

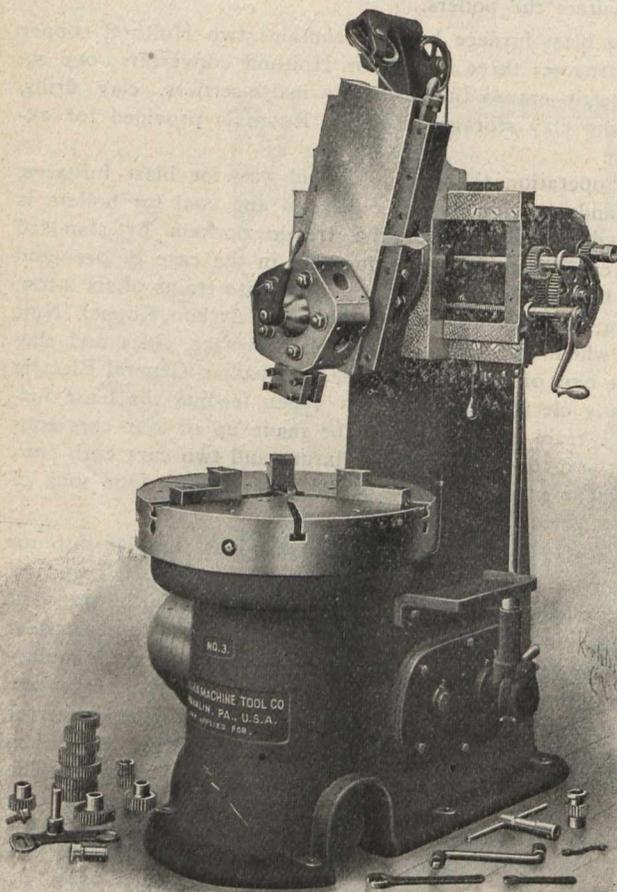
Both ends of the furnace are made alike, so that either end can be used for removing matte and slag. There is no brick work under the deck beams. The converters are 84 in. by 126 in. and are tilted by a train of gears and a worm, driven by the electric motor.

The water for the plant is supplied by a 16-in. diameter pipe running from a dam situated about 5,000 feet from the plant itself. The water is run by gravity into the jackets, and when drawn out is pumped into a tank above the smelting plant for fire purposes or into the reservoir, which is near the foot of the plant, and the hot water is also used in the boilers in order to economize at that point.—Correspondence, Engineering and Mines Journal.



VERTICAL BORING AND TURNING MILL.

Vertical boring and turning mills have rapidly come into use in many large as well as small machine shops throughout the country during the past few years, and their value as manufacturing tools is daily being more fully demonstrated. Their function is not so much to replace the lathe, but rather to do a variety of work such as chucking, boring and turning, etc., which can be performed more rapidly, economically and easier than on any other type of machine. The facility with which work can be placed on the table of a mill and held until ready for chucking and center-



ing is in itself of no inconsiderable importance in shop economy, where increased production is a factor which receives careful attention. This condition prevails more generally to-day than ever before and in the struggle for supremacy may determine the success or failure of a shop. The accompanying cut shows a 34-inch Vertical Boring and Turning Mill, built by the Colburn Machine Tool Company, Franklin, Pa.

It has a capacity of 34 inches in diameter and will take work under the cross-rail 14 inches high. It has 16 changes of speed varying from $2\frac{3}{8}$ to $68\frac{3}{4}$ revolutions per minute. This affords as great range as is necessary for any work which would ordinarily be done on this size tool. The feeds, both vertical and horizontal, are positive, gear driven, and are provided with adjustable automatic stops. There are

eight available changes of feed for each speed of the table. Feeds range from .012 to .125 of an inch in vertical or angular directions and from .025 to .250 of an inch in horizontal direction. The makers of this mill are prepared to furnish either three or four jaw chuck, or plain table, as the user may elect. The driving cone shaft is placed parallel with the cross-rail so that the machine may be located under a travelling crane and belted back to the countershaft, leaving a free space overhead for crane service. The ratio of back gearing is 21 to 1, and the 16 changes of speed are graded in perfect geometrical progression. The vertical slide has a travel of 18 inches, either by hand or power and is carried in a swivel saddle attached to the turret slide by a central stud. The saddle is clamped to the cross slide by four bolts working in a circular T slot. When the power feed is used an adjustable automatic stop regulates the length of travel as desired. An excellent feature of this tool is the graduated scale 18 inches long, which is attached to the turret slide cap parallel with the turret slide. The latter has an adjustable pointer which moves over the scale indicating at all times the travel of turret slide. The counterbalance weight is suspended within the column and is carried in such manner as to do away entirely with awkward overhanging arms, as frequently employed. The turret can be swiveled to any angle up to 30 degrees either side of the perpendicular, has a travel of $15\frac{1}{2}$ -in. by hand or power, and is equipped with stops for tripping feed. The turret is five-sided and holes are bored to fit tool shanks $2\frac{1}{4}$ -in. in diameter. The lock bolt is of hardened tool steel, ground perfectly true. It works in a hardened tool steel ring also accurately ground. A micrometer dial is furnished, which is a great convenience, providing a fine adjustment for depth of cut. The thread cutting attachment may be quickly applied and remain permanently attached to the machine without interfering with its regular operation. In addition to this 34-in. mill, the Colburn Machine Tool Co. built several sizes up to 6 ft. swing.



FATHER OF A GREAT INDUSTRY.

Joseph Dixon, founder of the Joseph Dixon Crucible Co., was a native-born Yankee, first seeing the light of day at Marblehead, Mass., in the last year of the eighteenth century. He was a genius whose ability was almost equalled by his extraordinary versatility. In almost all his many occupations he was a pioneer and inventor, and the strength and power of his features discloses the rugged strength of this man who so often had the courage and ingenuity to depart from old and accepted ways of doing things. One after another he took up new interests applying to each his mechanical genius. In every instance he made himself felt and



JOSEPH DIXON.

marked his progress with many new and valuable additions to knowledge and methods. "Before he was twenty-one he invented a machine to cut files; afterwards he learned the printer's trade, then wood engraving, then lithography, and became a thorough chemist, optician, and photographer. He was probably the first to take a portrait by the camera; he