crank-pins. It is then found that much less load is needed to give comparative steadiness of motion than would be required to balance the parts, and that the blowing engine must be balanced to run at a given speed, and thus be liable to definite changes of motion of the fly-wheel each stroke. In all steam engines with single cylinders it must be recognized that during an instant of the stroke, the fly-wheel must, solely and unaided, maintain the speed and give out the whole power of the engine *by retardation*, while in most engines, during a considerable portion of the stroke, the fly-wheel is aiding, or assisting to impel, the shaft of transmission; of course receiving a corresponding impulse from other portions of the same stroke.

The unbalanced forces which result from changes of speed of rotation of these unsymmetrical wheels, are transformed into pressures at the axes, and have to be sustained by the bearings and resisted by the frameworks which carry or support the same, in addition to any strain, proceeding from the mechanism employed in giving rotation or in transmission of power. As pressure or load upon the bearings, the increment of heat derived from friction may cause the total heat to surpass the limit of dispersion in cases where the direct weights of the fly-wheel approach, as they frequently do, the maximum load of practical endurance on the bearing surfaces. The apparently unaccountable heating of some fly-wheel bearings, where the absolute pressures from load or work are not so great as to cause heating, has been noticed by all practical mechanics, and the considerations now presented offer a reasonable hypothesis in explanation.

In Mahan's Moseley's Mechanics will be found some mathematical investigations leading in this direction, see appendix notes D and E, but a study of these forces and an application of the theorem to the special case of a fly-wheel regulating force or power, are needed to complete the theory of practical mechanical construction.

New Electric Lamp.—By the use of circular oblique theophores, with a special clockwork for each, E. Requier has succeeded in making an electric lamp which will operate for 24 hours. He thinks that the instantaneous obedience of the automatic theophore to its solenoid will enable him to divide a sufficiently intense electric current so as to supply a large number of his lamps.—*C. R.* C.