To compute the effect that one of these atoms produces upon a neighboring atom, all the component forces may be added together to find the whole force exerted by the first atom. This statement assumes that the force between any pair of charges acts independently of all the others.

Evidently before such a procedure can be carried out, exact locations for the several individual charges making up each atom must be assigned. These positions are obviously not known but can be determined by reasoning.

A beginning was made by imagining the simplest collection of charges to represent the simplest known atom, hydrogen. The first drawing of the all-nuclear hydrogen atom in 1921, representing these ideas, showed two negative electrons in contact with one body of positive charge. There has been no reason to change the picture since then. On the contrary, several reasons in its support have appeared.

Assumptions have been made in this theory for both the neutral hydrogen atom and for the alpha particle that are illustrated in figures 1 and 2 respectively. There are two negative electrons in each figure, considered as spheres of radius 1.86 10^{-13}cm. and charge -e . They are each in contact with a positive charge, of 2e for hydrogen, and of 4e for the alpha particle, and lie on opposite sides of it because of their mutual repulsion. The positive charges are single bodies, one of 2e and the other of 4e, in constant rotation on their own axes. The rotation of the negative electrons on their axes is assumed to be negligible. The diameters of the positive charges are so small by comparison with that of the electron that they cannot well be represented to scale in these figures and so are shown simply as dots.

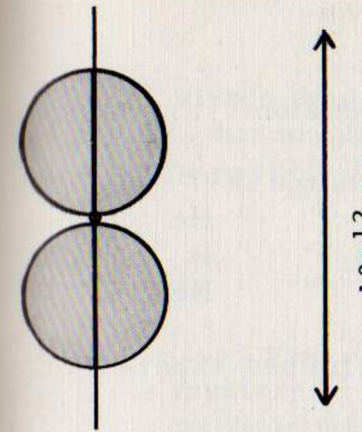

Fig. 1
Neutral hydrogen atom
Central positive charge
2 e

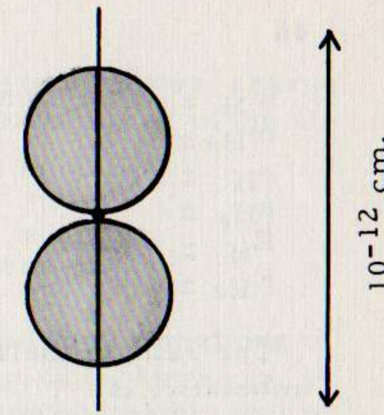

Fig. 2
Alpha particle
Central positive charge
4 e

The diameter of the positive charge in the hydrogen atom is equal to that of the alpha particle or the helium atom. This statement may be demonstrated by means of the mass formula, (see page 38), namely

$$m = \frac{A}{a}\left(\frac{E}{e}\right)^2$$

First, consider that approximately the whole mass of these bodies is associated with their positive charges. Denote the masses and charges of the positive charges as