MEAN RESULTS OF A THREE HOURS' AND A SIX HOURS' CONTINUOUS B.H.P. TESTS AT FULL NORMAL WORKING POWER; ALSO, HALF-AN-HOUR AT FULL POWER OF

THE "AJAX" GLASGOW GAS ENGINE.

	March 9, 1889, Mean of Three Hours' Tests, 9.20—12.20.	March 29, 1889, Mean of Six Hours Tests, 12 to 6 p.m.						Mean of Previous Six Hours' Tests, 12—6.	March 29, 1889, Full Power Tests, 6—6.30 p.m.
		First Hour, 12—1.	Second Hour, 1—2.	Third Hour, 2—3.	Fourth Hour, 3—4.	Fifth Hour, 4—5.	Sixth Hour, 5—6.		
Revolutions per Minute,	173·5	180·5	180·3	175·3	176·1	175·2	177·3	177·5	200·2
Net Brake Load, in lbs.,	99	98	98	98	98	98	98	98	98
Gas Consumption (*Main only*) in Cubic Feet, per Hour,	189·6	184	186	181	181	183	185	183	218
Brake-Horse-Power,	8·84	9·1	9·1	8·85	8·9	8·84	8·95	8·96	10·1
Gas, per Brake-Horse-Power, in Cubic Feet, per Hour,	21·5	20·2	20·4	20·4	20·3	20·7	20·6	20·4	21·6
Mean Effective Pressure, in lbs., per Square Inch,	60·8	...	...	...	...	...	...	63	...
Indicated Horse Power from above data,	10·04	...	...	...	...	...	...	10·6	...
Gas, per I.H.P., in Cubic Feet, per Hour (*Main only*),	18·9	...	...	...	...	...	...	17·2	...
Mechanical Efficiency of Engine, or $\frac{\text{B.H.P.}}{\text{I.H.P.}} \times 100$,	87·9%	...	...	...	...	...	...	84·2	...

Transmission Dynamometer.—There are many forms of transmission dynamometers,* by which the power, being transmitted from a steam engine, water-wheel, or other prime motor to shafting or to any particular machine, may be registered without absorbing more than a small and known amount of power.

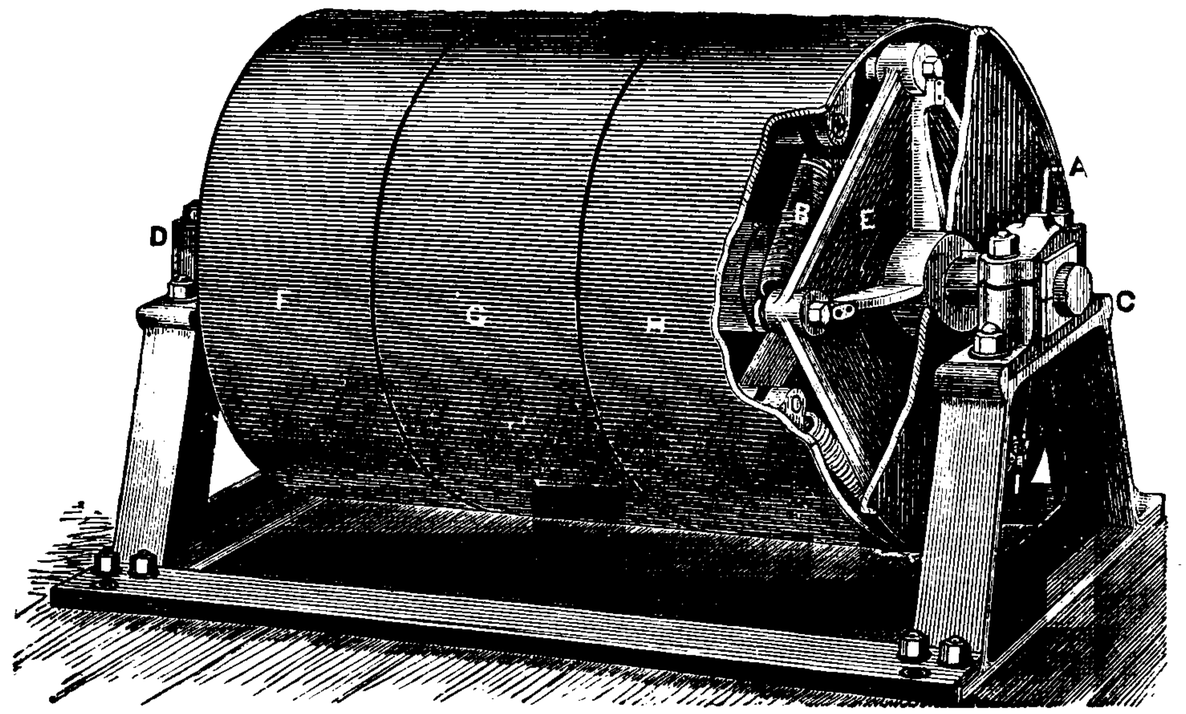
One of the simplest and most easily understood is that devised by Profs. Ayrton and Perry, of the City and Guilds of London Technical Institute.

† "The instrument, as seen in the figure, consists of a pulley, F, rigidly fixed to the shaft, C D, a loose pulley, G, and a pulley, H, joined by the spiral springs, B, to the ribbed plate, E, which is rigidly fixed to the shaft, C D. If, then, the engine belt is on F, and the belt to the dynamo or driven machine on H, or *vice versa*, the springs, B, will be stretched, depending on the 'torque' or twist transmitted. The extension of these springs causes, by means of a small link-motion seen at the lower right-hand corner of

* For a complete treatise on dynamometers see *The Electrician*, Nov. and Dec., 1883; also Prof. Goodeve's *Principles of Mechanics*, 1883 edition, pp. 188–191.

† From Prof. Ayrton's Lecture on "Measuring-Instruments for Transmission of Power," Published in *The Proceedings of the Society of Telegraph Engineers*, Vol. xi., pp. 265-267.

the figure, the bright bead, A, at the end of a long arm to approach the centre. Hence the smaller the radius of the circle described



PROFS. AYRTON & PERRY'S TRANSMISSION DYNAMOMETER.

by this bright bead as it revolves, the greater the torque.* Consequently, the horse-power transmitted is at once obtained from observing the indicated torque and the speed of rotation. The arm carrying the bead is slightly flexible, and when no power is being transmitted the bead is pressed with a certain force against the rim of the front plate, hence the bead does not commence moving until a certain prearranged horse-power at a given speed is being transmitted; its whole radial motion, therefore, is completed for a certain additional transmitted horse-power, the necessary addition depending on the power of the springs and the leverage of the link-motion. Consequently, a large change in the radius of the circle of light is produced by a small change in the transmitted horse-power. Further, one of the pins in the links can be taken out and put into another hole, which has the effect of greatly altering the leverage of the links, thus increasing the magnification and causing the motion of the bead to be completed for another range of power. For example, the springs

* The word torque was first suggested by Prof. James Thomson, Glasgow University, and means the turning moment or turning force multiplied by its distance from centre of shaft.