logische Figur*; Fr. *diagramme logique*; Ital. *diagramma logico*. A diagram composed of dots, lines, &c., in which logical relations are signified by such spatial relations that the necessary consequences of these logical relations are at the same time signified, or can, at least, be made evident by transforming the diagram in certain ways which conventional 'rules' permit.

In order to form a system of graphs which shall represent ordinary syllogisms, it is only necessary to find spatial relations analogous to the relations expressed by the copula of inclusion and its negative and to the relation of negation. Now all the formal properties of the copula of inclusion are involved in the principle of identity and the *dictum de omni*. That is, if r is the relation of the subject of a universal affirmative to its predicate, then, whatever terms X, Y, Z may be,

Every X is r to an X; and

if every X is r to a Y, and every Y is r to a Z, every X is r to a Z. Now, it is easily proved by the logic of relatives, that to say that a relation r is subject to these two rules, implies neither more nor less than to say that there is a relation l, such that, whatever individuals A and B may be,

If nothing is in the relation l to A without being also in the same relation l to B, then A is in the relation r to B; and conversely, that,

If A is r to B, there is nothing that is l to A except what is l to B.

Consequently, in order to construct such a system of graphs, we must find some spatial relation by which it shall appear plain to the eye whether or not there is anything that is in that relation to one thing without being in that relation to the other. The popular Euler's diagrams fulfil one-half of this condition well by representing A as an oval inside the oval B. Then, l is the relation of being included within; and it is plain that nothing can be inside of A without being inside B. The relation of the copula is thus represented by the spatial relation of 'enclosing only what is enclosed by.' In order to represent the negation of the copula of inclusion (which, unlike that copula, asserts the existence of its subject), a dot may be drawn to represent some existing individual. In this case the subject and predicate ovals must be drawn to intersect each other, in order to avoid asserting too much. If an oval already exists cutting the space in which the dot is to be placed, the latter should be put on the line of that oval, to show that it is doubtful on which side it belongs; or, if an oval is to be drawn through the space where a dot is, it should be drawn through the dot; and it should further be remembered that if two dots lie on the boundaries of one compartment, there is nothing to prevent their being identical. The relation of negation here appears as 'entirely outside of.' For a later practical improvement see Venn, *Symbolic Logic*, chap. xi. (C.S.P.)

Logical Machine: Ger. *logische Machina*; Fr. *machine logique*; Ital. *macchine logistiche* (E.M.). An instrument devised to facilitate by mechanical means the handling of logical symbols or diagrams.

There are three such instruments which merit attention:—

(1) The first was constructed by W. Stanley Jevons in 1869 (announced in his *Substitution of Similars*, 1869, 60; described in *Philos.*