AN IMPROVED UNIVERSAL MILLING MACHINE.

The machine shown in the accompanying illustration is not only of most excellent workmanship itself in all its details, but it is capable of being used for such a wide variety of work that all machinists familiar with its capabilities appreciate the justness of styling it a "universal" miller. It does the work of the planer or shaper, turns, bores, and drills, flutes taps and reamers, and cuts gears and spirals—doing everything with entire accuracy and generally in less time than it could otherwise be done, while it requires but the minimum of personal supervision, when once started on a job. The machine is largely used in the establishments of machine tool builders, technical schools, government arsenals, gun and testing machine works, fine jewelry factories, and tool rooms of almost every description, and it is not asserting too much to claim that it is largely due to the use of such machines that American machinery and tools now occupy so high a position in comparison with those employed in any other part of the world.

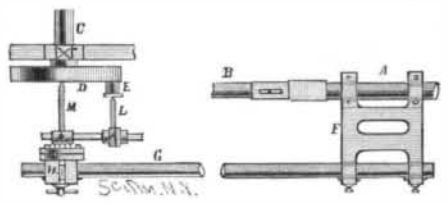
The distinctive features of the machine were first patented by Joseph R. Brown, in 1865, and it has since been widely copied, in its details and in its entirety, by numerous imitators. It has all the movements of a plain machine, while the table is fed automatically at an angle to the axis of the spindle, and the spiral head is so made and connected with the feed screw that a positive rotary movement may be given to the work. The wear of the main spindle is taken up by longitudinal movement, and the end thrust is taken by a collar. The cone has four steps for a three-inch belt. The knee can be moved vertically fifteen inches, and the saddle holding the spiral bed can be moved six inches in a direction parallel with the axis of the main spindle. The table is twenty-eight inches long and five inches wide, and has an automatic feed of seventeen inches. A series of graduations shows in degrees the angle to the axis of the spindle at which the table is fed, and index dials show the vertical and horizontal movements of the knee in thousandths of an inch. The spiral head has indexing mechanism by which the periphery of a piece of work may be divided into equal parts; and the velocity of the rotary movement of its spindle, or of the work, relative to the speed of the feed screw, is regulated by change gears at the end of the bed. The front end of the spindle is threaded to receive a chuck. A piece eight inches in diameter and fourteen inches in length can be swung between the spiral head and the foot stock. The frame is hollow, and fitted as a closet to hold the small parts that accompany the machine. The countershaft is usually run at about 110 turns per minute. The total weight of the machine is about 1,800 pounds, and the floor space required, measured over the extreme projections and points of travel of the various parts, is 55 by 50 inches. The machine is also made with an overhanging arm to support the outer end of the arbor carrying the cutter.

A New Dye from Seaweed.

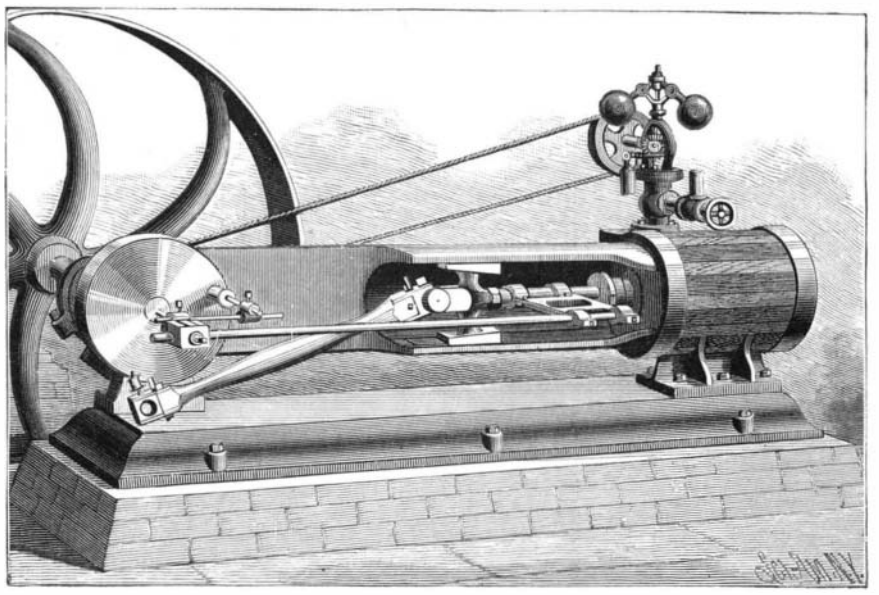
Formerly iodine, bromine, magnesia, and potash salts were the chief products of seaweed, which was also used, when more or less decomposed, as manure on land adjoining the sea coast (it yields upward of 2 per cent of ammonia). Some varieties were collected as articles of food in Scotland, Ireland, and Norway, etc. (the species of the genus *Ulva*), and the large species of *Laminaria*, especially *L. saccharina*, can be made to yield mannite. Of late years seaweed has been made into charcoal, and into a material for whip handles, and still more recently the curious substance algin has been produced from it, and is already in use as a stratum for photographic films, and for other purposes. From the substance algin, just mentioned, an acid called alginic acid has been produced, and by acting upon the latter with nitric acid a new light-colored dye, which is insoluble in water, but dissolves in alkalies, yielding a brown solution, has quite recently been discovered. The ammoniacal solution of this new product dyes cotton a fine Bismarck brown, which is not removed by soap, and is said to be not only equal to aniline dyes of the same description, but to excel many of them. A curious feature of this new product is that, contrary to what is observed with aniline dyes, it will dye cotton but not wool, and that its acid solutions will not act as dyes at all.

AN INSTRUMENT TO TEST ENGINE CRANK SHAFTS.

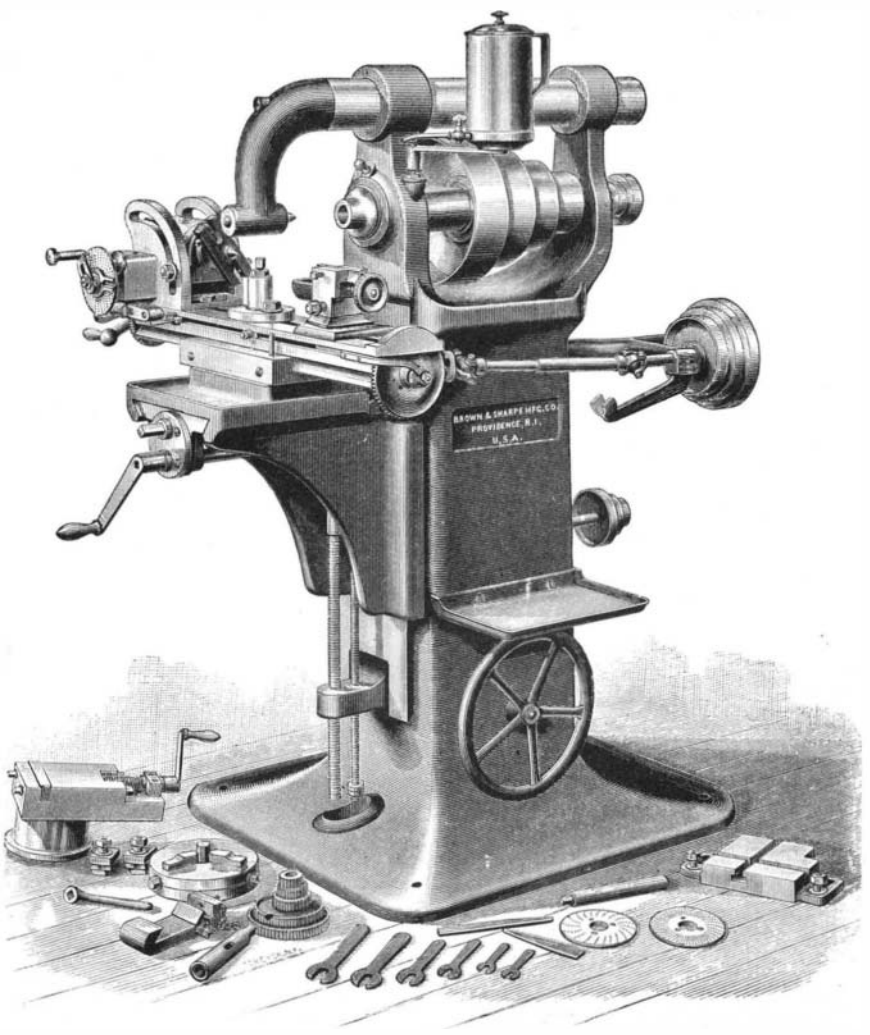
A means of testing and adjusting the crank shafts of engines forms the subject of a patent issued to Mr. John Paterson, of No. 56 John Street, Victoria, B. C., and is illustrated herewith, the small figure showing a plan view of the device. A small frame, F, preferably



of brass, is connected with the working part of the piston rod, A, B being the connecting rod and C the crank shaft, the crank, having been released from the crank pin, E, on the crank disk. A rod, bar, or tube, G, is adjustably fitted in the other end of the frame, F, to lie in the same horizontal plane as the piston rod, and carries a sliding adjustable head, H, fitted on the top with a small level. In this head rotates a hub carrying a radial arm having an adjustable pointer, L, while a pointer, M, is also fitted in the end of the hub. If the outside of the crank-pin is flat, or has been bruised, a small hole is drilled in the center. The frame being connected with the piston rod, the head, H, is set perfectly level, by means of the level in its top, and the pointer, M, centered on the crank shaft, which is then turned around to adjust the pointer, L, to the center of the crank-pin. This pin is then gauged at the outward and inward centers of the crank thereon, by which it will be perceived whether the shaft is rectangular with the line of the cylinder, and, by turning the crank-pin to the top and then to the bottom, following with the pointer, it will be shown whether the shaft is level or not, saving the labor and time ordinarily required to take out the piston, center the cylinder, and apply a line and level.



PATERSON'S STEAM ENGINE CRANK SHAFT TESTER.



BROWN & SHARPE'S NO. 1 UNIVERSAL MILLING MACHINE.

Recent Telephonic Investigations.

Electricians have so often had their preconceived ideas rudely shaken by the results of rigid experiment that the time for dogged persistence in past errors has almost passed, and new truths are assimilated with ease. Among such cherished ideas is the alleged infinitesimal strength of the ordinary telephonic current, a conception arising, no doubt, from the alternating nature of the telephonic current and the difficulty of constructing suitable instruments for its measurement. In referring to this subject in a lecture before the Boston Society of Arts, on work done at the Massachusetts Institute of Technology, Prof. Ch. R. Cross drew attention to the faulty construction of instruments intended for such investigations. Such instruments failed largely through the use of metal in close inductive proximity to the coil carrying the telephonic current to be measured, which gave rise to induced currents that weakened the original. Having removed this source of error by the construction of a galvanometer without metal, Prof. Cross finds that the average telephone current is far greater than is popularly supposed. The average current strength was not far from 0·5 of a milli-ampere, while an Edison lamp takes one-half ampere, or only 1,000 times as much; and in the loud-speaking telephone it was 20 milli-amperes—an amount sufficient to give one a good shock. Lastly, it was found possible to transmit speech distinctly by a current which could not be detected by the most sensitive instruments. These currents, from 0·5 to 20 milli-amperes, were produced by speaking or sounding a loud note from an organ pipe into the transmitter. These results were also confirmed by experiments on actual working lines. Much more interesting, however, were the experiments on the New York long-distance line for the purpose of estimating the losses. For this work granulated carbon Hunning transmitters were used. In talking to New York practically all the current passing into the line traversed the instrument and was measured. The operator in New York then talked over the line, and the current, less the loss, was found to be 0·01 to 0·02 milli-ampere, while when entering the instrument before passing over the line it was 10 to 20 milli-amperes, giving a loss of over 99 per cent. The actual working current was, therefore, exceeding small—in fact, absolutely much smaller than on the city lines. There should have been no unusual losses, as the day was perfectly clear. That the service over the long-distance lines should be so good is evidently due to the use of a metallic circuit of low resistance and retardation, and the sounds were clearer and more easily understood than on the city lines. The value of the current as determined by the material and shape of electrodes was also studied, and carbon, platinum, iron, and copper employed in various combinations. Carbon with carbon gave a large range of variation, platinum on platinum a greater range, which fell off suddenly. With iron the curve was low. In altering the electrodes a curious point was noticed, for it makes considerable difference which is the anvil electrode. It was found that the anvil is the governing electrode, for, with carbon as the anvil, the curve is like that of carbon for both, although the other may be of iron.—*Electrical World.*

Quick Repairing.

The steamship Monkseaton, of Newcastle, which lost three blades of her propeller when on a voyage from Liverpool to New York, was placed on the pontoon dock belonging to the Wallsend Pontoon Company, Limited, with 2,000 tons of cargo on board, and her stern raised out of the water sufficiently high to allow the broken propeller to be unshipped and a new one fitted in its place. The operation of tipping the vessel took one and a half hours, and the whole time occupied in raising her and changing the propellers was only twenty-three hours. The Monkseaton is a vessel of 2,900 tons gross tonnage, and the saving of time and money secured by her not having to discharge her cargo must have been very considerable.