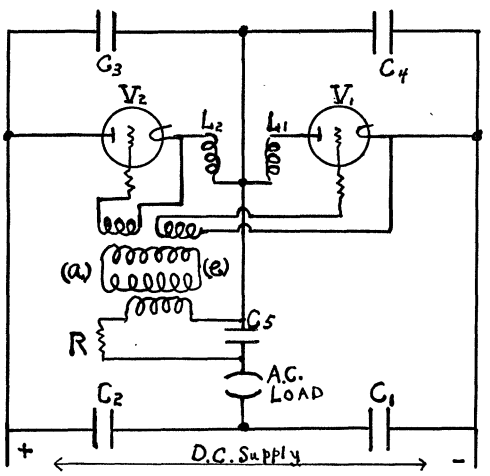

Fig. 2

laboratory or obtained at small cost. For the reactors L_1 and L_2 two windings of a one to one insulating transformer were used. Thyratrons FG-67 were used for V_1 and V_2. The grid excitation was obtained as shown. The frequency of the circuit could be changed by an alteration of R or by a change in any of the capacities C_1 to C_5. The circuit has good stability at any frequency under that at which the tubes V_1 and V_2 fail. This upper limit is well above 1,000 cycles with these thyratrons.

At times the circuit fails to start when the D. C. supply (about 250 volts) is connected. It may be started without producing failure by connecting the 60 cycle lighting supply through a resistance to the points (a) and (b). It is well to protect the tubes in case of failure by a fast circuit breaker or fuse of suitable capacity in the D. C. line.

This type of circuit is capable of furnishing considerable power at frequencies which can be changed gradually or abruptly by a variation in circuit constants. This is of advantage in the initial acceleration of the centrifuge as the frequency may be set initially at some low value and increased as the centrifuge speeds up.

Our experience shows that the induction motor type of drive gives a speed practically as constant as the frequency of the circuit and therefore better than usually required in most work. The heating of the rotor T gives no fundamental trouble because where accurate temperature control is required it is standard practice to maintain the vacuum chamber V at constant temperature by the usual thermostatic controls. If the air surrounding the rotor T is troublesome, T can easily be sealed in a vacuum chamber by a change in design. It should be pointed out that several other types of electrical circuits and drives may be used besides that described above. The synchronous motor drive has been used in this laboratory by Davis[6] to produce 1,400 r.p.s., while methods of driving high-speed electrical motors have also been devised, especially by Colwell and Hall.[7]

Although at present the air turbine drive must be used to obtain the very highest rotational speeds, the electrical drive serves equally well for many purposes and has the advantage, after once being set up, that it is automatic and requires no attention from the operator to keep the speed constant. This work will be continued, and we hope that a more detailed description can be published later.

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[6] T. Davis, *Rev. Sci. Inst.*, 7: 96, 1936.
[7] Colwell and Hall, *Jour. Franklin Inst.*, 221: 797, 1936.

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