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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 215.

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Detailed table of contents for the supplement, categorized into I. ENGINEERING AND MECHANICS, II. MEDICINE, SURGERY, HYGIENE, ETC., and III. BIOLOGY AND GEOLOGY.

HOW GREAT INVENTIONS ARE MADE.

There is a very prevalent notion that an inventor is a tinkering fellow, an uneasy sort of mechanic who is always experimenting, cutting, and trying, with a vague expectation of some day hitting upon something novel and possibly useful.

The real inventor is a man of an entirely different type. He knows precisely what he is driving at, and very frequently his invention is entirely thought out before the first stroke is made to put it upon paper or to shape it in a more material form.

The capacity to think is the inventor's first and most essential endowment, and no amount of tinkering, however patient and mechanically skillful, can ever take its place.

After sating his mind and eyes with foreign sights and scenery, an irresistible fit of invention came over him. Retiring within himself, the machine soon assumed in his mind complete form in every part and detail.

The difference between the working of a mind like Mr. Bigelow's and that of an inferior inventor is one of degree, not of kind. The same kind of thinking is done with more or less thoroughness by every true inventor.

In that wide field of invention in which the self-imposed task of the worker is to accomplish a new result by a wise choice and combination of known means, the rules to be followed are admirably set forth in Mr. Bigelow's description of the working of his own mind in developing the inventions for which he is so honorably known.

"My first step toward an invention has always been to get a clear idea of the object aimed at. I learn its requirements as a whole, and also as composed of separate parts. If, for example, that object be the weaving of coach lace, I ascertain the character of the several motions required, and the relations these must sustain to each other in order to effect the combined result; secondly, I devise means to produce those motions; and thirdly, I combine those means and reduce them to a state of harmonious co-operation.

"In making this choice of elementary parts one must reason from what is known to what is not so—keeping in mind, at the same time, the necessary combinations, examining each element, not only in reference to its peculiar function, but to its fitness also for becoming a part of the whole. Each device must be thus examined and re-examined until harmony and unity are fully established. I find no difficulty in effecting that concentration of thought which is so necessary in pursuits like mine. Indeed it is not easy for me to

withdraw my mind from any subject in which it has once become interested until its general bearings, at least, are fully ascertained. I always mature in my mind the general plan of an invention before attempting to execute it, resorting occasionally to sketches on paper for the more intricate parts.

Inventors less favored by nature with the power of close and long continued mental concentration which Mr. Bigelow was blessed with, or lacking the vividness and accuracy of his conceptions and the strength of memory which enabled him to hold fast the mental image of a complicated machine which his imagination had put together, may have to resort sooner to the pencil sketch or the material model.

Of course to the man who has creative mental power, a hand skilled in the arts of drawing and mechanical construction may be, and if properly exercised will be, a desirable adjunct in the art of invention; but it is not an essential factor, for many successful inventors have been, like Mr. Bigelow, unable to give their new conceptions material embodiment; and where manual skill furnishes a too ready incentive to the overhasty materialization of crude ideas, it is an accomplishment which the genuine inventor can well afford to dispense with.

THE IMPOLICY OF ANTI-PATENT COMBINATIONS.

The report of the Executive Committee of the Western Railroad Association for 1879 sets off with the following: "Duties of Members.—The members of the association can not be too frequently or too forcibly reminded of their duties in the association, which consist, chiefly:

"I. In introducing no new device, process, or appliance, and to make no change in those now in use, without submitting the same for an opinion as to what and how many patent or patents the same is subject to; and

"II. The entertaining, much less the settling, of no patent claim without an investigation thereof by the association; and never, except in extraordinary cases, settling any such claim contrary to the advice received."

When the National Association of Wool Manufacturers was founded, an especial object of many of its prominent promoters was a combination to resist certain patents which were supposed to bear heavily upon wool manufacturers. Against this course the first president, Erastus B. Bigelow, took the high ground that the association had better work to do.

We are confident that the association has not regretted its diversion from what at first seemed to many its primary purpose, and we have never heard that the wool manufacturing interest has grievously suffered at the hands of the numerous inventors who have so largely revolutionized the work of the woolen trade.

The Western Railway Association have undertaken to do what the wool manufacturers wisely saw to be impolitic, and the peculiar relations subsisting between railway corporations and the public are such as to make it vastly more impolitic on their part to combine for anti-patent purposes. The manufacturers of wool had received no favors at the hands of the general public, and their work was strictly private in character.

Should an association of wool manufacturers decline to give place in their factories to an improved loom, they would be foolish, but, being under no obligation to the public, they would not be amenable to that public for their folly. For railway companies to combine to prevent the adoption, say, of an improved brake, is a very different matter; and the associated railway companies cannot afford even to be suspected of such action.

As a natural effect of their unwisdom in this respect, we see before Congress a bill to compel railways to adopt and use improvements calculated to increase the safety of passengers and mails. The railway managers say that this is an unwarrantable and an unjust invasion of their rights; but that is a question for