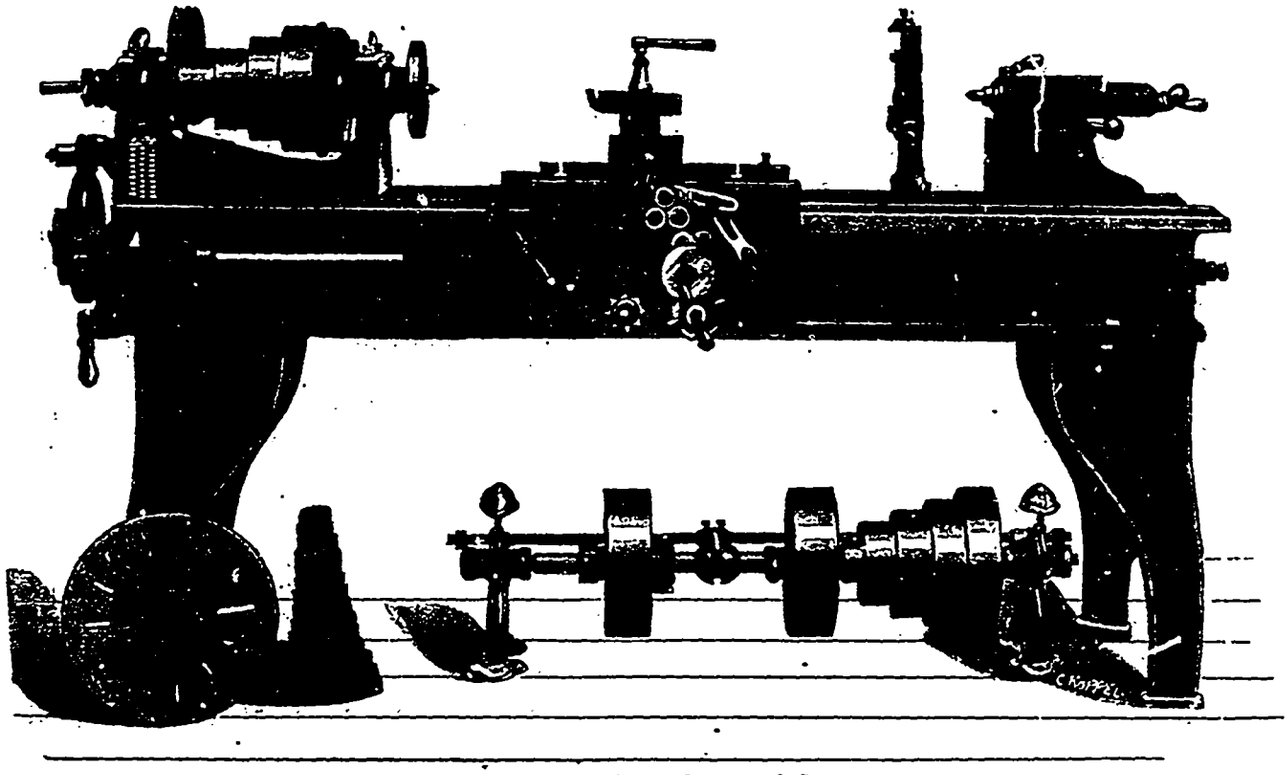
a comprehensive view of the situation, and study the new conditions that must be met to make the iron trade a success in all its branches in Canada. They have put their hands to the plough, and cannot well turn back.

PATENT TAPE ATTACHMENT.

A NEW LATHE.

THE combination of adjustable grooved bars with a slide connected with the tool rest, which has hitherto been in use for lathes, is open to the objection not only that it is apt to cause an excessive amount of wear of the screw and saddle guideways, but that, owing to the centres being put out of true line, it produces a jerky action of the tool, and, consequently, uneven work. A lathe, however, has been patented by D. Currie, and is being manufactured by R. Gardner & Son, Montreal, in which, it is believed, these faults are obviated by the addition of a taper attachment. Instead of the bevel gear to connect the longitudinal and cross-feed screws in ordinary use, means are substituted of transmitting the motion automatically, the cross-feed screw varying independently of the former one. In order to attain this end a worm is attached to a bracket fastened to the apron of the lathe ; and this drives another wheel with a corresponding number of teeth. The worm wheel is held in place by a sleeve running in a bearing, and on this sleeve are put the change gears. A quadrant is placed on the same bearing in order to carry away intermediate gearing, which is so arranged as to gear into cross-screw gear. The possession of a reverse feed renders it possible for the tool rest to travel in either direction. The intergears are fastened with a slide in the quadrant, so that when the lathe is displaced, the slide can be moved up to allow for larger gear. It will be seen from the above description that any slight deviation from accuracy in its centres, which is the point on which ordinary machines are almost sure to become weak, is, by this improved method of manufacture, automatically compensated for at once.



NEW LATHE, BY ROBT. GARDNER & SON.

Full particulars may be obtained of Robert Gardner & Son, Nazareth street, Montreal, the well known manufacturers of high class machinists' tools, etc.

HOW TO CHOOSE AN ENGINE.

The first thing for a prospective purchaser of an engine to determine, says W. H. Wakeman in the *Manufacturers' Gazette*, is the amount of power that he will require. Let us suppose, for example, the case of a small factory requiring 82 horse-power to run merely the engine itself and the shafting. It is safe to calculate that 30 per cent. of the whole power used will be needed to overcome friction, and therefore the 82 horse-power represents 70 per cent. of the power needed. Thus, as 82 is 70 per cent. of the amount required, $82 \times 100 \div 70 = 117$. That is, the amount of power to be provided is 117 horse-power. If the conditions are such that it will be most convenient to have the fly-wheel revolve 60 times per minute, it will be well to have a long-stroke engine, so that if the stroke is four feet, the piston speed will be 480 feet. In calculating the power of an engine, three factors come under consideration, viz., the area of piston, the mean effective pressure of the steam acting on this piston, and the piston feed in feet per minute. Our 117 horse-power (previously determined) represents 3,859,200 foot pounds, and if we wish to get from this the factors above mentioned, it is easily done by deciding on one of them and deciding the others by division. We wish to have a piston speed of say 480 feet per minute; therefore $3,859,200 \div 480 = 8,040$. If the boiler pressure is to be 100 pounds, forty per cent. of this 40 pounds mean effective pressure will be about the amount, and $8,040 \div 40 = 201$, which is the number of square inches that the face of the piston should contain. A reference to any table of the diameter and