

of a fibrous nature, less friction being observed to take place where motion occurs across than when parallel to the fibres. The power that is lost in overcoming friction, it is well known, re-appears in the form of heat, which, increasing with the increase of friction, becomes not only a test of the value of lubricants, but also of the anti-frictional value of the materials in contact, and, when excessive, is exceedingly prejudicial in destroying bearings, and in firing neighboring combustibles. It is not the intention of the writer to enlarge upon the evils that have resulted from imperfect bearings, and travellers have experienced the sickening sensation caused by the smell of burning oil, arising from hot boxes, and been subjected to detention, and, consequently, danger by the train being stopped between stations. Many, no doubt, have witnessed the futile attempts to remove a ruined bearing, with feelings anything but agreeable. Aside from considerations of safety, which, sometimes, it might appear is not the paramount duty or object with railway companies, the destruction of journals, and, indirectly, sometimes of the train itself, are, frequently, the result of imperfect bearings.

### AXLE FRICTION.

Of the various kinds of friction, I will treat on axle friction as bearing on the subject of this pamphlet, which, in railway locomotion, it is found an element of the greatest consequence to overcome. The great force with which the bearing and journal are pressed together must result in great frictional resistance and consequent waste of power; and, as in transferring the sliding friction between the rim and the rail to the sliding friction of the journal and bearing, the first named friction may be considered a power on the long arm of a lever, whose radius is the length of the wheel, and the sliding friction of the axle may be considered a weight on the short arm, whose length is the radius of the journal; it follows, that the smaller the diameter of the journal, consistent with strength, the greater mechanical advantage of the lever will be obtained. The limited surfaces, therefore, of the journal and bearing, between which friction