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AMATEUR MECHANICS.

CHASING AND KNURLING.

Among the multitude of operations possible with a foot lathe perhaps none is more vexatious to the amateur than that of cutting a good screw thread, and no acquirement is more valuable than to be able to chase a screw thread easily and accurately.

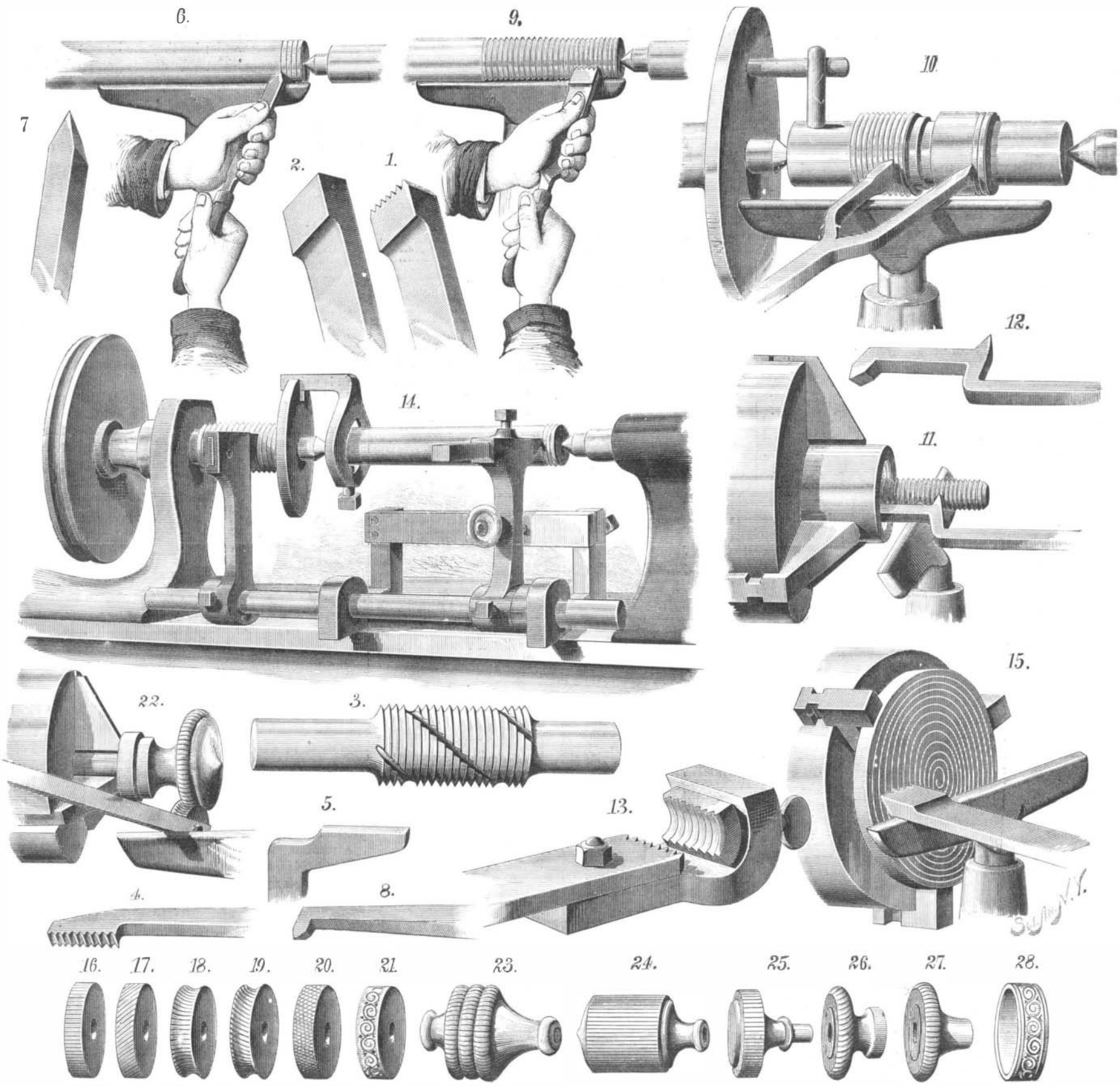
The ordinary chaser, Fig. 1, is a simple tool, which is easily made when one has the hubs for the different sizes; but wanting these, we recommend the purchase of chasers. A blank for an outside chaser is shown in Fig. 2, and the hub used in cutting the teeth is represented in Fig. 3. The latter consists of a piece of good steel having a thread of the desired pitch, which is traversed by spiral grooves to form cutting edges. This tool must have about the same temper as that of a tap. When used it is placed between the lathe centers and revolved at a slow speed, while the end of the chaser blank is held against it, being at the same time supported by the tool rest. The hub should be oiled during the cutting process. After cutting, the tool is hardened and tempered and ground on the elevated portion, which is the face, and smoothed on the back which slides upon the tool rest.

An inside chaser is shown in Fig. 4, the blank from which it is made in Fig. 5. For convenience in cutting the teeth, the blank is bent at right angles; after cutting and before hardening it is straightened.

The manner of starting a thread for chasing is shown in Fig. 6, the tool used in Fig. 7. The rest is placed a short distance from the work, the tool is held firmly upon it, and while the work revolves with a uniform speed the tool is moved dexterously so as to make a spiral line on the work, which is nearly, if not exactly, of the same pitch as the thread to be cut. If the operator is fortunate in the attempt, it will be a simple matter to start the chaser and move it along as indicated in Fig. 9. After a little practice it will in most cases be found an easy matter to chase threads without first starting them with a pointed tool. It is much easier to chase an inside thread than an outside one. A chaser seldom goes wrong when working on the inside.

A method of chasing thimbles is shown in Fig. 10. The threaded thimble which forms the guide screw is driven on the larger end of the tapering mandrel; the thimble on which the thread is to be cut is placed on the smaller end of the mandrel. One arm of the forked tool has a vertical chisel edge which engages the guide screw; the other arm has a chasing point which cuts the thread. The chisel edge is first brought into engagement with the guide screw, the point is then quickly brought against the work with more or less pressure. After the thread is well started it may be finished with an ordinary chaser or with a pointed tool.

Fig. 11 shows a method of starting an inside thread. The chaser has a tracing edge that follows the guide screw projecting from the center of the chuck, and a cutting point that forms the thread. Fig. 12 shows the tool in detail.



TOOLS FOR CHASING AND KNURLING.

Threads cut by a chaser without some kind of a guide to start them are often more or less crooked or drunken. To correct such threads and in cutting large threads, the doctor, shown in Fig. 13, is sometimes employed. The follower opposite the chaser is moved up by the thumbscrew as the thread deepens.

The most expensive, and at the same time the most desirable, contrivance for chasing screw threads is shown in Fig. 14. A casting fitted to the lathe bed has two ears, which are bored to receive the round sliding rod carrying the tool holder and the tracer. The tool holder is placed on the sliding rod between the two ears, and it carries a well fitted screw, which bears against the horizontal bar supported by two square posts which form a part of the main casting. This bar forms a guide which may be adjusted within narrow limits by means of the screw seen in the right hand post.

The lathe is provided with a face plate having a long boss arranged to receive thimbles having leading threads of different pitches cut on them. The tracing arm carries a thin tracing tool which engages the threaded thimbles, and is capable of yielding to admit of moving the cutting tool forward against the object being threaded; but being well fitted to the mortise in the arm it cannot move laterally without carrying the sliding rod and all attached to it. The tracing tool is slotted to receive a pin which passes transversely through the head of the tracing arm, and in the slot is placed a spiral spring which tends to throw the tracer forward.

The operation of this device needs no special explanation. The arm that carries the cutting tool is moved forward until its adjusting screw strikes the horizontal guide bar; the tracing tool at the same time engages the leading screw and carries all forward. When the tool has traveled as far as desirable it is drawn back and returned to its original position. With this tool threads may be cut on either cylindrical or tapering work.

It is sometimes desirable to form spiral grooves in the face of a disk; this may be accomplished in exactly the same manner as in the case of the cylindrical work. The method of doing it is illustrated by Fig. 15.

Knurls of various patterns are shown in Figs. 16 to 21 inclusive; these are employed in "beading," "milling," or knurling the heads of screws, the handles of small tools, etc. The manner of using this tool is shown in Fig. 22. The knurl is placed between the forks of a holder and upon a pin that passes through the fork, and is held with considerable pressure against the work as it revolves.

The knurls shown in Figs. 16, 17, 18, and 19 are easily made. All that is required is a hub something like that shown in Fig. 3. This is placed between the centers of the lathe, and the knurl blank is brought in contact with it and allowed to revolve in a holder supported by the tool rest. The straight blank is moved up and down until every part of the surface is cut in the same way. The concave blanks cannot be moved, but the hub should fit the hollow of the face of the blank. The knurl shown in Fig. 21 must be made by a die sinker. Figs. 23 to 28 inclusive represent examples of knurling done with the different knurls shown in the preceding figures. M.

THE HOME OF THE METEORS.

In a recent lecture at Harvard College Prof. Benjamin Peirce put forth, according to newspaper report, a novel hypothesis with regard to the origin of comets and meteors. In the absence of any complete statement of the hypothesis, it is impossible to judge of its scope and pertinence, or indeed whether there is any new hypothesis at all. Apparently Prof. Peirce has simply added to the well known hypothesis of the meteoric origin of the solar system so cleverly elaborated by Proctor, the suggestion that beyond the outermost planets there remains a vast shell of fragmentary matter, an envelope of bolides, out of which comets and meteors come. In other words, the home of the metors is simply that portion of the original nebulous mass lying beyond the region of aggregation which has resulted in the sun and planets, and thinned out, so to speak, the planetary spaces. Why this outer shell should be characterized as the special home of meteors is, however, far from clear, unless it be assumed that the interplanetary spaces have long since been entirely gleaned of their original supply of matter, so that the existing bolides, with which these spaces seem to be thickly sown, must have come from the outermost parts of the solar system.

An incidental point brought out in the lecture is novel, namely, that the heat which the earth is known to receive from space is to be attributed to the impact of meteors upon our atmosphere. That this meteoric heat is not an insignificant quantity Prof. Peirce shows by computation, by which he reaches "what he calls the unexpected and startling result, that the heat which the earth receives directly from the meteors is the same in amount as that which it receives from the sun by radiation."

Emery Belts and Wheels.

A correspondent says that most users of emery belts and emery wheels do not use glue that is thick enough, fearing it may chill before the sand or emery can be spread. In making an emery wheel or belt, if the cloth has never been glued, it should be sized with glue about as thick as lard oil, and allowed to dry thoroughly before applying the glue which holds the emery. Have the emery heated to 200° Fah., and coat the belt or wheel with glue about as thick as molasses and roll it in the hot emery. If a wheel or belt thus treated is allowed sufficient time to become thoroughly dry it will be very serviceable.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 171,
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AMERICAN AFFLUENCE OF MECHANICAL INVENTION.

Discussing the influence of American rivalry in producing or helping to produce the present depressed condition of the English cotton trade, a writer in the London *Times* makes the following comparison to show the "startling" difference in the rate of progress in this department of productive industry, characteristic of the two countries.

In the twenty-five years between 1853 and 1878 the average weekly production of English weavers rose from 825 yards in sixty hours, to 975 yards in fifty-seven hours; an increase of 23 per cent in the rate of production, due to improvement in processes. During part of the same period, the decade between 1865 and 1875, the cotton operatives of America, with a numerical increase of 150 per cent, increased their aggregate rate of production 500 per cent. In other words, the progress due to improvement in processes was more than ten times as rapid in America as in England.

This remarkable—from an English point of view, startling—difference in the rate of industrial progress was attributed by the *Times* writer very largely to the more ready adoption of labor-saving inventions by American masters and the superior intelligence and deftness of American operatives. Still further, the writer notes as a cause of difference the circumstance that for some time American manufacturers have brought to bear upon their processes "an eager spirit of improvement and economy, combined with a remarkable affluence of mechanical invention," in consequence of which they are able to produce many grades of goods at a less cost than their English rivals can.

The origin of the "affluence of mechanical invention" which has done so much for the American cotton industry, the *Times* writer does not attempt to trace absolutely. He discovers, however, one important source of American inventiveness in "the simplicity, cheapness, and efficiency of the method by which inventions are protected (in this country)—methods which offer a lively contrast to the cumbrous and costly devices by which England contrives to strangle the inventiveness of her people."

These are strong words; but they are by no means without parallel in many English publications of recent date. Every earnest and appreciative student of American industrial progress, whether native or foreign, has been equally impressed by the superior efficiency of the American patent law, in promoting industrial improvement through mechanical invention; and not a few foreign statesmen have urged the necessity of similar laws for their own countries, in several cases with no small degree of success. We must infer as an inevitable result that the competition of such nations for the control of the markets of the world will henceforth be increasingly intelligent and severe. The affluence of mechanical invention which has brought us to our present stage of prosperity must not be diminished—indeed, must be steadily increased—or our position in the industrial race will be forfeited. If we have caught up with, or surpassed, our older rivals through the encouragement of invention, we must encourage inventors still more, or those who have lately entered on the same course of industrial advancement, and thereby lessened our relative advantage, will beat us at our own game. This is as inevitable as gravitation.

In view of these indisputable facts, does it not seem strange that any one having the prosperity of American industry at heart—or even professing to have it at heart—can seriously advocate the abandonment of the principle and practice to which our industrial progress has been so largely and so manifestly due?

Whatever may be the faults and deficiencies of the American patent system they certainly do not fall on the side of over encouraging invention or over-guarding the inventor's right to the proceeds of his own thought and labor. If any change in the system is advisable, it certainly does not involve any additions to the inventor's inevitable burdens; nor any increased privileges to those who would like to appropriate his inventions without his consent or due payment therefor.

JADED HEADS.

The school of popular morality which ruled a generation ago is responsible for no little mischief; and its teachings have not yet quite gone out of fashion. It knew but one virtue—unceasing application to work or study; but one sin—the neglect of business for recreation. For a man to stop work to rest himself or to play was a symptom of inherent laziness, or worse, an inclination toward moral, mental, or physical dissipation. Untiring industry, even when unnecessary, was raised to the topmost pinnacle of social virtue; and to say that a man "died in the harness," was to pronounce the highest eulogium.

A reaction has taken place; yet the fashion of overdoing still compels many a man to toil on unnecessarily after the physical and mental strain has become all but unbearable; and too often, by the time a man has trained a young family to life conditions which only a large income can sustain, he breaks down and leaves his children to bear the brunt of a poverty made tenfold more severe than it otherwise would be by the daintiness of their previous living. And even when the broken down merchant or professional man leaves his family a competence, they are very apt to inherit an ill-balanced and ill-nourished nervous system, which makes a positive and sustained enjoyment of life an impossibility.

In a recent lecture in this city, Dr. C. R. Agnew said that if there is more nervous disease in this country than elsewhere, it is because the average American youth is supposed to be able to do anything. Men should know on what points they are ignorant, and so escape many damaging strains.