

WHAT CONSTITUTES A GOOD LATHE?

BY L. F. LYNE, M.E., in *American Machinist*.

A good lathe should be capable of turning a true circle, of boring a perfectly round and parallel hole, to face off a true plane surface, and all this it should admit of doing in the shortest possible time. It is also expected that a screw-cutting lathe will produce a perfect thread, and not only is it necessary that it fulfil all the foregoing requirements a few times, but that it continues to do so year after year with the least possible adjustment and expenditure for repairs. The writer has frequently heard it remarked in the shop that "any fool can work with tools," and in many cases the observance of this principle on the part of employers and foremen is productive of harm; for while the fool is said to be able to work with tools, and the employers not wishing to employ fools in their shop, the men are obliged to get along as best they can without the tools that are actually needed. I believe in giving good men good tools, and requiring them to be kept in order. In this way a hurried job may be done in less time than it would take to get the tools ready under other circumstances.

The great aim of manufacturers now is to devise machines by which they may be able to utilize unskilled labor. The prejudices of the workmen themselves have been a great drawback to the introduction of improvements. For instance, a man who has always used a hand lathe with heel tools does not like to be set at work on any other. There is a great disposition nowadays, on the part of the men, to exercise brains as little as possible, the extent of their ambition being to get through ten hours a day, and then leave the shop and its associations until the next day. This class of men never rise to positions of honour so long as they entertain these principles. The turning-lathe is required at the present day to do a greater variety of work than ever before, hence the necessity of special lathes, some of which take their names from the particular class of work to which they are adapted.

In this article I have in mind a lathe designed to perform the greatest variety of work, such as is required in shops generally. I am decidedly in favor of a flat bed or shears for the following reasons: They are more firm and less liable to spring, and extended surface is necessary to durability. Some will argue that the large surface gives more friction. Friction is dependent upon weight not upon surface, therefore, the same care given to a V shear the carriage will move on the flat top equally as easy, if not more easily. In England most of the lathes are built with flat top shears, but in the United States it is just the contrary. Why it is so, no one pretends to say; however, "facts are stubborn things, meet them as you will"; and this is a fact—viz., whenever a special lathe is required for heavy work and durability, a flat shear is always adopted as in the case of the best axle lathes. The carriage has a better bearing on the flat shear, hence it will stand a heavier cut, and will work smoothly, whereas, on a V shear, it has a bearing only at or near the ends. The carriage can also be made lighter on the flat shear, and the extended surface will better exclude the dirt than on the V shear. An important advantage in using a flat shear is that the reduction in the thickness of carriage will increase the capacity of the lathe by allowing it to swing larger pieces of work. Let it be understood that "molasses," or oil resembling it both in appearance and action, cannot be used on a flat top shear, or any other, without serious trouble.

An axle lathe with a V shear would not answer, because it would wear hollow where used the most; and why should not this test recommend the adoption of the flat top shear for other lathes? It is by far the easiest to fit up and to keep in order.

The inside edges of the shears should be planed, tapering about one-eighth of an inch to the inch, so that the back head will fit into its place without lost motion, and when it does occur can easily be taken up.

In some cases the manufacturers made a V on the under side of the shear, upon one side with a correspondent shape on the clamp by which the back head is held fast, so that when the bolts are tightened the head will always be drawn up to the same side of the shears, thereby always insuring the alignment of centres. Let it be borne in mind that there are numerous strains on the bed of a lathe when at work, all acting in different directions. The strains upon the centres have a tendency to bend it in the shape of a bow, while the revolving spindle produces a severe torsional strain upon it. The bed therefore should be strong enough to resist strains in all directions, and by the use of the flat top shear the cross braces can be extended nearer the top than is possible with the V shear. The leading screw, as it has been remarked before, should not only be inde-

pendent of the feed, but should be properly supported so as to maintain as nearly as possible, a straight line, as it will be found to make a more perfect thread. There are lathes now built having the screw placed in a trough or cavity directly under the inside edge of the top of the shears. The advantages claimed for this arrangement, in addition to keeping the screw in line, are that it is kept free from dirt, and when cutting a thread the line of strain is brought as nearly in line with the tool post as possible, and near the centre of carriage.

Where the screw is placed down near the bottom of the bed it is inclined to twist the carriage; and to any thoughtful mind this becomes apparent at once. The feed motion should be connected by gears from the spindle to a small shaft running the length of the bed, and by suitable devices to the pinion that works in the rack. The principle is to apply the feed power as near the tool post as possible, thereby avoiding unnecessary friction.

The spindle should be made of steel, with good large bearings, which must each be an exact circle, for they will reproduce their own shape. There must be no end motion, and the lathe must have a proper device for taking it up when it does occur through wear. I am in favor of the extension of the spindle, though the bearing to receive the different change gears for feed and screw-cutting, in this plan does away with the complication of gears under the cone, which are always a source of trouble and accumulation of dirt. The castings can then be made solid under the cone and kept clean. All lathes should have a projection on the casting to prevent the belt from running into the gears, for the writer has seen otherwise good lathes, on which the belt could only be kept out of the gears with the greatest care.

The cone pulleys should be properly proportioned to the back gears, so that the speeds will increase and diminish in exact ratio to each other. The cone should be turned inside and outside, thereby avoiding that thumping sound which exists in some lathes after they had become a little worn, which reminds one of a "country grist mill." The cone should be wide enough to run a good wide belt, large in proportion to the size of the belt, for there is nothing lost by a little excess in this particular. There are very few lathes in which the line centre will run true except in one position, which shows that the proper discretion was not used in boring the hole for the centre. The proper way is to finish the spindle on the outside, then bore and finish the hole for the centre which insures a perfect job. For application of chuck, manner of applying gibs to slide rest, and application of centres, the reader is referred to my previous articles. In the latest improved back head there are eccentric rollers, so placed that when it becomes necessary to raise the head, it may be raised clear of the shears, so that the entire bearing comes up on the rollers: thus it is easily moved, besides avoiding the accustomed wear upon the shears. In place of the ordinary screw for holding the spindle from moving, a split, conical-shaped sleeve is used on the end next to face plate, which is forced into place by a large nut which covers it, and insures a central position for the spindle every time.

I believe in having just enough motion sideways on the back head to allow the alignment of the centres to be rectified, which becomes necessary as the lathe wears, and never drawing the head over in order to turn tapering, for the following reasons, viz., it is impossible to get a perfect bearing on the centres when they are not in line. There are good devices for turning tapering, which are applicable to any lathe at a nominal price, and will soon pay for themselves. This former or taper attachment gives greater capacity to the lathe than the other, as in the cast of very short tapers and irregular forms. The cross-slide of the carriage and slide-rest should fully cover the slides so as to exclude all dirt. All parts should be easily accessible in case of accident or repairs.

ENEMIES OF HUMAN LIFE.—An English paper, *Capital and Labor*, thinks that, while excessive labor, exposure to wet and cold, deprivation of sufficient quantities of necessary and wholesome food, habitual bad lodgings, sloth and intemperance, are all deadly enemies to human life, none of them are so bad as violent and ungoverned passions. Men and women have survived all the former, says the writer, and at last reached an extreme old age, but it may be safely doubted whether a single instance can be found of a man of violent and irascible temper, habitually subject to storms of ungovernable passion, who has arrived at a very advanced period of life. It is, therefore, a matter of the highest importance to every one desirous of preserving "a sound mind in a sound body," to have a special care amid all the vicissitudes and trials of life, to maintain a quiet possession of his own spirit.