PAINTING MACHINE TOOLS.

33. Most machine tools are finished by giving them a coat of paint. The surfaces of the castings are cleaned first in the foundry scratch room, and any remaining dirt or irregularities and unevennesses of joined parts is removed during erection by chipping and filing so far as may be necessary to make a good surface. The shop painter next goes over the surfaces with a filler, which is a kind of thick, heavy paint, very adhesive and quick-drying. It is applied with a putty knife, as it is about as thick as very soft putty or freshly opened white lead. This filler hardens rapidly when exposed to the air. The filled surfaces are then smoothed by wetting and rubbing them with a piece of grindstone or a piece of a broken emery wheel, or by simply rubbing them with coarse sandpaper. When the smoothing has been finished, one or two coats of paint having the desired color are applied. Green paint is preferred by some builders and shop superintendents, as it gives a lighter appearance to the shop than black paint. Green and even lighter paints are much used for machine tools, and if the painted surfaces are covered with a varnish that will resist oils, they are easily kept clean and the general appearance of the shop is thus much improved. Steel-gray metallic paint is a favorite paint with many builders on account of the handsome appearance it gives to the machines.

MACHINISTS' INDICATORS.

THE BATH INDICATOR.

34. The **Bath indicator** is a tool that is especially adapted to lathe work, for if the work is out of true it will indicate the error in thousandths of an inch and fractions thereof. A sectional view of this indicator is shown in Fig. 2. It consists of two parts, which are the adjustable

head *a* that carries the multiplying mechanism, and the shank *b* for holding the indicator in the tool post. The indicator has a removable plug *c*, which can be screwed into

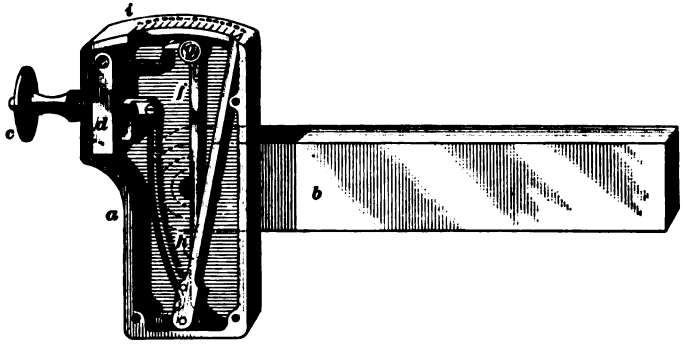

FIG. 2.

either one of two holes that are drilled and tapped into the lever *d*. This lever is fulcrumed at *e*, and has an arm the end of which engages the short arm of the bell-crank *f*

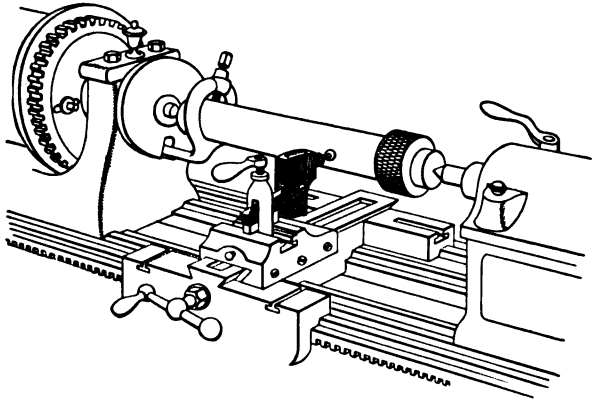

FIG. 3.

that is fulcrumed at *g*. The long arm of the bell-crank *f* engages a pin placed near the fulcrum of the indicating lever *h*, whose end in moving past a graduated scale *i* shows

any movement of the plug c to an enlarged scale. The levers are so proportioned that a movement of $\frac{1}{1000}$ inch of the plug c will cause the end of the lever h to move through an arc that is $\frac{1}{12}$ inch long when the plug is screwed into the hole farthest from the fulcrum c. By screwing the plug into the other hole, the sensitiveness of the indicator is doubled; that is, a movement of the plug of $\frac{1}{1000}$ inch will cause the end h to move through an arc having a length of $\frac{1}{6}$ inch. The manufacturers of this indicator furnish a number of differently shaped plugs to suit individual preferences and to suit various classes of work.

35. Fig. 3 shows how this indicator may be applied to work driven between the centers of a lathe in order to test its truth. The indicator is held in the tool post; the cross-slide is then fed forwards until the plug touches the work. When the latter revolves, the indicating lever shows how much, if any, the work is out of true.

36. In order to adapt this indicator for testing the coincidence of center-punch marks with the axis of rotation of the live spindle, the device shown in Fig. 4 is employed. This consists of a cylindrical piece of steel pointed at one end. The other end is hollow, and has a plug with a center in the end nicely fitted to it. This plug is free to slide axially a small amount, and is acted on by a helical spring. In use, the pointed end of the device is placed into the center-punch mark of the work, and the other end is placed on the tailstock center. The tailstock center is now screwed in sufficiently to slightly compress the spring. Now, if the work is revolved, the device will obviously move in a conical path, if the center-punch mark of the work does not coincide with the axis of revolution, and this movement is indicated if the plug of the indicator is placed against the centering device. As

FIG. 4.

the movement will be greatest at the work, the indicator should be applied to the centering device as near to the work as circumstances will permit.

TEST INDICATOR.

37. The Brown & Sharpe Manufacturing Company make the indicator shown in Fig. 5, which is not only useful in the erection and inspection of machine tools, but also has a wide range of usefulness for general work. It is possible by its use to readily determine the degree of inaccuracy of a plane surface on the top, bottom, or side of a piece of work, or to easily ascertain the amount of end movement, for example, of a spindle, or the extent to which a spindle may run out of true.

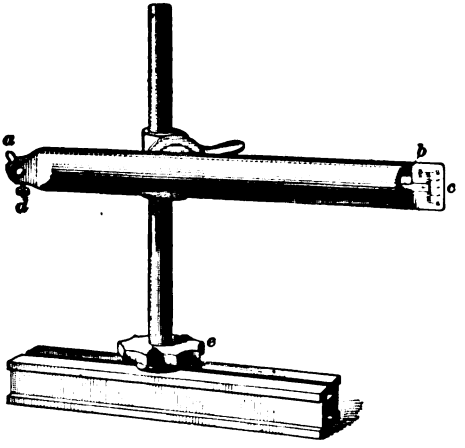

FIG. 5.

The upright post, or stand, may be clamped at any point on the base by the nurled nut *c*. The sleeve that carries the arm may be fastened at any height on the post, or may be turned around the post to bring the arm on either side. The arm turns in the sleeve and may be set at any angle relative to the base, or it may be inverted so that the point *a*, which is brought in contact with the work, will point downwards. The movement of this point is magnified a number of times owing to the fact that the length of the arm *b* of the index finger is much greater than the length of the arm in contact with the work; its movement may be read

GENERAL HINTS ON SHOP PRACTICE.

LUBRICANTS.

INTRODUCTION.

1. A lubricant may serve for either one of two entirely different purposes, and should, consequently, be selected in accordance with the purpose for which it is intended. In practice, a lubricant is used either in order to reduce the friction between two bodies one of which moves on the other, or in order to carry away the heat generated by a cutting operation.

LUBRICANTS FOR REDUCING FRICTION.

2. Selecting a Lubricant.—A lubricant reduces friction by interposing itself in the form of a thin film, which may be considered as being composed of a large number of minute globules, between the rubbing surfaces of the moving bodies. These globules act as rollers or balls, and convert the sliding friction into a rolling friction to an extent depending on their deformation under the load they carry. The deformation of the globules of the lubricant depends on its consistency, and is greater for a thin lubricant than for a heavy and thick one. For this reason a thick oil should be

SHOP AND FOUNDRY PRACTICE

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