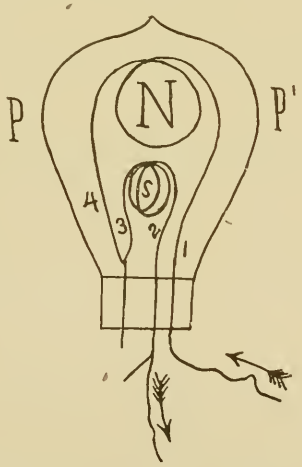
The Edison Effect in a "Hylo" Lamp.

By Arthur L. Foley.

The figure is a diagram of a "Hylo" turn-down incandescent lamp in which N and s represent (when the current is in the direction indicated) the north and south ends respectively of the 16 c.p. filament (F) and the 1 c.p. filament (f), the former consisting of two and the latter of three turns. Whatever be the direction of the current the filament coils are of opposite polarity, the potential difference between legs 3 and 4 is small, and that between legs 1 and 4 a maximum. When f is burning F is in series with it, but the current is insufficient to render the latter luminous. When F is burning f is short-circuited, but has the same potential as leg 4 of F.



Let P and P′ be points on the globe at the ends of a diameter through the plane of the filaments, and NS and sn be points on the globe where the axes of the filaments F and f meet it. At P there is a deposit from one to two cm. wide, while the globe is perfectly clear on either side. At P′ the conditions are exactly reversed, the central region being dark with clear glass on each side. At n, also at s, there is a small circular deposit about half the area of a turn

of f. This deposit is surrounded by another in the form of a ring about 1 cm. wide and 2 cm. in diameter, the ring being open next the base of the lamp. Between the central deposit and the ring the glass is clear. There is no deposit within 2 cm. of the base of the lamp, and very little on the crown.

The theory of molecular shadows and the Edison Effect, so thoroughly worked out by Fleming* and others, explains the general character of the deposit, but seems to fail to explain the definiteness of it. In general the deposit is of uniform density and quite dark, while the clear places are perfectly clear, the line of separation being as definite as if the deposit had been laid on with a brush.

The weak magnetic field of the small filament was sufficient to concentrate the deposit at the ends of its axes, leaving certain regions perfectly clear. It seems that it should be possible to keep clear any desired part of the wall of a vacuum tube.

The peculiarity of the deposit above described was noticed but a few weeks since, hence the incompleteness of this investigation. An attempt to age a number of similar lamps by running at an excessive voltage resulted in a practically uniform deposit.

*Molecular Shadows in Incandescent Lamps. Philosophical Magazine, Vol. 20, 1885.
A Further Examination of the Edison Effect in Glow Lamps. Philosophical Magazine, Vol. 42, 1896.