

Lean, E. F. Pullen, C. L. Ramsey. Third Year—C. A. Chilver, C. J. Ingles, J. Parke, F. N. Rutherford.

Mechanical, Electrical Engineering.—Honors.—First Year—W. L. Amos, J. C. Armer, F. Barber, W. C. Blackwood, C. A. Colhoun, R. S. Davis, C. B. Hamilton, A. L. Harkness, C. N. Hookway, A. H. Hull, W. Maclachlan, D. G. McIlwraith, B. W. Marrs, W. K. Sanders, R. L. Sewell, C. L. Vickery, J. N. Wilson, E. M. Wood. Second Year—G. B. Aylesworth, G. G. Bell, W. R. Carson, F. W. Harrison, C. Kribs, C. E. Sisson, W. F. Stubbs, E. D. Tillson, W. E. Turner. Third Year—J. H. Alexander, J. H. Barrett, A. M. Campbell, C. P. McGibbon, A. E. Pickering, M. R. Riddell, R. S. Smart.

Department of Chemistry.—First Year—C. C. Forward.

The Cecil Rhodes scholarship has been awarded to E. R. Paterson, B.A., son of J. A. Paterson, K.C., Toronto.



### FIFTY-THREE INCH VERTICAL BORING AND TURNING MILL.

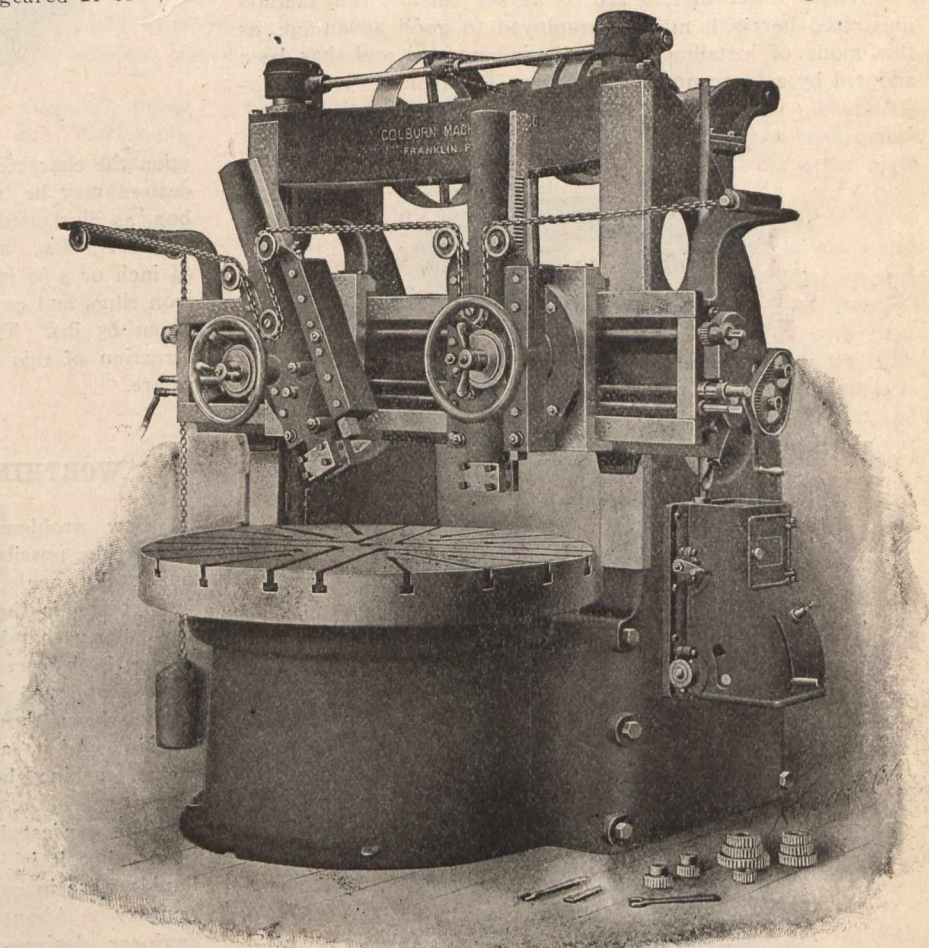
The following is a description of a 53-in. vertical boring and turning mill placed on the market by the Colburn Machine Tool Co., of Franklin, Pa.: The capacity is full 53 inches in diameter, and will take 46 inches in height under the cross rail. The table is 50 inches in diameter, geared 21 to 1, and 105 to 1 with back gears in, and has 20 changes of speed. It is of massive construction and ample provision is made for securing any description of work, is driven by steel pinion on to cast iron spur gear with 105 teeth  $2\frac{1}{2}$  diametral pitch, and powerfully geared from high-speed drive. The table speeds are correctly graded in geometrical progression. The spindle is of cast iron with large angular babbitted bearing at the top and straight vertical bearing in the centre. Bearings running at high speed, or subjected to heavy wear, are bushed with bronze. The heads are entirely independent in their movements, both as to direction and amount of feed, can be set to any angle and carry tool bars that have a movement of 25 inches. Either head can be brought to the centre for boring, and centre stop determines its correct position. The cross rail is 7 feet long, extra heavy, and is raised and lowered by power. The feeds, both vertical and horizontal, are duplicated on the right and left hand side of machine, are positive, have 10 changes ranging from 1-32 to  $\frac{3}{4}$  of an inch horizontally, and from 1-64 to  $\frac{3}{8}$  of an inch in vertical and angular directions, and are in correct geometrical progression. The screw cutting attachment, when ordered, is furnished for right hand side unless otherwise specified; but can be fitted to either side as required. It is arranged to cut from 4 to 13 threads per inch, including  $11\frac{1}{2}$  for pipe thread. All feed and change gears are clearly indicated on an index plate in plain view, and are readily adjusted for the required changes. The lubrication of machine has received careful attention, and proper provision for convenient and ample oiling of all sliding surfaces and running bearings has been provided. Belt drive: When machine is supplied as regularly equipped with belt drive, it has five step cone for 3-inch belt. The full range of speeds are obtained by shipping countershaft speed between each successive step of cone, giving ten changes, which number is doubled by throwing in back gears, avoiding the confusion and complication embodied in some makes now on the market, and subsequent neglect in taking advantage of the full range in grade of speeds and feeds. The floor space outside of all projections is 9 feet

5 inches by 7 feet 6 inches. The height from floor to centre of cone pulley is 94 inches. Diameter of large step 20 inches. Diameter of plain pulley 24 inches. Extreme height 8 feet 10 inches. The cone pulleys do not overhang but are placed between the housings, and the shafts on which they run are supported on both ends. Two countershafts are regularly furnished, one mounted on the housings of the machine, carrying the upper five-step cone pulley and one 24-inch pulley for 4-inch belt. The other countershaft has double tight and loose pulleys, 20 inches in diameter, for two open 4-inch belts; also one 24-inch driving pulley for 4-inch belt. The speeds of this countershaft should be 425 and 499 revolutions per minute. The net weight of 53-inch mill is about 17,000 pounds.



### WATER SOFTENING.

"Worth Knowing" is the title of a book issued by the Keystone Chemical Manufacturing Co., of Camden, N.J., setting forth the claims of Keystone tri-sodium phosphate. This Keystone tri-sodium phosphate ( $\text{Na}_3\text{PO}_4$ ) is a white crystalline substance resembling table salt, is very soluble in water, non-corrosive in action, and, being non-volatile, will not vaporize and pass off with the steam. This makes it particularly valuable in establishments where the goods manu-



Fifty-three Inch Vertical Boring and Turning Mill.

factured are of such a delicate nature as to be affected by coming in contact with the steam, as in lard refineries, breweries, ice manufacturing plants, etc. It is the only commercial chemical that will, with or without heat, immediately change the hardenable carbonates of lime, magnesia and other incrusting minerals into unhardenable phosphates, and neutralize the carbonic and sulphuric acid released by decomposition, producing a clear, soft, harmless water. From the fact that water hardness and boiler incrustation result from the presence of these minerals, the great value of this chemical is seen. The boiler compounds that are composed mainly of tannic acid and caustic soda, mixed in different proportions, are replaced with a scientific chemical containing neither of these ingredients, and one having a positive action that is both chemically and mechanically correct.