

that ought to be done by the cutter. The tendency of filing is to produce irregularity, and when the work is heavy and the speed slow, the use of the file is the height of absurdity and ought not to be permitted by any foreman.

The beautiful glaze produced by a sharp turning tool is as nearly akin to the working surface made on shafts by long running as any new journal can be, and consequently a well turned bearing is much less likely to heat and cause trouble than a filed one. When new shafts heat at the outset, a little time and patience will in general suffice to bring them down to their work, and in all cases it has been found the best practice in this country, to bore the brasses from a sixteenth to an eighth of an inch larger, according to the diameter of the shaft, so that the journals may bottom fairly and not touch the sides at all. When shafts are "side bound" they will invariably heat, because in addition to the peculiar rolling friction of the work there is added the weight of the metal, which in shafts of 15 and 20 tons is an important item. Of course weight is present in any case, but in a well fitted bearing it is dead, and not *wedging weight* so to speak, such as exists in brasses which fit tightly to the sides of shafts. In our best machine shops files are virtually discarded in fitting large brasses to bearings; as in addition to their awkwardness, there is the expense of them to be considered; besides this the peculiar harsh surface they leave is not favourable to a cool bearing. The scraper is substituted with good results, both of time and execution, as when well done the scraped brass is perfectly mirror-like, and is reduced to a working surface in a short time. Shafts may be well turned and properly fitted to their places and yet heat beyond all control; this evil can sometimes be remedied by applying *medicine* to the shaft with the oil, in the shape of black lead sulphur, and in cases of great emergency, common quicksilver; this last substance is most excellent for curing journals that have been cut of the peculiar rough surface they acquire, as it produces a kind of greasy gloss that for a short time covers up the neglect or misfortune of the engineer. Where all other measures fail the brass itself must be taken out and its composition changed; either it is too hard or too soft for the journal. We have known of a chronic hot bearing being cured in this way, after a great deal of time and labour had been expended in keeping it in running order; even to the extent of playing upon it with an inch hose throughout the trip. In the navy all the journal boxes on the new gunboats are hollow and fitted with pipes through which a stream of water passes continually. Some merchant ships are also thus fitted.

It is a curious fact in connection with bearings that they will occasionally defy all the efforts of experience and science to reduce them to obedience after they once heat thoroughly. It is possible that this effect may be traced to a want of proportion between the size and the labour on the shaft; but of two bearings both precisely similar (in fact on the same shaft, we have found that the one which had the most duty to perform behaved the best. This is of course an unusual case, and is merely cited as an example of the previous remarks. When shafts set in brass boxes heat, they merely

cut the shaft or the box, but when Babbitt metal is used, heating causes mischief that can only be repaired by overhauling. One peculiar effect of white metal is to reduce iron journals much more rapidly than brass; where brass boxes are lined with Babbitt metal, as is often the case, the iron journal will be found very much worn down where the white metal comes in contact with it, while the brass shell of the box is but slightly thinner than it was originally. This is owing to the peculiar toughness of the white metal; where journals are run in this substance and well lubricated, they acquire a perfect surface in a short time that very much lessens the friction of an engine or other machine. We have seen large engines "turned over the centre" when the steam gauge did not show a pound of steam; this is not wholly owing as many suppose, to extreme delicacy of workmanship and tightness of the working parts, but to the vacuum produced in the cylinder by the almost infinitesimal portion of vapour admitted to it; and although the steam gauge may not indicate any tension whatever, there is a certain amount in the boiler which is transmitted to the cylinder, or else the machinery could not be moved. This is a little digression from the subject of bearings, but is in a measure connected with it; for while we stated a few lines back that free movement was not entirely dependent on easy bearings, we must admit that a stiffly connected engine will not turn the centres readily; where the resistance amounts to more than the vacuum is able to overcome, of course the engine must stand still.

A great many engineers seem to think that slacking off a hot bearing will cool it, independently of other considerations; this is not always the case. Too much friction is of course a source of derangement, but excessive freedom is also a fruitful cause of hot bearings; this may be accounted for by the theory that the oil is pounded out by the journal in jumping up and down, and it thus comes in contact with the naked metal; the fact remains true whatever be the reason assigned. Good lubricants, care and cleanliness, will generally result in handsome bearings; no one will question that a large amount of power is absorbed by a rough bearing, or one half oiled. Stop up the oil holes, and if the collars have much play back forth, arrange leather shields to cover the space; keep dirt out and oil in, and much better results will be obtained than where carelessness is practiced and filth allowed to accumulate.

MANUFACTURE OF PARAFFINE IN SCOTLAND.

The London *Ironmonger* contains a communication (which we condense) on the manufacture of paraffine, at Bathgate, Scotland, the most extensive of the kind in the world. The works were established by James Young, the patentee of the process for manufacturing oil for commercial purposes from coal, and to whose success we are indebted for the introduction of coal oil, and petroleum—the latter being purified for use by the coal oil process. Bathgate is situated on the field of the celebrated Boghead coal—a rich cannel—and was commenced about twelve years ago, upon a very small scale; but since then it has developed with an immense