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THE HOUNSFIELD BALANCED IMPACT MACHINE

BRITISH

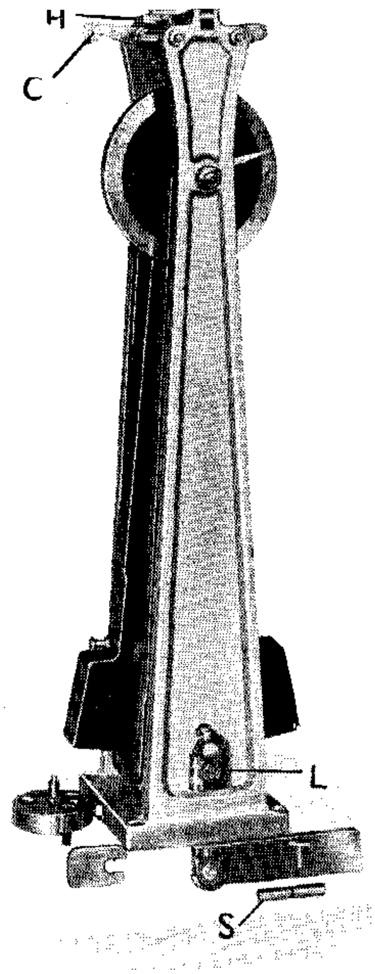

Fig. 41

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THE HOUNSFIELD BALANCED IMPACT MACHINE.

Although the Notched-bar Impact Test and the Brinell Hardness Test are both approximate or rough tests compared with the Tensile Test, nevertheless these two tests are probably used more than any others for commercial purposes for judging the suitability or otherwise of a material for the purpose required.

They have the advantage of being cheap tests and the combined results give a very fair idea of the essential mechanical properties.

While the Brinell Test gives the approximate tensile strength, the Impact Test shows the resistance a material is likely to offer to shock and indicates its ability to withstand stress concentration.

Generally speaking the resistance to shock of a material may be guessed from its ductility—elongation and reduction in area—in the Tensile Test.

However, apart from the fact that there are many exceptions to this rule, in tempering high quality steels to give toughness or ductility, the elongation and reduction in area increase as the tempering temperature increases, but there is considerable lag in the increase of the energy absorbed in breaking the notched-bar test-piece. This lag is very pronounced with alloy steels.

In some cases the impact value differs widely from what might be expected from ductility tests.

Material, used for all the important parts of machinery such as shafts and axles in all transport vehicles, where failure may mean loss of life, is almost invariably subjected to this test, but bolts are very frequently deficient in shock-resisting properties.

The manufacture of bolts involves removing or machining off a large proportion of the raw material as well as screw-cutting; for both these operations free cutting steel is a great advantage, but free cutting steels generally have very low shock-resisting properties; hence if the failure of a bolt is going to be serious, the material must be subjected to the notched-bar test.

In the pendulum-type machines, the initial energy is given by the vertical heights through which the weights fall, and the residual energy, after bending the test-piece, is given by the heights they rise to on the opposite side as indicated by a pointer.

DESCRIPTION.

The Hounsfield Balanced Impact machine is extraordinarily light and compact because, whereas in ordinary impact machines the mass of the anvil and base should, theoretically, be infinitely great compared with that of the moving tup, in this machine the moving weight is equally divided between two tups moving in opposite directions, and the total weight is only 39 lb.

The test-piece S is located at the centre of percussion of these tups, so that there is no reaction at the ball bearings.

The supports for the bearings and the release mechanism are carried in a light aluminium frame F which can be secured to any table or bench with wood screws, thus the necessity for a permanent space and for a concrete foundation are avoided.

The weight at the centre of percussion is 12 lb., and as this point falls through a vertical height of 2 ft., the energy stored is 48 ft. lb., and the relative velocity is 22.7 ft. per sec., which is equivalent to that obtained from a weight falling from a height of 8 ft.

This velocity in conjunction with the short distance between the anvils means that the angular velocity of bending is very high.

Fig. 41 shows the machine locked, with the notching tools and gauge in the foreground while Fig. 42 shows the machine with the test-piece S in position ready for action.

The tups are held up by the catches C and are released by throwing the hammer H over.

When the tups pass one another a non-return pawl mechanism is brought into action which prevents the tups from swinging backwards.

As the indicating pointer P records the difference in movement between the tups the scale K is a very open one over 12 in long.

The padlock L prevents the machine from being used by unauthorized persons who might damage themselves or the machine.

The results obtained from various impact machines are not directly comparable, but results obtained from this machine when multiplied by 2.5 give good Izod Equivalents.

MAKING THE NOTCHED-BAR TEST-PIN.

The lathe chuck Fig. 13, is screwed to a " back-plate " or lathe face plate FP in the usual manner.

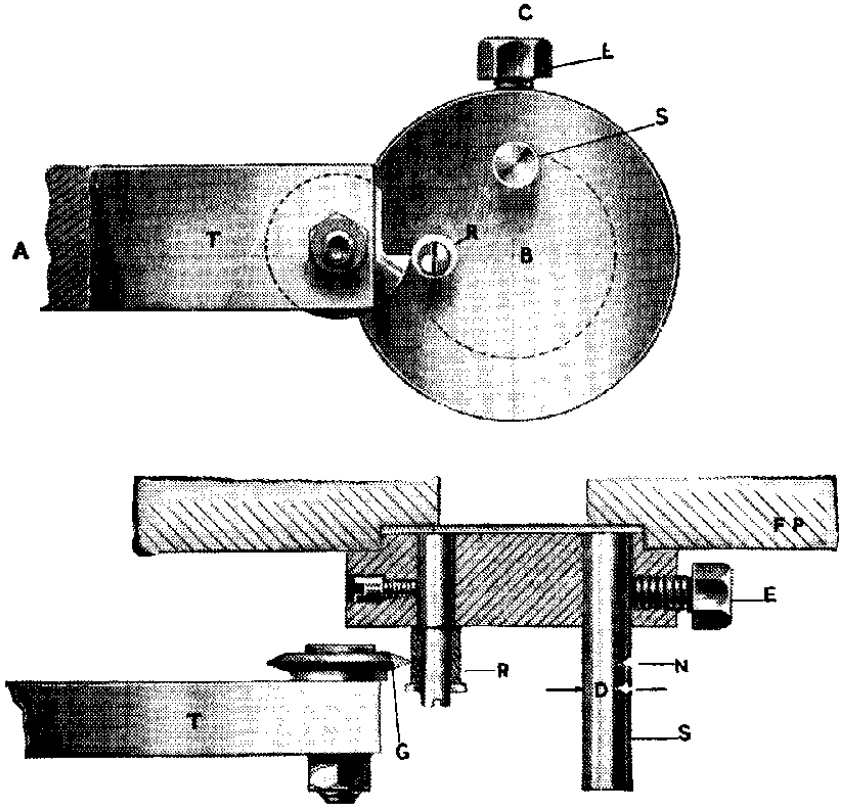

Fig. 13

The material to be tested is turned down to $\frac{5}{16}$ in. diameter for a length of $1\frac{3}{4}$ in. as shown in Fig. 14.

This piece is held in the chuck, as shown at S in Fig. 13, by the screw E. (The plan view is a section through A, B, C.)

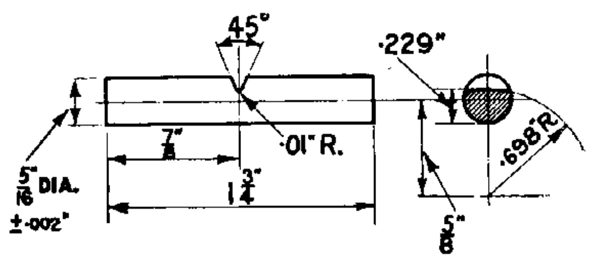

Fig. 14

The grooving tool G is held in the tool bar T so that the face **G** is $\frac{1}{16}$ in. below the bolt centre or $\frac{3}{8}$ in. above the bottom of the tool bar.

This tool bar is reversible to suit larger lathes, and when reversed the face G is set to come $\frac{1}{2}$ in. above the bottom of the tool bar.

The tool bar is then secured to the slide rest so that the cutting face G is level with the lathe centre.

When the notch is nearly deep enough the mandrel should be pulled round by hand till the tip of the tool just touches the roller R.

If the root diameter D is not .229 in. to gauge, the screw locking the eccentric roller-spindle should be loosened and the spindle re-set to give the correct root diameter.

When the cutter requires re-sharpening it must be ground on the face G only, so that the correct shape of the notch is maintained.

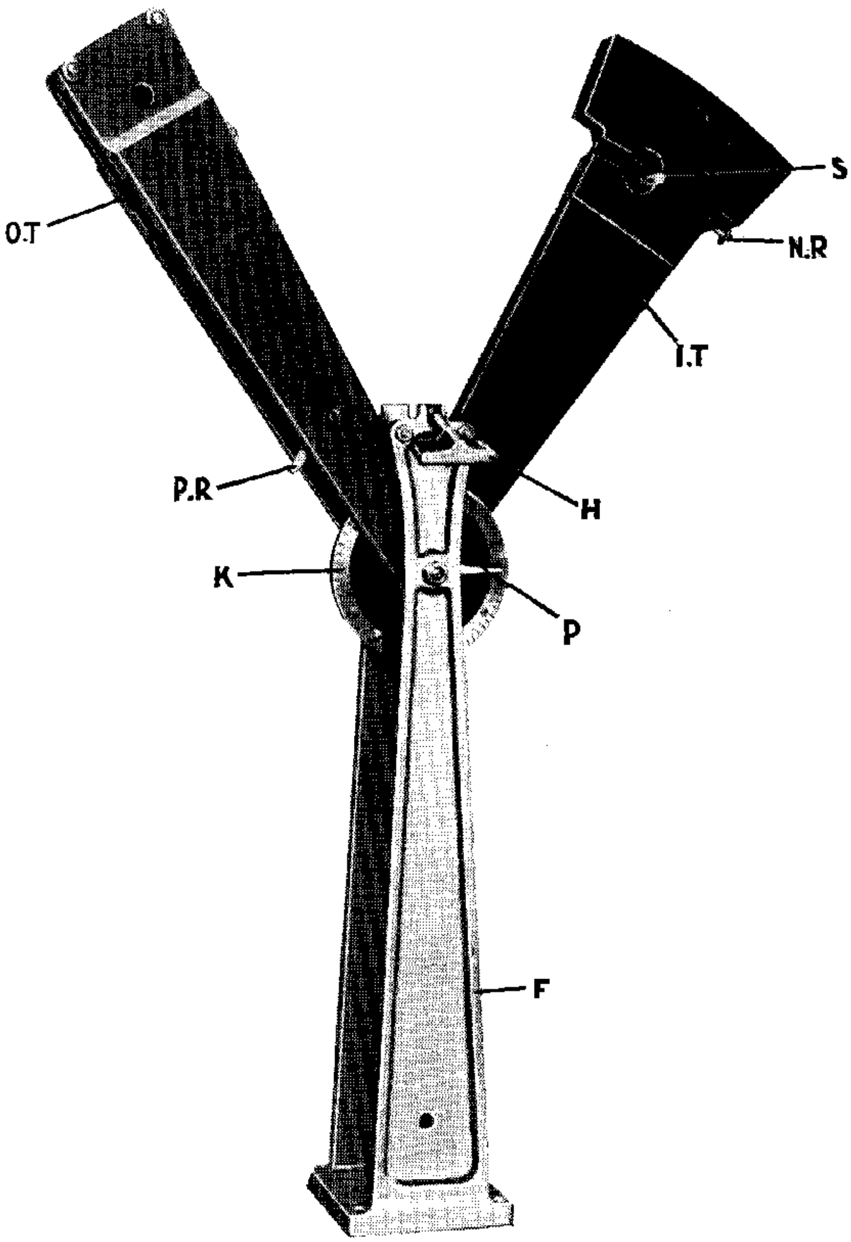

Fig. 42

OPERATION.

Having made the test-piece, raise the pawl release lever PR, move the hammer H out of position and lift the inner tup IT to the right till it is held by the catch C.

Then move the outer tup OT upwards to the left with the *left hand*, keeping the right hand on the inner tup. Always avoid putting a hand in a position where a falling tup might injure it.

Insert the test-piece S in the inner tup by withdrawing the notch register NR and see that the notch register actually engages the V notch.

Throw the hammer over smartly and observe the reading of the pointer P.

To lower the tups move the pawl release lever outwards, raise the tups—with one hand on each tup—to release the pawl, then the tups will come down freely.