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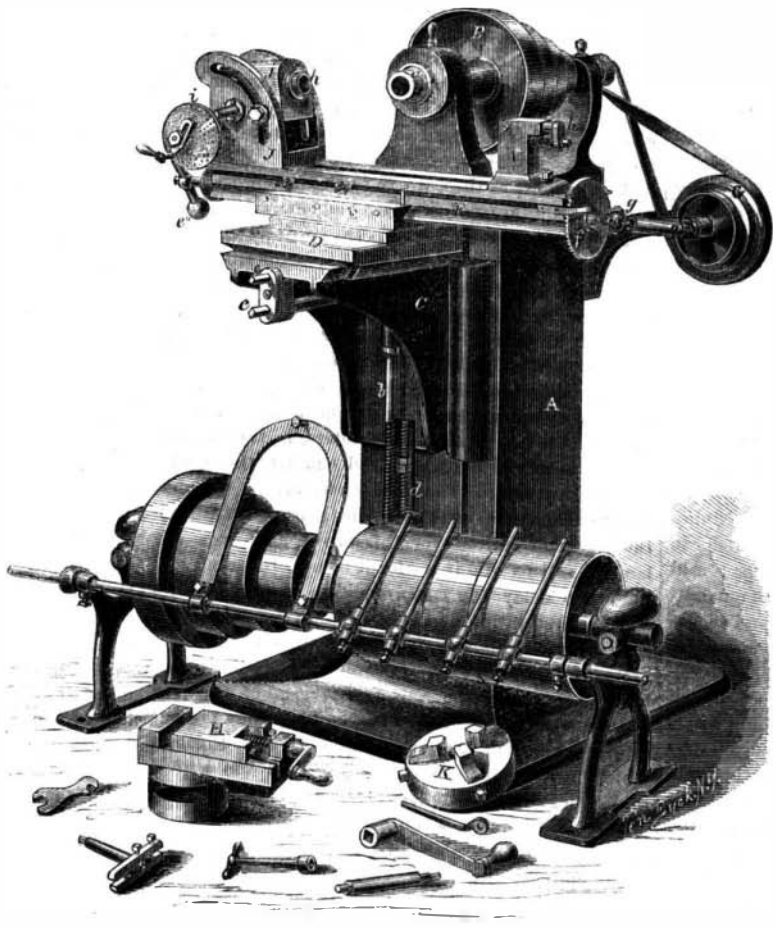
Improved Universal Milling Machine.

The machine represented in our engraving is adapted to the making of a great variety of tools required by gun-makers and machinists ; such as twist drills, mills of all shapes, with straight or spiral teeth, and cutters for geers or other work. It will cut a tapering or conical mill with either right or left hand spiral teeth, and is designed to supply the place of the common index milling machine used by gun-makers, but is adapted to a greater variety of work. The frame A, is cast hollow in one piece and has shelves also cast in it, forming a cupboard to hold tools.

In the upper part of the frame is the main arbor *a*, made of steel, running in a Babbitt-metal box with an anti-friction curve at the front end and in a straight, bronze box at the rear end ; it can be closed up to compensate for wear. The front bearing can be tightened by forcing up the pulley, B, with a nut provided for the purpose. Upon the front side of the frame, A, a knee, C, is fitted to slide, which can be moved by a screw, *b*, connecting it with a projection from the frame. This screw is vertical and is connected with a horizontal shaft by beveled geers, being operated by a crank on the squared end of the horizontal shaft, *c*, that projects from the forward part of the knee. Behind this vertical screw, is another rod, *d*, which is attached firmly to the knee, and passes freely through a hole in the same projection in front of the frame which answers as a nut for the first-named screw. This constitutes a stop motion which limits the rise or fall of the knee and through it the depth to which the work is milled. Upon the top of the knee C, a slide, D, is fitted, on a line parallel with the main arbor, to be moved by the screw, *e*. To the upper part of this sliding piece the casting, E, is attached, that moves on its center horizontally only, a graduated arc showing its position. This piece can be clamped very firmly to the one below it. In this also the long carriage, F, shown in the usual cut, is fitted to slide, and is moved in the way by a screw working through a nut in it with a handle, *e''*, on one end. On the opposite end is a bevel geer, *f*, connecting with another on a short shaft projecting from the side of the carriage. A connection is made between this short shaft and that of the feed cone, G, by two Hook's joints, *g*, and a shaft between them, made of two pieces, one sliding into the other with a feather let in to one of them so that their relative positions may not be changed. This feeding arrangement is thrown in or out, by a lever, and can be set to stop it at any point. A vise, H, shown at the foot of the machine, is provided, which can be attached to the carriage, F, thereby rendering the tool equivalent to a plain milling machine with the advantage of being able to feed the carriage at any angle. At one end of the carriage is a stand, I, fitted to slide in a groove, with a center, *h''*, in its top ; this stand can be fastened at any point ; opposite to it is a head, J, having a hollow arbor, *h*, in which a centre can be placed to be on a line with the centre *h''*, in the stand described. Between these centres is placed the work to be milled, in which any variation of spiral or its equivalent can be made by means of the index, *i*, on the side of the head that is connected with the arbor by two miter geers, a worm, and worm wheel. The arbor in the head can also be connected with the screw that moves the carriage by spur wheels engaging with the miter geers and worm wheel just mentioned. When this is done, the arbor, *h*, revolves as the carriage advances, and thus gives a spiral motion to any piece held between the centres or on an arbor in the head. Changes of spur geers are furnished by which any spiral can be obtained. The machine ordinarily cuts right hand spirals, but by inserting an extra geer a left-hand motion can be given to it. The part, *j*, of the head, J, supporting the arbor, can be raised to any angle and set, by divisions upon the arc through which it moves. This arrangement renders the cutting of tapering spirals as easy as straight ones. It can also be depressed below the line of the centres for the purpose of cutting the teeth in tapering rimers. A small universal chuck, K, is fitted to screw on the arbor, *h*, and is found convenient for cutting face mills, or doing any work on or near the ends of small cylindrical pieces. The jaws in this chuck run through to the backside so as to hold an arbor firmly. A spiral or twist drill, which is too long to go between the centers, may be milled by removing the center in the head and substituting the chuck, K ; as the arbor which the chuck screws is hollow, a drill of any length, not exceeding $1\frac{1}{16}$th inches in diameter can be made, the end projecting from the chuck being taken by a center in the stand, I. The usual tables, showing the changes of geers for spirals, and the other divisions made by the index plates, accompany the machine. The overhead pulleys are arranged for two belts to reverse the motion of the main arbor.

These machines are in operation at several of the private armories. Further information concerning them can be obtained by addressing the makers, J. R. Brown & Sharpe, 115 South Main street, Providence, R. I.



J. R. BROWN & SHARPE'S UNIVERSAL MILLING MACHINE.

Portable Soup.

A new species of food for army uses, called the extract of flesh, is highly commended for invalid soldiers and others. A half ounce represents the whole amount of nutriment in a pound of fresh beef. The method of preparation is thus described :—"The whole process consists in taking lean beef, free of bone and fat, chopping it fine as when used for sausages or mince meat, and mixing it with its own weight of cold water. It is then slowly heated to boiling and allowed to boil briskly for a moment or two, when it is strained through cotton cloth to separate the coagulated albumen and fibrin. The evaporation to dryness of the solution must be conducted at a low temperature by a water bath or a steam heater. The powder is readily soluble in water. When properly dried it will keep for months. Enough can be stored in an ordinary watch-fob to sustain a soldier a week. An ordinary porcelain-lined kettle holding a gallon is sufficient for the preparation of the extract. To dry the solution, put the kettle into a larger vessel containing hot water. With but little trouble on the part of their friends, almost every soldier might be provided with some of this valuable nutriment."—*Exchange.*

[This is by no means a new species of food. This is the portable soup described on page 416 of Liebig's "Letters on Chemistry." He states that it is easily soluble in cold water, and when dissolved in about thirty-two parts of hot water with the addition of some salt, it has the taste and peculiarities of excellent soup. The intensity of the flavor of the dry extract of flesh is very great. It does not keep so well, however, as Borden's famous meat-biscuit.

THE PNEUMATIC POST —We learn from the London *Times* that the system of conveying parcels in tubes —illustrated on page 209, Vol. V. (new series), SCIENTIFIC AMERICAN, will soon be in operation in London for the public. A pipe, two feet 9 inches in diameter, has been laid from the central station of the London and North-western Railway to the General Post-office—a distance of half a mile—and the mails are to be delivered through this tube between the post-office and the railway.