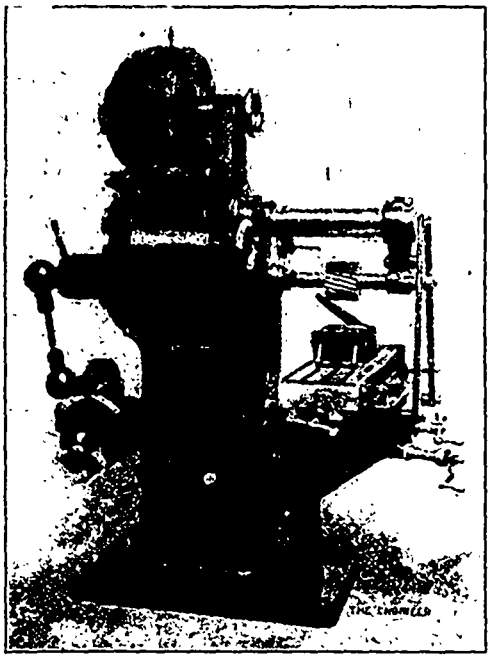

Fig. 3.—Milling Machine driven by a C-W Motor Controlled by the MV System.

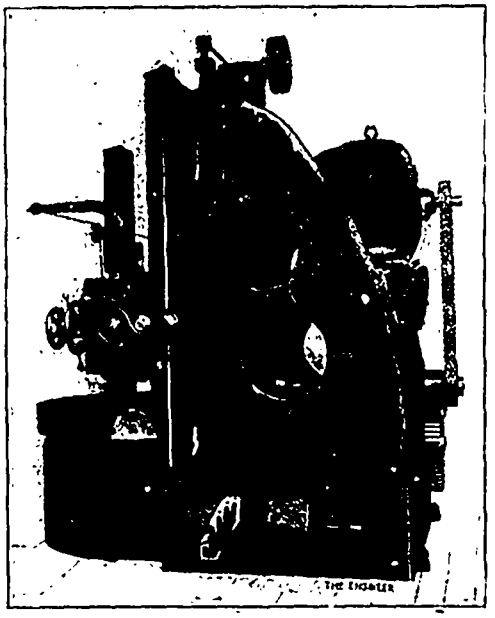

Fig. 4.—51-inch Boring Mill Driven by a C-W Form I Motor with MV System.

commendation, the greatest benefit being derived from the elasticity which is obtained only by the adoption of this method. With individually driven tools there is no longer any necessity for the rigidity of arrangement which obtains with shafting and belting, so that if it becomes necessary to re-arrange the plant at any time, the expense is reduced to a minimum.

The valuable light which possibly the building has been constructed especially to provide can only be maintained by avoiding the adoption of any equipment requiring overhead construction which must necessarily prove an obstruction in this regard.

A study of the evolution of the introduction of electricity into industrial plants, first for lights, second for cranes and elevators, third for constant speed motors for group drive, and lastly, variable speed motors individually connected to the tools, indicates clearly that the group method can hardly be compared with individual drive so far as advantages are concerned, or it would not have been necessary for manufacturers to spend their energies in developing the ingenious applications of individually motor driven tool equipments which have been offered to the market during, we may say, the past year.

While the driving of groups of tools by means of constant speed belted motors permits of the elimination of very heavy belting and long line shafts, and in this regard is an advance towards the ultimate end—electric drive of individual machines—it does not and cannot offer that which is by far the most important feature of electric driving, i.e., the possibility of placing speed control of the driven tool at the immediate will of the operator.

With these preliminary remarks as to general problems governing questions which have to be determined before a purchaser can properly select the electric system which is best suited for his own particular plant, we will pass now to a description of a particular system of electric drive which offers certain positive advantages due to its methods of variable speed control. The system which we will describe is that offered by the Crocker-Wheeler Co., of Ampere, N.J., and the information given below will be particularly valuable to any one interested when making a comparison between the method of individually driving tools and that of operating them in groups.

The ordinary belt driven tool usually has a speed range obtained by mechanical means, of from 20 : 1 to 50 : 1 with increased speed steps of about 30 to 50 per cent. The Crocker-Wheeler system for the multiple voltage operation of machine shops not only extends the speed range but also reduces the speed increment per step to about 10 per cent., which has been found by experience to be as small an amount as would be desirable to use. This system is a method of electric power distribution at different voltages which enables standard motors to be operated by changing the potential of the current at their terminals. The generating plant supplies the highest voltage of the system. This voltage may be termed the primary and is divided by a three unit balancing transformer into three unvarying voltages of unequal value which are maintained between the wires of a four-wire circuit, various connections of which offer six different and distinct voltages.

The principle on which this system of speed control is based is that in a separately excited shunt motor the speed of the armature is proportional to the voltage supplied to the terminals. If this voltage remains constant the speed will remain constant even with varying loads.

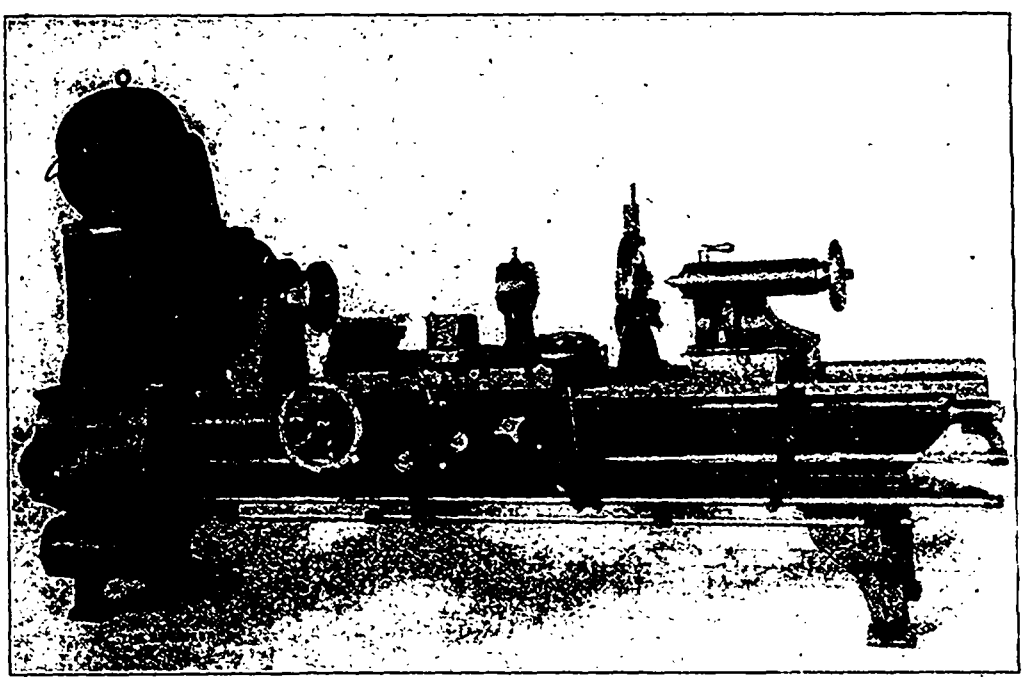

Fig. 5.—24-inch Screw-cutting Lathe driven by a C-W Form I Motor with MV Control.