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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.

Mr. Bigelow said that his most recent carpet loom—one upon which seventy-two yards of Brussels carpet have been woven by one girl in ten hours—was completely worked out in his mind and mapped upon his brain, not in his study or factory, but in the railroad cars while making his last visit in Europe.

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.

Showing a rough sketch of the invention, the only drawing of it that had been made, Mr. Bigelow said: "All I have now to do is to direct a draughtsman to work in the details."

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.

To carry an invention through the first and second stages is comparatively easy: the first is simply an investigation of facts; the second, so far as I can trace the operations of my own mind, comes through the exercise of the imagination. I am never at a loss for means in the sense above explained.

On the contrary, my chief difficulty is to select from the variety always at command those which are most appropriate. To make this choice of elementary means and to combine them in unity and harmony—to conduct, that is, an invention through its last practical stages—constitutes the chief labor.

"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.

He said that if the association should attempt to inquire into the validity of patents they would be liable to the imputation of combining to defeat inventors. They had no power to decide questions of patent rights; and if they were to go into any court as a body in opposition to any patent, they would only invite defeat through the prejudice which such a combination would excite.

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.

Not so the work of the railway companies. They have received large grants of land and other valuable franchises from the public, not for the enrichment of their stockholders, but for the public good. They are common carriers, and in view of the conditions under which they come into existence, the community has a right to insist that the carriage of persons, property, and mails by them shall not be needlessly delayed or rendered needlessly hazardous.

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

the courts to decide, should the proposed bill be passed by Congress.

Right or wrong the attempt by Congress to compel railways, as General Banks' bill reads, to "put into actual and continual use such inventions and improvements as shall, upon thorough trial tests, actually contribute to the comfort, security, and safety of persons being transported as passengers," and tend to prevent delays in the transmission of mails, etc., may be taken as a natural and inevitable result of the attempt on the part of the associated railways to refer all action with reference to improvements to an outside and irresponsible organization. And as the people of the United States are more numerous and more powerful than any possible association of railway officials, it is the reverse of politic on the part of the latter to provoke a conflict which can only result in their overwhelming defeat.

THE WESTERN RAILWAY ASSOCIATION AND THE PATENT LAWS.

Speaking of the failure of their efforts to secure the passage of the bill to effect a general amendment of the patent laws last winter, the executive committee of the Western Railroad Association say, in their report for the year just closed:

"For many reasons, but principally on account of the success which has of late attended the work of the association in contesting unjust claims, and in settling just ones equitably, your committee has made no special efforts in this direction during the present Congress."

American inventors will be pleased to see this frank admission by the association that for all legitimate purposes the patent laws are adequate as they stand. No fuller justification could be asked for the position taken by the friends of inventors during the contest in the last Congress, namely, that the general invasion of the constitutional rights of inventors proposed in the Association's bill (S. 300), was as unnecessary as its object was unjust. Now, having admitted that the present laws are sufficient to enable them to contest successfully unjust claims, and to settle just ones equitably—certainly all that any association can reasonably ask—it is to be hoped that the Western Railway Association will have the grace to cease to whine about the alleged oppressions of patentees, and refrain from further attempts to have the patent system recast so as to place inventors at the mercy of any who might choose to infringe their rights.

THE PROPOSED WORLD'S FAIR IN 1883.

One decided advance has been made toward securing a World's Fair in this city three years hence. The two rival organizations which had the project in hand have given place to a single committee made up of citizens of accredited social and financial standing. There has also been introduced in Congress a bill creating for the management of the proposed Fair a United States International Commission, composed of sixty honorably known citizens of New York, two commissioners from each State, one from each Territory, and one from the District of Columbia. It is further provided in the bill that the Exhibition be held under the direction of the Commission as one body; that the Board of Finance be elected by the subscribers to the stock, and that those elected thereby become, if not already so, a part of the Commission—thus avoiding any troubles that might arise from a dual organization; that the capital stock be placed at twelve millions of dollars, in shares of ten dollars each; and that foreign nations be invited by the general government to participate in its exhibition.

No appropriation is asked for, but there is no provision against such an application in the future. The list of incorporators is made up of names that ought to inspire confidence. Each of the gentlemen named has agreed to serve on the commission, and all together they furnish a reasonable guarantee that the undertaking will be wisely managed.

THE LOGIC OF GOVERNMENT CONTROL.

For a number of years the propriety of transferring to the National Government the control of railways and telegraphs, as in some European States, has been strongly urged in this country. This, on the plea of cheapness and good management, notwithstanding the too frequent experience that the business affairs of the government are apt to be badly conducted, and their results obtained at a far greater cost than for similar work in private hands.

The action of the British Postmaster General in relation to the telephone companies furnishes a pretty illustration of the logical result of such government monopolies. Every one knows that a few years ago the British Government acquired possession of all the telegraph lines of the United Kingdom, and made them a part of the postal service. By the same act, as English electricians aver, the government put a practical extinguisher upon telegraphic improvements in Great Britain—a natural result of bureau management. But this is not the worst of it. Government monopolies are not only fatal to progress in their tendency to discourage invention, but they are very apt to become aggressive, and try to suppress outside rivalry. Hence the natural but none the less amazing attack upon the English telephone companies by the Right Honorable Lord John Manners, who filed an information in the Court of Queens Bench, Jan. 20, asking an injunction to restrain the English Telephone Company and Edison's Telephone Company from using wires for the transmission of messages.

The next day in the Exchequer division of the High Court of Justice, application was made by the Attorney General

on the part of the Post Office for an *ad interim* injunction to restrain the English Telephone Company and the Edison Telephone Company from discharging the functions for which they were called into existence. After some discussion it was arranged that an injunction should not be taken, but that the defendant companies were to keep certain accounts until the hearing and final decision of the case. The argument on behalf of the Post Office is that telephones are telegraphs within the meaning of the act by which the latter inventions were committed to the charge of the Post Office Department, and the Attorney General represented it to be a serious grievance that the government, after spending millions on telegraphs, now found their monopoly interfered with by telephones, which he submitted were practically the same invention. It is reported, although this part of the question was not mentioned during the hearing, the Post Office officials hope to be able to compel the telephone companies to take out licenses from the Postmaster General and pay royalties for carrying on their business. The trial of the case is set down for an early day in February.

THE OWNER OF THE CAPE OF GOOD HOPE AND HIS OSTRICH FARM.

Mr. McKellar, who was most kindly hospitable, has an ostrich farm, but his flock of birds was not very large at the time of our visit, he having had bad luck at first in breeding.

He owns the actual Cape of Good Hope and a long stretch of the moorland adjoining, and has thrown a wire fence right across the peninsula, so as to give his ostriches the run of a large tract, stretching right down to the cape itself. One old hen ostrich was a pet about the house, but used to do sad damage in the farm yard eating the young goslings, swallowing them like oysters.

It was amusing to go with Mr. McKellar into one of his breeding paddocks; here a pair of ostriches were brooding on a nest of eggs, dividing, as usual, the labor between them.

The cock was very savage and attacked all intruders, so his master had a long pole with a fork at the end of it, and when the ostrich ran at the party he caught its neck in the fork. The ostrich was excessively enraged, but soon had to give in.

A kick from an ostrich is well known as very dangerous. The only thing to do when attacked without means of defense, Mr. McKellar said, is to lie flat down and let the bird walk on you till he is tired. I was astonished at the brightness of the red coloring developed on the front of the legs of the cock bird during the breeding season. The ornamental appearance of the bird is greatly enhanced by it.

A narrow but strong and high pen is provided for plucking the birds in. They are driven into it and held fast. It is found better to pluck the feathers out than to cut them off. The stumps, if left in, are apt to cause trouble.

Young ostriches, when first from the egg, have curious horny plates at the tips of their feathers, like those in the feathers of one of the Indian jungle fowls, and some other birds not in the least related to one another.

The cape peninsula becomes very narrow towards its termination, and ends in two capes, Cape Point, on which is the lighthouse, and the Cape of Good Hope. The Cape of Good Hope itself is a mass of rock, terminating in perpendicular cliffs toward the sea, but with ledges here and there, on which numbers of cormorants (*Phalacrocorax capensis*) nest.—*H. N. Mosely, Challenger Notes.*

Sewer Gas and Disease.

The authorities of one of the largest hospitals in London lately took measures to ventilate all the drains and sewers in connection with their institution. Up to the time these alterations were made, pyæmia and erysipelas had almost driven the medical staff to despair. When the whole of the ventilation was completed, and as soon as the pressure was removed from the traps of the closets and lavatories, no fresh cases were found to occur. For months the hospital wards were free from both erysipelas and pyæmia. Suddenly, however, there was a fresh outbreak of these diseases, but it was noticed that the epidemic was confined to one of the surgical wards, built apart from the main building, on the pavilion plan, and having only one story. Close investigation proved that the ventilation pipe in this wing had been stopped up by a careless workman. When this was remedied, all traces of the epidemic disappeared.

The Millers' International Exhibition.

A bill was passed in the House of Representatives, January 15, providing for the importation, free of duty, of all articles for exhibition at the Millers' International Fair, to be held in Cincinnati, Ohio, during the coming summer. The Exhibition will be opened June 1. The machinery will be shown in motion.

In view of the enormous interests involved in milling, the variety of grains made use of, the numerous rival systems and processes employed, and the wide range of invention covered by milling apparatus, it is safe to predict a notable Exhibition. American millers and mill furnishers are taking a lively interest in the Fair, and the president of the National Millers' Association reports a fine prospect for a full and instructive display.

MACASSAR OIL.—Sunflower oil, 100 grammes; goose grease and "kamfett," of each 15 grammes; liquid storax, oil of eggs, oil of thyme, cacao butter, of each 8 grammes; neroli, 4 grammes; Peruvian balsam, 0.6 gramme; otto of roses, 0.05 gram.—*Henkenius.*

Kind Words from Chicago.

Our newspaper contemporaries are constantly saying good words for the SCIENTIFIC AMERICAN and our other publications. We are not unmindful of such courtesies, although we seldom occupy space in these columns for giving them expression; but the following from the *Chicago Journal of Commerce* is so well put, we beg the indulgence of our readers for giving it place:

"The SCIENTIFIC AMERICAN is one of the really standard publications of the day. Established in 1845, it has now reached the thirty-fifth year of its publication. The success of this publication has been something remarkable, and its circulation is now fifty thousand copies weekly. It is a paper that ought to find its way into every workshop in the land, without a single exception. It is invaluable to the mechanic, artisan, and inventor, and the wide field it covers makes it alike invaluable to those interested in purely scientific and chemical pursuits. Its handsome pages and accurate illustrations of new inventions, machinery, workshops, and sketches in natural history are all in entire keeping with the active spirit of this progressive age, and there are, indeed, few publications more deserving of a place in the homes of our land. The SUPPLEMENT—which is a distinct paper from the SCIENTIFIC AMERICAN—contains sixteen octavo pages, with handsome cover, uniform in size with the SCIENTIFIC AMERICAN. This is really a royal issue, and while the price of the SCIENTIFIC AMERICAN is placed at \$3.20 per year, or \$1.60 for six months, the SUPPLEMENT is placed at \$5.00 per year, postage paid, to subscribers. Money could not be more judiciously expended than by subscribing for these publications."

The Indian and the Telephone.

An amusing application of the wonders of the telephone as an assistant detective of crime comes to us from Julian. Several horses were recently stolen in that neighborhood, and suspicion fell upon a certain Indian as the thief. Some one having introduced a telephone up there, the same was being exhibited, when it occurred to the owner of the stolen horses to get the Indian to come in and hear the "Great Spirit" talk. The Indian took one of the cups and was thrilled with astonishment at being apparently so near the Great Keeper of the happy hunting grounds. After some little time spent in wonderment, the Indian was solemnly commanded by the Great Spirit to "give up those stolen horses!" Dropping the cup as if he had been shot, the Indian immediately confessed to having stolen the horses, and tremblingly promised if his life was spared he would restore the "caballos" at once, and he did so.—*San Diego (Cal.) Union.*

Curiosities of the Telephone.

With a single telephone held, say, to the right ear, the transmitted voice appears to come from a distance to the right; while with a telephone held to the left ear, it seems to arrive from the left of the listener.

With a telephone to each ear, if one ear be less sensitive than the other, or if the telephone be held further from that ear, the voice apparently shifts to the side of the other ear; and if both ears hear alike and both instruments are equally near their respective ears, the voice apparently proceeds from in front of the observer.

Petroleum in Hanover.

Borings are being made in the Hanover petroleum district with such promising results as to make the prospectors extremely hopeful. A dispatch from Berlin says that the borings are now 60 feet deep, and the existence of a petroleum basin as large and rich as the one in Pennsylvania is regarded as beyond doubt by mining experts. The deepest borings already yield four hundred weights of oil per well daily, and the quality of the oil is improving. The work is being prosecuted by Hamburg and Bremen firms engaged in the American trade.

Cheap Indelible Ink.

Braconnet recommends the following: 20 parts of potassa are dissolved in boiling water, 10 parts of fine cut leather chips and 5 parts of flowers of sulphur are added, and the whole heated in an iron kettle until it is evaporated to dryness. Then the heat is continued until the mass becomes soft, care being taken that it does not ignite. The pot is now removed from the fire (allowed to cool), water is added, the solution strained, and preserved in bottles. This ink flows easily from the pen.—*Pol. Notizbl.*

Large Farming.

It is reported that Mr. Oliver Dalrymple, the great Minnesota farmer, intends to cultivate 30,000 acres of wheat this year. He will have 20 steam thrashers in operation with 135 reaping machines. Last year he employed 600 laborers, and this year will increase the number to 700.

THE woolen trade in France has been making rapid progress. In 1851 there were only 850,000 woolen spindles in that country, but now they number 2,270,000, thus distributed among the departments: Nord has 1,350,000; Marne, 160,000; Somme, 125,000; Ardennes, 120,000; Aisne, 140,000; others, 375,000. The value of the woolen yarns exported amounted to 32,200,000 francs; of manufactured goods, to 464,200,000 francs; of combed wool, to 30,900,000 francs; of woolen waste, to 36,700,000 francs; making a grand total of 564,000,000 francs. About 147,632,000 francs were paid for wages annually.