

List No. 42.

# PHYSICAL INSTRUMENTS

THE  
CAMBRIDGE  
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CAMBRIDGE, ENGLAND.

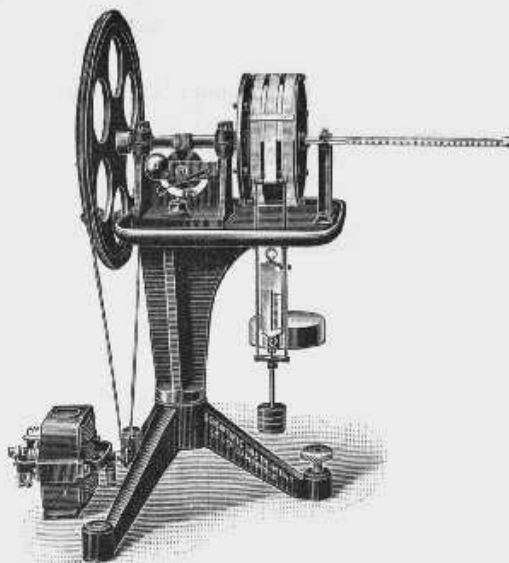
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**1313. Mechanical Equivalent of Heat, Callendar's Apparatus for Determining** (see illustration). This apparatus, invented and patented by Professor H. L. Callendar, F.R.S., comprises a cylindrical calorimeter of thin brass, whose axis is horizontal, containing a known quantity of water. This is rotated at a moderate speed either by hand or by means of a water or electric motor. Unequal weights are suspended from the ends of a silk belt slung over the cylinder, and so arranged as to make one and a half complete turns round the cylinder. Stability of equilibrium is secured by the addition of a light spring balance which acts in direct opposition to the lighter weight. Since this spring balance contributes only a small (positive) term to the effective difference of load at the two ends of the belt, small errors in its readings are relatively unimportant. The weights are adjusted by trial to suit approximately the friction of the belt, the final adjustment being effected automatically by the spring balance. A counter registers the number of turns which have been given to the calorimeter, while the rise of temperature is read by means of a bent mercury or platinum thermometer, inserted through a central opening in the front end of the cylinder.

No. 1313.  $\frac{1}{2}$  full size.

*The chief advantages of this apparatus are:—*

1. The friction is very nearly independent of the speed.
2. The balance is automatic.
3. There is no change in thermal capacity of the calorimeter with change of speed or of load.
4. There is no pulley- or bearing-friction to introduce errors.
5. There are no forced vibrations and no dash pot is required.
6. The factors of the mechanical work expended are ascertainable to a high degree of accuracy.

*A lecturer can obtain a value of "J" correct to  $\frac{1}{2}$  per cent. in about 10 minutes, in the presence of a class of students.*

Price including glass thermometer but without motor.

£12. 10s. 0d. \$60.90 d Balsamic

For full particulars, see special leaflet.

**Callendar and Griffiths' Platinum Resistance Thermometers.** A coil of fine platinum wire wound on a mica frame is protected by a glass or porcelain tube. The increase of the resistance of this platinum coil with rise of temperature indicates the amount of that rise. By making the coil form one arm of a Wheatstone Bridge, any change in resistance, and consequently of temperature, can be measured with great accuracy.

An arrangement of compensating leads eliminates all errors due to variation of the temperature of the wires connecting the thermometer with the indicator or recorder. The thermometer can thus be placed in positions where it would be impossible to read or use a mercury thermometer; while a series of thermometers distributed over a considerable area can be read from one central station by means of an indicator and switchboard. Temperatures as low as  $-200^{\circ}$  C. and as high as  $1200^{\circ}$  C. can be measured without difficulty.

*When used in conjunction with Callendar's Patent Electric Recorder these thermometers furnish continuous records of temperature.*

*For further information regarding the prices of Callendar Recorders, resistance thermometers especially suitable for laboratory, educational and industrial work, temperature indicators and accessories, see special catalogue, "Technical Thermometry," List No. 39, which will be sent post free on application. The figures in brackets refer to this list.*