Leaflet No. 84

A REPEATED IMPACT TESTING MACHINE

THE CAMBRIDGE
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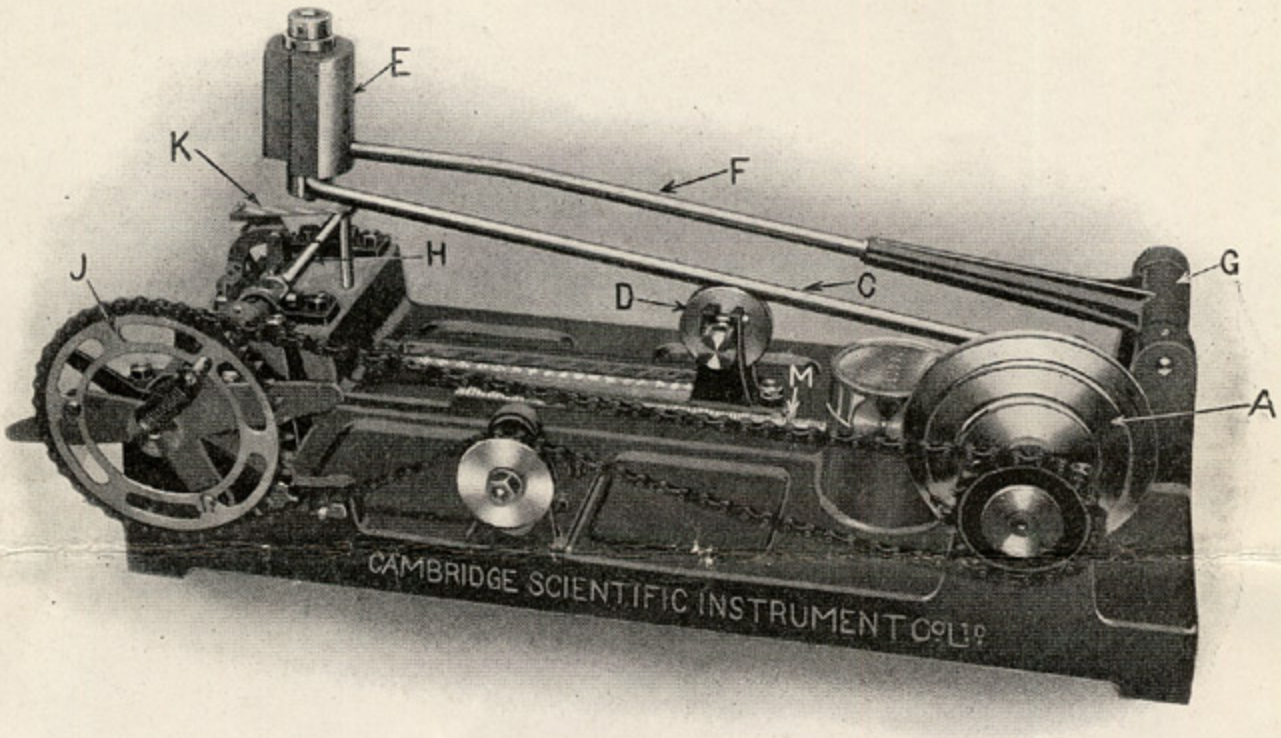

Fig. 1. General view of Repeated Impact Testing Machine.

General. That the testing of materials by impact is an all-important test is now fully recognised by steel makers and constructional engineers. During the past four or five years it has been more and more keenly felt that the results obtained by means of the ordinary tensile tests of the materials which are used in the construction of machinery parts, are not a complete indication of the value of these materials; but it is being realised that impact tests supply information which cannot be obtained from tensile tests.

The chief aim in the testing of any given material by impact is to study its constructional value—in other words, to determine the resistance of the material to shock under approximate working conditions; and engineers recognise that the proper test for this purpose is an impact test involving a comparatively large number of blows.

Description. The machine described in this leaflet is a modified and improved form of the impact testing machine originally designed by Dr Stanton* of The National Physical Laboratory, for subjecting small notched bars to repeated transverse blows of a definite amount from a hammer. The gear by which the hammer is raised is so designed that no part of the mechanism is subjected to shock from the hammer blows.

* See paper read by T. E. Stanton, D.Sc., and L. Bairstow, on "The Resistance of Materials to Impact," *Proc. I. Mech. E.*, Nov. 20, 1908. See also *Engineering*, page 731, Nov. 27, 1908; and page 572, May 6, 1910.

The general appearance of the machine is shewn in Fig. 1, and Fig. 2 is a diagrammatic sketch of the hammer and lifting gear. Referring to these figures, the machine is fitted with a cone-pulley *A*, so that it can be driven by a belt from a line shaft or small electric motor. One end of the spindle driven by this cone-pulley carries a crank *B* which is connected to the lifting rod *C*. This lifting rod is supported on a roller *D*, at some point in its length, so that the circular motion

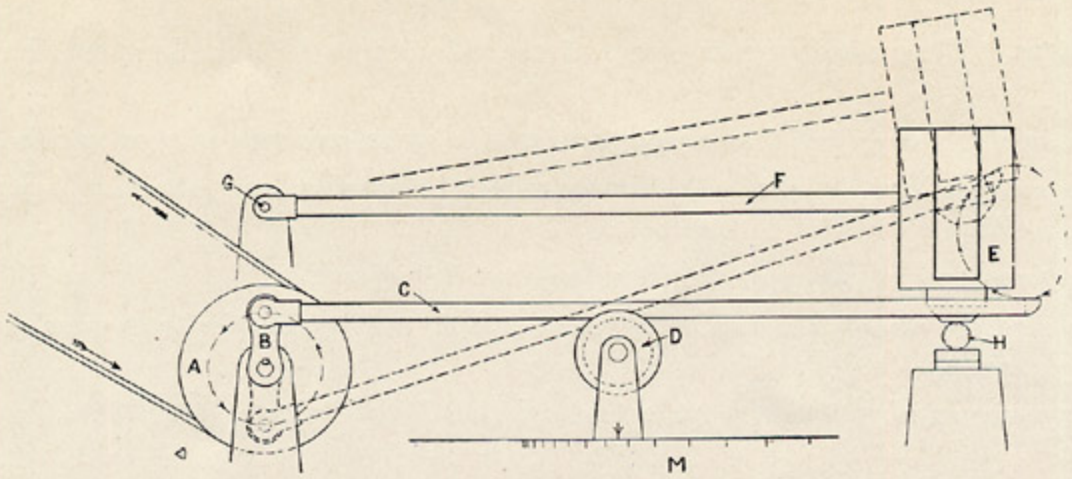

Fig. 2. Diagram shewing hammer and lifting gear.

imparted to the rod at the crank end causes it to rock and slide on the roller. Thus an oval path, shewn dotted in Fig. 2, is traced by the free end of the lifting rod. At this end the rod is bent at right angles so that on the up stroke it engages with and lifts up the hammer head *E*. This hammer head is fixed to the rod *F*, which is hinged at the end *G*. Having reached the top of its path, the lifting rod *C* moves forward, disengages with the hammer, which then falls freely on to the specimen *H* under test.

This cycle is repeated from 70 to 100 times a minute. The height through which the hammer falls can be varied by moving the roller *D* along a scale *M* which is calibrated to read directly the vertical height through which the hammer falls. Adjustment can be made by this means up to a maximum of $3\frac{1}{2}$ inches (90 mm.).

The specimen *H* is usually about $\frac{1}{2}''$ (12 mm.) in diameter, with a groove turned in it at its centre to ensure its fracture at this point in its length. It is supported on knife edges $4\frac{1}{2}''$ (114 mm.) apart, the hammer striking it midway between these knife edges. The knife edges are cut slightly hollow, and a finger spring *K* holds one end of the specimen in place. The other end is held in a chuck which is hinged in such a manner that it does not take any portion of the hammer blow, all of which comes on the knife edges.

The specimen remains stationary whilst the blow is struck, but between the blows it is turned through an angle of 180°. The mechanism for turning the specimen through this angle is shewn in Figs. 1 and 3. The wheel *J* is rotated uniformly by means of a chain drive, making one complete revolution for every two blows of the hammer. This wheel is connected through a spring *S* to the chuck holding the specimen, and whilst the hammer is making the stroke this spring is being compressed, the specimen being prevented from rotating by means of the lever *L*, which is held in contact with the stop *T*. After the blow is struck, the arm *O*, travelling round with the wheel *J*, releases the stop *T* by one of the pins *P* which engages with the projection *R* of the stop.

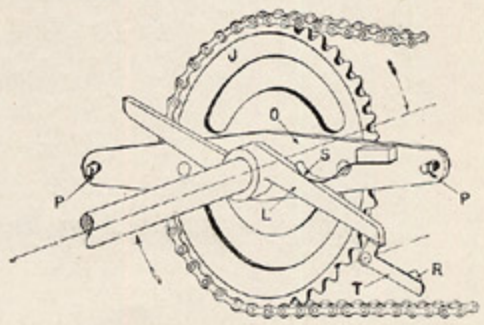

Fig. 3. Mechanism for turning the specimen between the blows.

A revolution counter to register the number of blows struck is fixed to the bed plate of the instrument. When fracture occurs, the specimen falls away, and the hammer head continues to fall, first tripping an electric switch, and finally coming to rest on a steel stop-pin *H*. The electric switch should be connected in the driving motor circuit so that immediately it is tripped the motor will stop.

As already stated a groove should be turned in the centre of the specimen in order to ensure fracture occurring at this point and also to bring the diameter down to an exact standard value. For the purpose of cutting this groove we supply a special tool which can either be used whilst the specimen is in the lathe, or the specimen may be clamped in a vice and the tool turned around it. A small gauge is also included and when this will just fit into the groove the diameter at the bottom of the groove is exactly 0·4″ (10·16 mm.).

Advantages. We mention below some of the advantages of our Repeated Impact Testing Machine :—

(1) *The specimen is subjected to simple and sudden stress reversals of a calculable amount.*

(2) *The machine can be run continuously without requiring any attention beyond occasional oiling.*

(3) *The force and frequency of the blows are readily adjustable.*

(4) *The machine records the number of blows struck, and automatically stops when the specimen breaks.*

(5) *The power required to drive the machine is small, only about* 1/10 *H.P.*

PRICE.

Catalogue No.		£	s.	d.	Code Word
7300	**Repeated Impact Testing Machine, as in Fig. 1. Without driving motor**	**40**	**0**	**0**	*Impacable*
7302	**Repeated Impact Testing Machine, as in Fig. 1. Also including Motor (110 volt D.C.) with necessary Speed Reducing Gear mounted on common base with Two-way Switch and Fuse.** Belts for connecting motor to machine included	**50**	**10**	**0**	*Impallid*
7304	Ditto, but with motor for use on 110 volts A.C. instead of D.C.	**50**	**10**	**0**	*Impanate*

N.B. Motors for other voltages can usually be supplied without extra charge, though they may cause a delay in delivery.

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No. 31. *The Rosenhain Calorimeter.*
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