of Commons, the first on the occasion of presenting the Education Estimates in April, 1917, and the second on the introduction of the first Education Bill in the following August. He has accompanied the publication by a highly illuminating preface of sixteen pages, in which is resumed all the more important features of the revised draft of the Education Bill of 1918, and of the chief points of his many speeches in support of his reforms, characterised by a felicity of phrase and diction which will go far to hearten supporters of the measure and even to conciliate and win opponents. Mr. Fisher's addresses are instinct with a broad humanity and a spirit of real helpfulness. He is a man consumed with the idea that the welfare of the child is the nation's most vital concern, and his arguments and pleadings rest "upon the right of human beings to be considered as ends in themselves, and to be entitled, so far as our imperfect social arrangements may permit, to know and enjoy all the best that life can offer in the sphere of knowledge, emotion, and hope." In this faith he goes forward on his high mission, confident that he will win the support of all who desire the highest well-being of the nation.

Microscopic Examination of Steel. By Dr. Henry Fay. Pp. iv+18+Fig. 1+photographs 55. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1917.) Price 6*s.* net.

THIS little work was originally issued by the United States Ordnance Department for the use of inspectors of ordnance material, and has now been published as a guide to others engaged in the inspection of steel. A very brief account of the equilibrium diagram of the iron-carbon alloys is given, and the reader will find it necessary to supplement this by reference to fuller treatises, in order to understand the series of photomicrographs, mostly of excellent quality, which compose the greater part of the book. The entire account of the metallic constituents of both annealed and hardened steels is compressed into five pages, and although the statements are terse and accurate they can convey a definite meaning only to readers who are to some extent prepared by previous study of the subject. It would have been well to mention the fact that only carbon steels are dealt with, otherwise such statements as that "commercially martensitic steels are unimportant on account of their extreme brittleness, and they are found only rarely," are liable to mislead. Alloy steels are met with by most inspectors in the course of their work, and a word of warning is necessary that structures which are unusual in pure carbon steels may be quite normal in some commercial products.

A few details of methods of polishing and etching are included, but we miss a reference to the newer copper reagents, which render such good service in indicating the segregation of phosphorus. A detailed description of three defective steels which failed in practice illustrates the usefulness of metallographic methods in the control of material, although a considerable amount of experience is required before it is possible to interpret aright the indications of the microscope. For the purpose of acquiring such experience, the reader is recommended to examine a number of steel specimens, the heat treatment of which is definitely known, before attempting the study of abnormalities. C. H. D.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Long-range Guns.

SEVERAL correspondents have rightly pointed out that the ranges given in my short article on this subject in NATURE of April 4 are twice as great as would be given by the stated initial velocities. The heading of the velocity column should have been "Horizontal Component of Initial Velocity," not "Initial Velocity." The horizontal component, where there is no resistance, is constant for the whole range.

At the end of the article I referred to the elliptic orbit of the projectile. The elements of the ellipse are easily found. Since, at the vertex of the trajectory, the weight of the projectile is just balanced by centrifugal force, and since the radius of curvature of an ellipse at the end of the major axis is b^2/a, $b^2/a=v^2/g'$, where v is the velocity in apogee and g' the earth's attraction at that distance; also, since $b^2=a^2(1-e^2)$, it follows that $e=1-v^2/R'g'$, where R′ is the apogee distance of the projectile from the centre of the earth, and

$$b=R'\sqrt{\frac{1-e}{1+e}}.$$

A short table of v and b is appended.

If $R'=R+H$, R being the earth's radius and H the greatest height of the trajectory above the earth's surface, and if, also, θ is the angular distance between the major axis of the ellipse and point where the orbit cuts the surface of the earth, the range is $2R\sin\theta$, θ being determined by the equation

$$\cos\theta=\frac{1}{R}\left(R'-\frac{H}{e}\right).$$

If the projectile has a horizontal velocity v at the surface of the earth, the table gives the approximate value of the minor semi-axis of the elliptic orbit.

v ft. per sec.		b miles	
1,000	..	158	
2,000	..	279	
3,000	...	462	
4,000	...	620	
5,000	...	780	
25,900	...	Earth's radius	Circular orbit

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The Motion of the Perihelion of Mercury.

AM obliged to Mr. Harold Jeffreys for his friendly criticism (NATURE, April 11, p. 103), but my suggestion was not one of a resisting medium pure and simple, but of a resistance greater at perihelion than aphelion, and therefore synchronous with the planet's orbital