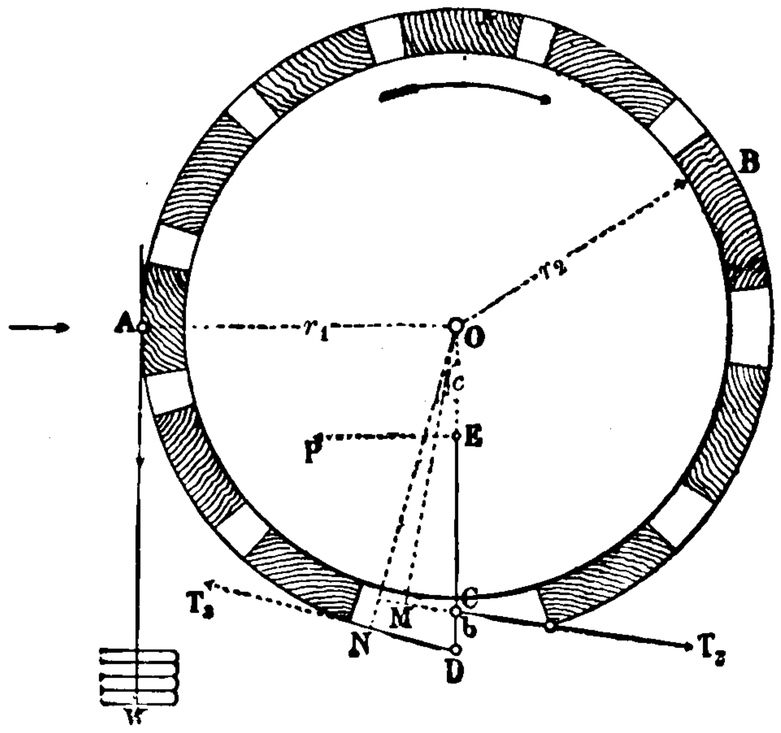
the load to reassume the medial position. If the change in the position of the point of suspension of the load has been due to a temporary cause, this automatic action may restore the balance without further adjustment; but if the departure from the medial position is not small, then the adjustment by the hand-screw must be resorted to. It will be seen that the compensating action cannot come into play except by the rise or fall of the weight from its proper position, and hence the value of the device is confined to its power of limiting that rise and fall.

So long as the Appold brake, like that of the Royal Agricultural Society, is not used for more than 15 H.P., and is sufficiently, but still sparingly, lubricated with tallow or suet, the friction between the wooden blocks and iron wheel is such that the



APPOLD'S COMPENSATION BRAKE, USED BY ROYAL AGRICULTURAL SOCIETY.

weight of the brake-strap and blocks with the suspended load, is sufficient, at the ordinary speeds of the engines tested, to carry the load without screwing up the belt (by adjusting screw as shown in last figure) so that there is more than a few lbs. tension

at the compensating lever, E C D. Under such conditions the lever does not affect results, and adjustment of the frictional grip and position at which the load is carried has to be made by the hand-screw. The conditions are the same as, or very similar to, those which would obtain if the brake were without compensating lever, but with a belt so slack that the bottom blocks barely touch the wheel.*

Let W = load on brake-strap (see foregoing figure);

T_2 T_3 = tensions at two ends, C and D, of strap connected to lower ends of compensating levers;

P = pull on upper end, at E, of these levers;

r_1 r_2 = radii of brake-strap and wheel respectively;

F = total friction of brake-strap.

In the correspondence upon Mr. Beaumont's paper, Professor T. Alexander and Mr. A. W. Thomson considered that the Appold brake gave quite accurate results when it was used properly. Let the lever, E C D, take some definite fixed position, say to the left of the vertical when the engine is working smoothly; in this position the lever may be supposed to be fixed to the ground. The tension of the brake-blocks on the lever, towards the right at C, and left at D, are represented in the figure by T_2 and T_3. On the other hand the reactions of the lever on the brake-blocks are T_2 towards the left at C, and T_3 towards the right at D; then, since there is equilibrium, the sum of the moments round O, the centre, of (1) friction of brake-blocks, (2) weight, W, and (3) the tensions of lever, T_2 and T_3, is zero. Taking the lever now, not as fixed to the ground, but as pivoted at E; then R, the resultant of T_2 and T_3, must pass through E. T_2 and T_3 may now be replaced by R; and the sum of the moments round O, the centre, of (1) friction of brake blocks, (2) weight, W, and (3) the force, R, is zero. Resolving R into vertical and horizontal components, V, and, P, acting at the point, E; then, since E is vertically under O, the line of action of V, passes through O, and its moment is zero; and therefore the sum of the moments round O, the centre, of (1) friction of brake-blocks, (2)

* Extract, with following three figures, from *The Proc. Inst. C.E.*, vol. xcv., session 1888-89, by kind permission of the Council. In Paper by W. W. Beaumont, M.Inst.C.E., on "Friction Brake Dynamometers."