AMATEUR FOOT-LATHE.

(See page 348.)

BUILT FOR THE EDITOR OF THE "AMERICAN ARTISAN" BY THE STUDENTS OF THE SIBLEY COLLEGE OF MECHANIC ARTS, FROM THE DESIGN OF PROF. JOHN E. SWEET, DIRECTOR CORNELL UNIVERSITY MACHINE-SHOP, ITHACA, N. Y.

The dimensions and capacity of this lathe are as follows: 4 ft. bed, 10 ins. swing, turns straight and taper, 6 ins. in diameter over slide-rest, and 26 inches long; and three speeds of automatic feed instantly changed in direction; cuts with eleven change wheels, twenty-six different pitch screws, both right and left hand, from four to sixty-four to the inch; turns and bores conical pins and holes, the angle determined in degrees by an accurately graduated circle, turns spheres and hand-wheel rims accurately. The slide-rest is changed and fixed in all positions instantly, and made fast for facing in a most simple and convenient manner.

The slide-rest may be removed and an improved hand-rest substituted by the use of one hand only, and that in the most simple manner. The tool-post is provided with a lever arrangement, by which the tool can be withdrawn three-sixteenths of an inch, and returned to the same place for screw-cutting and other purposes.

The head-stock is provided with a three-lift cone and internal back gear, changed by a single action, a hollow mandrel and graduated face plate. The friction feed is changed quickly and thrown out of gear by the action of throwing the screw cutting in, and *vice-versâ*. The screw is thoroughly protected, is in the best possible position, and works in an open nut three times the usual length.

The slide-rest is gibbed, has more than twice the usual length, is provided with oil-chambers leading to the ways, and a spring bolt for securing the hand and cross slide-rests.

The foot-stock is secured by a single movement of a handle, is offset for turning taper by operating a single screw, and the foot-spindle made fast by a cone. The screw is provided with a safety-guard to prevent wedging when the handle is turned the wrong way, and the oil-reservoir is placed in better position than usual, as it is better protected.

A shelf and rack for tools and change-wheels are arranged under the shelf.

The leg at the foot of the lathe is pivoted to the bed in such a manner that the bed will not be affected by an uneven floor, the driving-wheel bearings are of unusual length, and embraced in a self-contained structure. The disc crank admits of the crank-pin being changed to change the lift of the treadle. The crank-pin is of unusual length, and that and the main bearings have liberal end-play. The slotted connection permits the treadles being raised or stopped up. The rock-shaft of the treadle is pivoted on tempered steel knife-edges, or scale beam-joints, and the power is transmitted to the connecting-rod by the same device. The joints work frictionless, and need no oil. The rock-shaft is set high, so as to give the acting foot of the operator an easy and natural direction; the lever and connection to the crank are so arranged and proportioned as to give *more* than a half revolution of the main wheel during the *down*, and *less* than a half revolution on the *up* stroke, and so as to have the change from down to up take place *slowly*, and from up to down *quickly* —all necessary elements in an easy action for the operator. The treadle is provided with an automatic catch, so that when the lathe is set going fast and the feet removed, the treadle is caught up and remains up until released, which is readily done by placing the foot below and releasing the catch with the ankle.

The lathe is provided with a novel and extremely simple centre-set. In all places where changes need to be frequently made, a fixed handle is provided, and where changes are occasionally necessary, each screw-head or box-nut is made to receive the one single wrench that fits the tool-post screw.

COMMON PASTE.—To a table spoonful of flour add gradually ½ pt. of cold water, and mix till quite smooth. add a pinch of powdered alum, some add a small pinch of powdered rosin, and boil for a few minutes, stirring constantly. The addition of a little brown sugar and a few grains of corrosive sublimate, will preserve it for years.

MACHINE FOR CUTTING OFF HOT IRON.

(See page 348.)

The London *Engineering* of May 14, 1875, contains the illustration of a neat, compact machine for cutting off iron, constructed by Messrs. Richards, London and Kelley, engineers, at Philadelphia. The employment of circular saws for cutting off hot iron bars being old and well-known, reference in these columns will be made only to the machine shown by the engraving, which merits notice from its simplicity and symmetry of design.

It will be proper to state that this firm, although known as wood-machine manufacturers, do a regular engineering business, having made stone-cutting and planing machinery, sugar-cutting machines, and a large variety of special machines for working wood, iron, and other materials Such being the nature of their business, they were not unfrequently called upon to discuss the processes for cutting iron and steel, and in the course of business gave the matter some thought and attention. They were finally induced to build the machine by one of their old customers, Mr. J. A. Durgin, of the Pittsburgh Locomotive Works, who was visiting London last fall, where he saw a variety of machines cutting both iron and steel successfully. Feeling greatly the want of such a machine, he immediately visited the office of Messrs. Richards, London and Kelley, at No. 10 John street, Adelphi, London, where he met Mr. Richards, and requested a machine for the Pittsburgh Locomotive Works; the result of Mr. Durgin's request is now before us as it left the hands of the designer.

The machine shown has one claim which is of considerable importance; there are no sliding surfaces, and no chance of derangement from iron scales or iron dust. The saw-spindle is mounted in a pivoted frame, and as there is no friction or other resistance than the cutting action, an operator will feel the operation of the saw as it is pressed against the iron, a matter of some importance, and necessary to protect the saws from injury, which often occurs when the feed is not sensibly felt. A number of the supporting brackets are fitted on a rod three to four feet long, so long as to be set up in the position shown, or dropped down out of the way as the length of the iron being cut may require. Adjustable gauges for determining the length of the pieces cut are provided on the opposite side of the machine from the one shown in the engraving. The belt coming down from a shaft above becomes slightly tightened as the saw is pressed forward to the iron, and loosened again when the saw returns to the position shown. The purpose of this arrangement is to avoid unnecessary strain upon the saw-spindle when the machine is not in use, and to permit it to run continuously—a matter of convenience when a number of workmen use the same machine, as it saves stopping and starting each time a piece is to be cut.

PLATE-SHEARING MACHINE WITH REVOLVING CUTTERS.

(See page 349.)

Messrs. Shaw, Hossack, & Co., of Openshaw, near Manchester, show at the Cheetham Hill Exhibition, Manchester, their plate shearing machine with revolving cutters, of which we give an engraving above. The machine is provided with an adjustable grooved table and sliding bar, with a stud on the latter, for shearing plates to different radii. A special feature in the machine is that the top cutter shaft is mounted in eccentric bushes, so that by turning these bushes it can be brought nearer the bottom shaft, so as to take up the wear of the cutters. The eccentric bushes are graduated on the edges, so that the two may be turned equally, and the two shafts be thus maintained parallel. The machine will shear plates up to $\frac{3}{16}$ in. thick, and it is altogether of a neat and good design.

WHY THE COMPASS POINTS TO THE NORTH. — There are many wild and vague theories to account for this direction of the needle; but nothing, appears to settles the question so ably as the rotation of electrical currents around the earth, and the consequent declination of the needle, as any one may have perceived who has sat several hours together, and watching the varied movements of the needle around the circuit or under different conditions of current.