The Strain-figures of "Like" Poles, and Rhumbler’s "Gummiring-Modell" in Relation to the Cytoplasmic Spindle.

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With 2 figures in text.

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In Rhumbler’s paper "Die Mechanik der Zelldurchschnürung nach Meves’ und nach meiner Auffassung" (ante, Vol. VII. ’98. p. 535), he describes a circular model of 300 indiarubber rings, each attached by six inextensible bonds to its neighbours to form a hexagonal network, representing a plane section of as an alveolar structure in Bütschli’s sense; and produces photographs showing its condition when pulled through holes in its support, so that the network is under strain from "attractive centres". As in this case each pair of centres is apparently united by a spindle, he argues that the principles governing "like" centred forces do not apply here, and that similarly two like centres of diffusion and surface tension are capable of producing the achromatic figure in the dividing cell, with its minute alveolar structure. Meves has in reply summarily pointed out that the "spindle" of the model depends on the fact that its meshes cannot glide on one another as the alveoli of the cell must do accordingly to Rhumbler’s own theory. To this objection, so far as I am aware, Rhumbler has made no reply; but as he utilises figures from this model in his recent paper "Mechanische Erklärung der Ähnlichkeit zwischen magnetischen Kraftliniensystemen und Zelltheilungsfiguren" (ante, Vol. XVI. 1903) we must suppose that he still remains unconvinced.
Since it is of extreme importance to ascertain whether the forces at work are "indifferent" ones or "dual" and "polarised", we must examine the character of the field of force which indifferent forces will produce (such as for instance two heavy centres in space, omitting all considerations of the Earth's action). I reproduce (Fig. 1) a diagram which Rhumbler copies from Meves with the addition of two lines, the one, or "axis", uniting the centres, the other its perpendicular bisector. Now a line of force is thus defined by Clark Maxwell: If we draw a line such that at every part of its course it is coincident in direction with the force at that point, this line may be called a 'line of force'. One such line of force is the interpolar axis, for a minute heavy particle at any point on the axis will move along it to the nearer pole; or if at the centre will remain there. Similarly every perpendicular bisector of the axis is a line of force; for a heavy particle at any point of such a line will be acted upon by equal and equally inclined forces from either centre, whose resultant will be along this line. Besides these crossed lines there will be a third set all convex to both the preceding ones. Such a figure may be termed a 'crossed field', or an 'anti-spindle'. This reasoning applies to all similar pairs of attractive or repulsive centres respectively, and to the fields of 'like' centres of polarised or dual forces, acting through a uniform medium capable of transmitting the strain equally in all directions. Thus it would apply to Rhumbler's network, on the condition that its meshes are sufficiently numerous and sufficiently small for their long sides to be able to form continuous curves under the action of the