

reached. Before setting up new work, whereby, of course, the position of the clamping head and cylinder may have to be relocated, the following mode of operation is adopted: Supposing the cylinder and clamping head are near the centre of machine and are wanted at the extreme end of the machine; then first clamp the clamping head to the bed and by means of the quick traverse push the cylinder back 4 ft.; then clamp the cylinder to the bed, unclamp the clamping head, and run it back 4 feet. Repeat this cycle of operation as many times as necessary. The inner boring-bar can, of course, be withdrawn in one operation. The piping for the different cylinders is at the rear of the machine supported in brackets or rollers where the piping is sliding. There are handles for operating the various valves both on the front and rear sides of the machine.



CINCINNATI HEAVY PATTERN UPRIGHT DRILLS.

The latest upright drill made by the Cincinnati Machine Tool Co. is here shown, this particular machine being fitted with patent geared tapping attachment on spindle with quick return motion, and also with compound table. The tapping attachment, as illustrated, is applied to machines from 24 inches up, and the manufacturers claim that this attachment makes the drills the most efficient on the market for drilling and tapping work, such as generally done on high-priced machines. These drills fitted with this attachment are but little higher in price than a machine fitted with friction clutch pulleys, when the additional belting and line shaft pulleys are taken into consideration. By the use of this attachment drilling and tapping can be done very much quicker than on machines arranged with friction clutch pulleys, or tight and loose pulleys, as the operator has full control to stop, start and reverse the spindle instantly, thereby being enabled to do a greater amount of work owing to the reduced time in making changes of drills, chucks and sockets. By using this attachment either right or left-hand tapping is done equally well, a forward motion of the lever, shown at the left, starts the tap, and after the required depth has been reached, a movement of the lever in the opposite direction reverses the spindle and returns the tap twice as fast as it went forward. The attachment can be disengaged when no tapping is to be done, thus saving all the parts from wear, leaving the machine a Standard Drill, with the advantage of being able to stop the spindle instantly for making changes of chucks, sockets and drills without stopping the machine at the shifter. The success of this attachment has been so satisfactory that over 50 per cent. of all drills made by the company now embody this. The compound table shown in connection with this drill is very heavy and neat in design, so rigid that it is practically impossible to spring it. For jig and tool-room work it is most desirable, as work can be clamped on the table and brought in proper position to be drilled by use of the cross and lateral feeds. By fitting a milling arbor in the drill spindle this style of table allows milling and key seating to be done on work that cannot be done to advantage on a milling machine. The table can be swung round a column, leaving the base plate free for larger work if necessary. These tables are of very ample dimensions, and are furnished on any machines, from 24 inches up. The 21-inch Cincinnati heavy pattern drills are

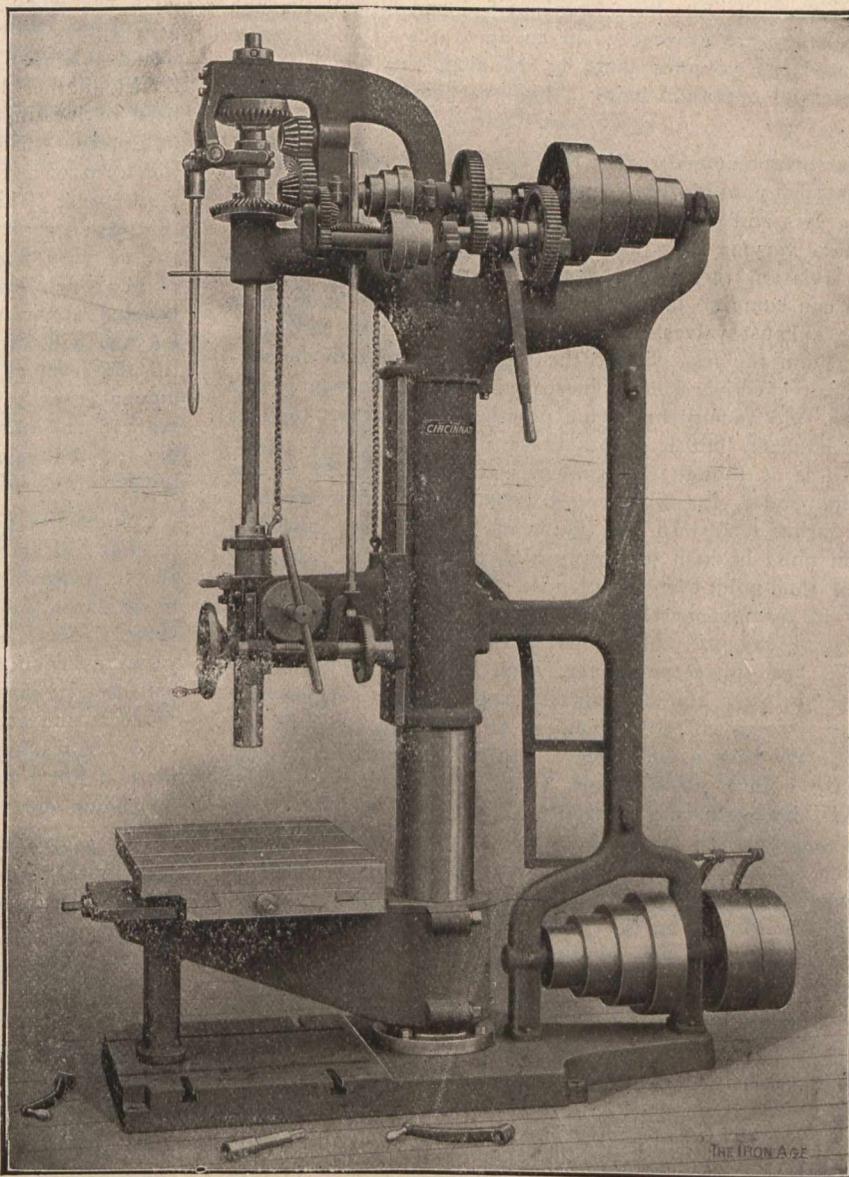
furnished in stationary head design in four styles, plain, wheel and lever, with back gear, with power and automatic stop, or complete with back gear, power feed or automatic stop; and any of these machines can be furnished with their patent geared tapping attachment, round or square tables, as may be desired. The Cincinnati heavy pattern sliding head drills are furnished in the following sizes: 24, 28, 32, 36 and 42-inch, and can all be furnished with the patent geared tapping attachment, compound table, square or round tables, as desired. Any of the machines can be furnished with motor drive, either direct geared or belt driven. The new 1904 catalogue will be mailed on addressing the Cincinnati Machine Tool Co., Spring Grove Avenue and Township Street, Cincinnati, Ohio.



VACUUM PRACTICE AS APPLIED TO LOW TEMPERATURE EVAPORATION.*

BY H. G. SPURRIER, TORONTO JUNCTION.

In all steam power plants of any magnitude, the vacuum pump is one of the necessities of economical power production, and in this connection its operation is well understood. But of late years much of great chemical and



Cincinnati Machine Tool Co.'s Upright Drill.

mechanical import has been developed. Modern industries and developments have demanded the production of materials that were, a few years ago, scarcely more than curiosities. Research has shown that many bodies can be produced of better quality and more cheaply by aid of the low temperature boiling points secured in vacuum apparatus than by any other method. And, as is always the case, the manufacturer has followed close in the wake of the scientist, and

* A paper read before the Canadian Association of Stationary Engineers.