

# **PRACTICAL HINTS TO DRAUGHTSMEN**

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Practical Hints to Draughtsmen by Charles William MacCord

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**CHARLES WILLIAM MACCORD**

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TO DRAUGHTSMEN**



# PRACTICAL HINTS

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FOR

## DRAUGHTSMEN.

BY

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## PREFACE.

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THE leading object of this treatise is to explain various modes of representation which are in many cases better than the precise ones of projection; for mechanical drawings often convey false impressions by too close adherence to the truth, and become obscure by being too exact.

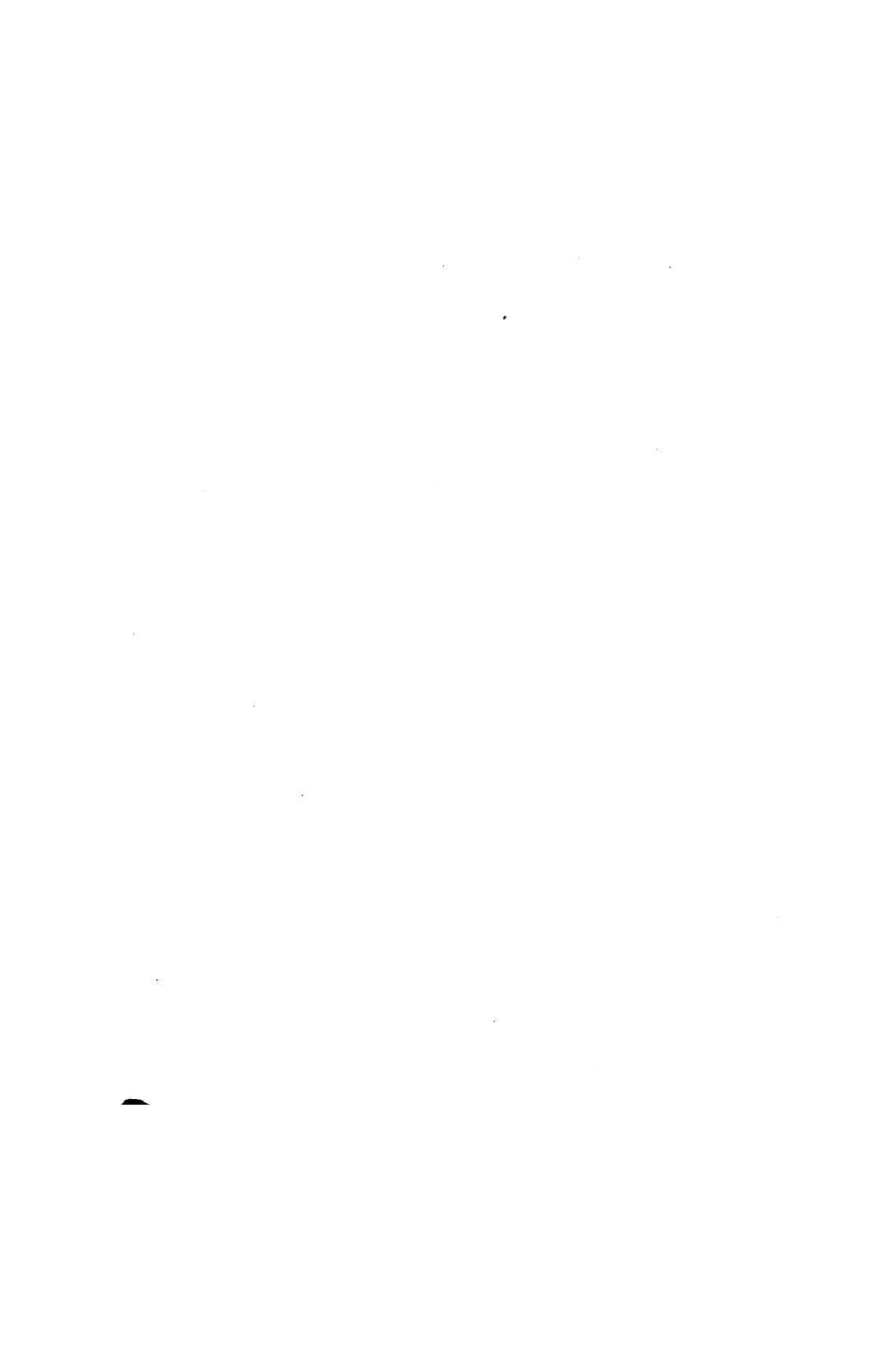
All working plans are made for the purpose of showing what is to be done, and should exhibit the maker's knowledge, not of the refinements of theory, but of the requirements of practice. They are to a considerable extent beyond the jurisdiction of the rigid laws of descriptive geometry, and to that extent they lie within the domain ruled by plain common-sense. This fact is often not duly impressed upon the mind of the student; which is unfortunate, because no one thing is more fatal to practical efficiency than the strict formalism which subordinates the end to the means, allows no exercise of discretion, and binds the draughtsman to the observance at all times of inflexible rules.

It is hoped that the reader will escape such thralldom in either constructing drawings to scale or making sketches; both of which are illustrated by a number of practical examples of approved methods.

The addition of the chapter on drawing instruments is justified by the fact that in most treatises upon drawing, mere descriptions or illustrations are given, with nothing to guide the novice in distinguishing the good from the bad; and also by the reception of numerous letters of inquiry, from those desirous of information upon this very important and much-neglected matter.

C. W. MACCORD.

HOBOKEN, N. J., August 22, 1887.



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# PRACTICAL HINTS FOR DRAUGHTSMEN.

## CHAPTER I.

WORKING DRAWINGS DEFINED. RULES OF PROJECTION DEFINED. CLEARNESS AND CERTAINTY THE ESSENTIAL REQUISITES. ILLUSTRATIVE EXAMPLES.

1. **Mechanical Drawings** are made in the main according to the principles of projection, which constitute a part of the science of descriptive geometry; but even a perfect acquaintance with that science will not of necessity or of itself make its possessor an efficient practical draughtsman, no matter how skilful he may also be in the manipulation of the instruments.

The object of working drawings is, *to show the workman what to make and how to make it*, which they should do in a distinct and unmistakable manner. And it is amply proved by experience, that drawings may be in themselves absolutely correct, and fail nevertheless to accomplish this object. The meaning may be there; but if it is not clearly and forcibly expressed, the work is radically bad, though never so finely executed.

Other things being equal, he is the most valuable man in the drawing office who can with the least outlay of time and labor produce such work as will enable the construction to be carried forward with certainty and dispatch. To this end his drawings must be easily read and well arranged; it will not suffice, as many suppose, that they be correct as studies of projection. It is well that the draughtsman should be master of the principles of his science, but in the practice of his art he should not be their slave; perspicuity is as important as accuracy, and judicious defiance of rigid rules will often result in a gain in this respect as well as in a saving of time.

2. It is mainly to such irregularities that the following pages are devoted; supposing the reader to be already familiar with the laws of projection, it is proposed to show how and when those laws may be broken with impunity.

This cannot be done wholly by laying down specific instructions; it would be difficult if not impracticable so to classify exceptions as to deduce from them rules that would cover the whole ground, or be of universal application. New devices and new combinations are continually arising, special features of which may require special treatment, and there is constant occasion for the exercise of judgment and ingenuity.

The general plan adopted therefore is, to illustrate the matter by a number of

examples selected from practice, explaining in each case the particulars in which it violates the strict canons by which so many submit to be fettered, and showing the advantages thereby secured.

3. For the guidance of the workman, there are required *detail drawings*, showing the construction of the different parts, and a *general plan*, showing these parts assembled, or put together.

If a machine is to be manufactured by the quantity, with interchangeable parts, a separate drawing is usually made of each individual piece, large or small, with all the dimensions accurately marked in figures. And the idea is to some extent prevalent that this is always necessary, and that the draughtsman's work is not complete without it.

But the term detail drawing is also used in another sense: Suppose the case of a constructing engineer designing the machinery for a steamship. He must furnish to the building shop, certainly, drawings from which the engines can be made as he plans them, but in his detail sheets he need not dissect so minutely as above indicated. A drawing, for instance, of the connecting rod, showing it keyed together as when in place, is as properly a detail drawing as though the shank, brasses, gibs, keys, straps, bolts and set-screws were disconnected and scattered broadcast over the paper. It is indeed a better working drawing, since with a fraction of the labor it explains more, showing both how the different pieces are made and how they are related to each other and fitted together.

4. It is in this broader sense that we use the expression *detail drawings*, as distinguished from what might more accurately be called the *detached* drawings mentioned above. The former are always necessary, whether the others are required or not; he who can make them can always make the others on occasion; and the more skilfully he can make them,—the greater his ability to *condense*, and to reduce the number of sheets,—the more efficient will he be, and the more expeditiously can he "put work in hand" in cases of emergency. They are in effect both "general" and "detail" drawings for the members of the machine, and are all that the designer need furnish to the constructor, who is at liberty to follow his own judgment as to further subdivision.

5. General plans, as above stated, are intended to show how the various parts of the machine are arranged and put together as a whole.

They are too often made upon the assumption that in each view it is necessary to introduce every piece that would be visible, partially or wholly, in the corresponding view of the machine itself. The effect is sometimes more confusing than explanatory, and in the majority of cases a great many minor details can be omitted not only without detriment, but with a great gain in perspicuity. This is more especially true as to bolts and nuts—the fastenings must of necessity be shown in the detail drawings, and usually a repetition of them is worse than useless.

6. No rule can be laid down as to how many views should be made, or what views they should be; these points must be decided by common-sense and good judgment, aided by experience. But there can be no greater mistake than the too common deduction from a study of projections, that a front view, an end view and a top view are always required and always sufficient. No pains should be spared to