

weight of the insulator to an equal degree—taking care, of course, to be well within the limits of the necessary thickness for safety for the latter. Thus a core with a ratio of copper to dielectric of 3 to 2 or even 3 to 1 will give the same speed as a much larger core of equal weight, and will cost a great deal less. It was largely on this account that the estimate of the Post Office for the Pacific cable of £2,924,100 nearly doubled the lowest tender to the Dominion Government for the same route. For the Vancouver-Fanning Island section alone a core of 796 lb. per mile of copper to 532 lb. of dielectric would cost some £340,000 less than the enormous and unwieldy core of 940 lb. of copper to 940 lb. of dielectric which the Post Office proposed. The speed would be only 7 words per minute less—that is, 18 words instead of 25.

In connection with a long section, however, it must be remembered that the increase in the weight of the core, in order to make it yield the same speed as a short section, adds considerably to the weight of the cable when sheathed. Thus the Anglo-American Atlantic cable of 1894, with a core of 650 lb. per mile of copper to 400 lb. of dielectric—the heaviest core yet made—reached a total weight of 2·01 tons per mile, or nearly double the ordinary deep-sea type. This weight at a depth of 3000 fathoms entails a great strain on the cable when being heaved up to the surface for repairs; but the modern type of sheathing, in which each wire abuts the next one so as to form a continuous archway, which resists the lateral pressure caused by a longitudinal strain, greatly minimises any chance of the core being damaged through this cause. Moreover, the method of taping

and tarring each sheathing wire separately, which was first introduced by the Silvertown Company, is an almost complete safeguard against weakness arising from rust.

With regard to the nature of the ocean bed to be crossed between Vancouver and Fanning Island, the surveys of the *Albatross* and *Thetis* prove it to be for a large portion of the distance a level plateau barely exceeding in any part 3000 fathoms. It will, in consequence, be only necessary for the ships of the company contracting to lay the cable to survey carefully the landing-places at either end, and then to take a line of widely separated sounding along the intervening distance. The other sections present no special difficulties, and the line they take has already been fairly well surveyed.

It only remains for the Imperial Parliament to sanction the carrying out of a project which the Colonies have so much at heart. The liability incurred is insignificant. It consists of a third share of a capital of £1,600,000, which Mr Sandford Fleming calculates to be sufficient for the undertaking. The interest on £1,600,000 at $2\frac{1}{2}$ per cent, together with any unforeseen expenses, would not amount to more than £45,000, which, with £30,000 for working expenses, makes a total of £75,000. The surplus of revenue over expenditure for the first three years is estimated at £154,000. The contractor who lays the cable undertakes to keep it in repair for three years; but after that the cost of repairs will have to come out of revenue, so that in the tenth year the total surplus will be £742,000, and the whole £1,600,000 would be paid off in twenty years without costing the taxpayers a single penny. The