HOW TO DO IT, AND HOW NOT TO DO IT.

In walking through a workshop the eye of the ordinary observer will almost invariably lead him to form a tolerably accurate estimate of the capabilities of at least a large proportion of the workmen; and especially is this the case in a large shop, where the men can scarcely be so carefully selected as in small establishments, when their numbers are comparatively limited. There is something in the attitude, the interest taken in his work, the energy or delicacy, as the case may be, with which the expert workman handles his tools, which points him out as plainly as the awkwardness, indifference, or abstraction indicates his opposite; and what that something is the pen of our artist has delineated far more plainly than words can express. Take, for example, the figure represented in "How to Do It" in the act of rough chipping, and it is observable at a glance that his mind as well as his muscle are concentrated upon his work. We are very apt to cast a pleasant glamour upon the past; and this it is which causes each successive generation to look back, perhaps with regret, to the good old times; and to those who highly value mechanical skill, the days of the hammer and chisel were good old times indeed. The workman of the special machine workshop of these days would be altogether surprised to see the large amount of good and accurate work which expert old mechanics can perform with the hammer, chisel, and file. There are, indeed, workmen still extant who would have no hesitation in undertaking to equal in quality and surpass in quantity, upon some kinds of work, the capabilities of the ordinary vise hand even with the assistance of a modern planer and shaper. Among this class of work the fitting in of brasses into ordinary pillow blocks may be instanced. And although, as we have said, the hand workman of the good old times is not altogether extinct, he is not to be found in special machine shops, and may be looked for in repair shops, where he commands nearly one third more than the average machinist's wages.

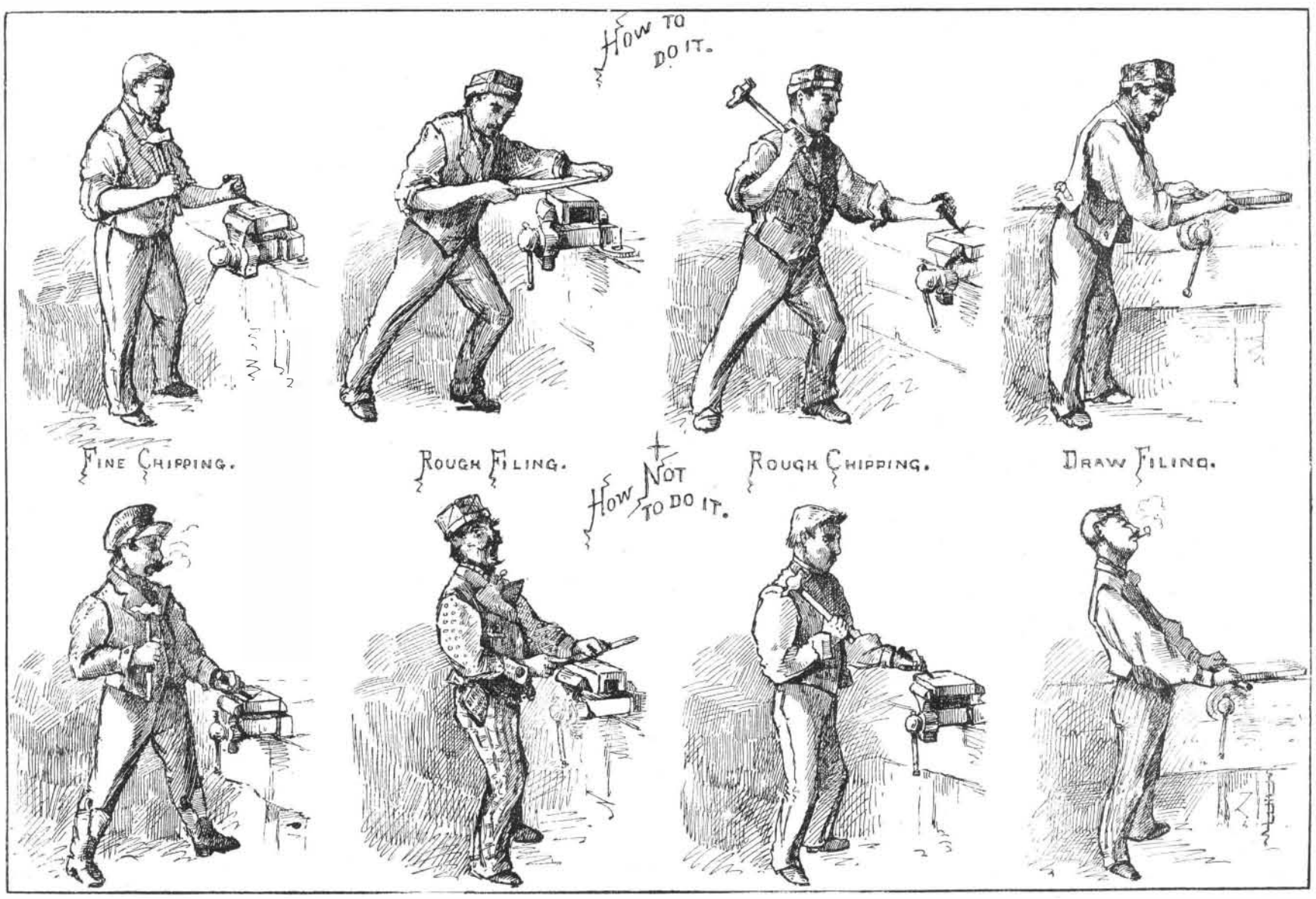
In the illustration under the heading of "How Not to Do It," our artist has represented not only errors in the method of manipulation, but also the want of interest in the work which is at times met with in large shops among the operatives; while in "How to Do It," he has shown the proper attitude for the workman performing the several operations, and has given him, in each, the look of a zealous and painstaking artisan.

The chipping hammer is not by any means the rude instrument which it appears to the uninitiated; and there are as many styles of using it as there are in the use of the pen. For heavy duty, it should be held near the end of the handle. The arm should swing freely, the hand never traveling further backwards than a line vertical to the operator's shoulder. The movement should be obtained partly from the elbow, partly from the shoulder, partly from the body itself, and (in a minor degree) from the wrist. If then we turn to the figure "Rough Chipping," in "How Not to Do It," we perceive that, with the hammer held as there shown, these movements would be difficult, and would cause a constrained action of the body and arm. The chisel should be held close to its head, gripped tight, and pressed firmly against its cut.

For fine chipping—that is to say, for the finishing cut—the chisel is held in the same manner; the hammer is grasped nearer to the middle of the handle, and the blows are comparatively light. Under such circumstances, the cut may be so smoothly taken that the finger applied over a length of, say, two inches, without the assistance of the eye, will fail to detect if the work has been chipped or filed. Both these operations require strict attention; and though apparently rude, they are actually delicate if skillfully performed.

In contrasting the two illustrations of rough filing, the practised eye would readily detect the improper manipulation, irrespective of the want of attention, shown in the one figure. The distance of the operator from his work would alone expose his unskillfulness. To properly use a rough file, it should be held so that the file handle presses against the palm of the hand, and hence so that the strain due to pushing the file will be in a line with the length of the arm from the hand to the elbow. The operator should stand well off from the vise, and must drive the file by a motion of the body almost as great as that of the arms. In this way, the weight of the body will be placed upon the file to such an extent that the heel of the operator's forward foot will lift from the floor, as shown in our illustration, the fulcrum for the pushing duty being the rear foot. During the return stroke of the file, the forward or left foot comes into play as a fulcrum, by which the operator's body recovers its former position; and it also enables the arms to relieve the file of pressure during its back stroke. The motion of the file during this latter stroke should be much quicker than during the forward motion. The file is a wonderful tool in skillful hands, capable, indeed, of producing work more truly smooth and accurate than any other known cutting tool, the lathe tool not excepted. Its use, indeed, in the finishing processes is mainly to correct the inaccuracies which are inherent to work produced by other cutting tools, especially upon plane surfaces; and it is an inexorable fact that we have at this day no machine or tool capable of producing flat metal surfaces as small, even as six inches square, so true that a judicious application of the file will not at least double the contacting area of two such pieces placed together.

Draw filing is a method of using the file which answers two purposes: the first to leave the file marks in the most desirable direction, and the second to touch only such parts of the work as require operating upon to secure truth and accuracy of dimensions. Having rough and smooth crossfiled the work down to such a size that the drawfiling will entirely erase the crossfile marks (for filing in the position shown under the heading of rough filing is called crossfiling, whether the file be a rough, second cut, or smooth file), the operator tests his work to discover the protruding spots or places. He then casts his eye along the length of the file, holding the latter edgeways to the eye, first to ascertain the curve or sweep of the face of the file, and secondly, to select a part of the file where that curve is the greatest and most regular. Then turning the file over, he brings the selected part of the file to bear upon the protruding part of the work, and uses the file as shown in our illustration, watching intently every mark made by the file teeth, so as to insure that the cutting duty is being performed exactly in the required spot, and that the surrounding surface is not being operated upon. If the surface of the work has been drawfiled all over, and it becomes difficult to distinguish the file marks being made, he gives the file a slight lateral movement (first to one side and then to the other) as well as a reciprocating one, so that the new file marks distinguish themselves by slightly crossing the old ones. It is in drawfiling that the utmost skill is to be shown; and here we may caution the operator against an error that he is very apt to fall into. This error is in taking long strokes in drawfiling; because in such case the filings are apt to clog in the file teeth, producing what are technically termed "pins," that is, small pieces of iron which stick fast to the file and cut scratches in the work, entailing a large amount of extra work to file such scratches out. It is obvious that the brains must not be wool-gathering when drawfiling is under operation; for good judgment, strict attention, careful manipulation, and perfect confidence must be combined to produce good work. An error in selecting the part of the file to be used, or an error in applying that exact spot to the requisite place in the work, will produce a hollow spot in the work, which, if the latter is down to its proper size, can never be remedied; while want of judgment as to the quantity of metal requiring to be removed will cause either a badly finished job or else consume more time in testing the work than in filing it. *Apropos* of this latter fact, a well known master mechanic related to us the other day a piece of advice once given by a skillful workman, A, to an artisan, B, who, though a very industrious, painstaking man, was, from lack of experience, somewhat the reverse. A had employed B to work for him by the piece; and giving him a locomotive guide bar to file up, he first told him to test the bar. Then, giving him a rough file, he said: "Now file off as much as you think is necessary, and don't be afraid of it; when you have done so, come and tell me." B set to work with a will; and in a quarter of an hour he came to A, saying that he had filed off what he considered ample. "Go back to your vise," said A, "and file off just as much more. "But—" said B. "There are no 'buts' in the case," said A; "do exactly as I tell you." B set doggedly to work, and obeyed orders; and on testing the job, it required a little more filing in the same places. "This," said our visiting master mechanic, "was a lesson I never forgot and have often remembered to my advantage." The moral here pointed is founded upon a fact which any one who watches the manipulation of vise hands (upon all but very small work) will speedly observe, namely, that, for lack of cultivating the judgment, it often takes more time to try and retry the work than it does to file it. Fitting journal brasses, keys, dies, and sliding blocks, and filing very true flat surfaces, may be instanced as classes of work in which this is liable to occur.



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