PATENTING AND PROMOTING INVENTIONS

MOÏS H. AVRAM

PATENTING AND PROMOTING INVENTIONS

Patenting and Promoting Inventions

BY

Moïs H. Avram, M. E.

Member of American Society of Mechanical Engineers—Member of American Association for the Advancement of Science—Member of the Aëronautical Society of America—Member of Society for the Promotion of Engineering Education

Lecturer on Industrial Engineering at New York University

NEW YORK
ROBERT M. McBRIDE & CO.
1918

Published May, 1918

THERE are those who in prosperity and affluence forget that all human activities can no more remain selfish, but are directed for the education, improvement and elevation of those who need the soft hand of encouragement.

To you who have not shunned these responsibilities in the midst of your affairs, thus energizing the future to safe prosperity, I dedicate this book.

Col. H. J. Slocum
Dudley Olcott, 2nd
Howard C. Seaman
Mrs. Emily E. Kelly
James Houston
Walter C. Teter

CONTENTS

AUTHOR'S FOREWORD.

With the passing of every century seems to have come the dawn of a new era, and each succeeding one, as it slowly rolls around, goes down into history to be referred to by all future generations by that title which best describes its dominant note, race, or most characteristic achievement. So with the birth of the Nineteenth Century sprang into life a new race, the race of inventors, destined in turn to bring about the most romantic and epochal era of civilized man, The Era of Invention.

Certainly prior to that time there existed no such race. To the centuries that went before, the word invention had little meaning. True, there was a straggling handful of progenitors who came before, but this virile and scattered few followed for the most part discursive careers, and the reward for their efforts came in the form of bitterest contempt or persecution at the hands of their contemporaries. They were iconoclasts, thought to be, in many instances, emissaries of Satan himself. Their discouragements were of a nature calculated to destroy all hope, and to snuff out even the last flickering flame of genius.

If we are to believe the tale that Voltaire

tells us, it was not until Sir Isaac Newton's trend of philosophic thought was rudely awakened by a blow upon the head by a falling apple, that that great natural law, gravitation, came to be generally recognized, in about the year of our Lord 1666.

This book, originating in my own belief and experience, is written in the earnest spirit of helpfulness, and is based for the most part on my many years of intimate contact with the varied and intricate problems of industrial development. I know of no popular handbook of *unprejudiced* advice for the guidance of those interested in the matters pertaining to inventions and inventors.

Seldom it is that the inventor or the man of money to whom he looks for co-operation is equipped either by training or experience to cope with the problems that confront him. The design of this volume is to point out the many pitfalls that beset the path of the inventor and the investor alike, illustrated by concrete examples of failure and success, and to indicate in as illuminating a manner as possible the proper procedure in obtaining protection for and in developing patentable ideas, that they may become commercial successes.

It can be stated with full consideration for accuracy, that not more than one invention out of every thousand brings profit to its

sponsors, while a goodly proportion of the failures spell financial ruin and wasted years for their protagonists.

It is far from my desire to deplore that ever-present temptation for business adventure, or in any way to discourage inventive endeavor, for in these we have the very essence of our industrial progress. We must, however, face the cold fact that millions of dollars are squandered annually on inventions, and scores of careers blighted in the process. With expert and unprejudiced advice available, much of this money would not be lost, and many inventions which end in utter failure would take their rightful place in the industrial world as departures or improvements of pronounced mechanical reliability and usefulness. On the other hand, thousands would never be attempted. The enormous waste occasioned by the lack of this directing skill can ill be afforded, and no effort should be left untried to divert these misdirected funds into channels which lead to definite accomplishment.

According to reliable statistics, approximately *half a billion dollars* represents the annual outlay on the part of capitalists and individuals, who at the instigation of inventors and promoters give their support to new inventions and various commercial projects.

Inventor, Promoter, Capitalist. Here we have the trinity, each factor having the same ultimate aim, but usually with divergent views as to how this aim is to be realized. The inventor has always been confronted by the lack of capital, and must seek the services of the promoter, while the promoter is dependent upon the inventor as the original source of his projects. The capitalist, in turn, must look to both these factors to furnish profitable avenues of investment, but he must further rely upon the services of the expert engineer, who as investigator and organizer can reconcile their differences and indicate the way, or pilot an enterprise to success.

The author has not attempted to make this volume an exhaustive text-book on patent law, promotion, or finance, but it has been his aim to give the reader sufficient material and warning, to lead his footsteps into proper paths should he ever seek the protection of our patent laws or be confronted with any of the problems of our complex industrial life.

It is, therefore, with the hope that it may accomplish its purpose, and tend to prevent future errors in the great field of endeavor of which it treats, that this book is respectfully presented to the public.

Moïs H. Avram.

New York, 1917.

FOREWORD

The keynote of Mr. Avram's book is the insistence upon the work of the trained expert, whose coöperation with the inventor will produce results more surely and with less of waste than the ragged and fumbling procedure that is usually followed.

The work will undoubtedly be of great value to the inexperienced inventor, and to many an experienced inventor whose experience has not yet taught him the wisdom that the book has to offer. The snares and pitfalls that beset the inventor are so numerous as frequently to rob him of the fruits of his labors. Mr. Avram shows what must be done and what avoided if the inventor, having an idea of genuine worth, is to secure his patent and place it on the market to the best advantage.

But Mr. Avram goes further than this. He recognizes the fact that the success of the inventor concerns the public welfare, and the discussion rises in the concluding paragraphs to a creative proposal which seems to me of far-reaching significance. In these paragraphs the author has put forth the germinal idea of a project for the conservation of the labors of inventors generally.

Mr. Avram is an alumnus of the School of Applied Science of New York University, who has achieved eminence in his profession through unremitting labor, joined with a fine combination of constructive imagination and rigorous standards of excellence. These qualities have lent value to this volume, which I have had the privilege of seeing in the printer's proof and have read with the keenest interest.

ELMER ELLSWORTH BROWN.

New York University, January, 1918.

CHAPTER I.

WHY INVENTORS FAIL.

1. Fate of Patents. 2. Corporation Patents. 3. Proper Exploitation. 4. Creative Temperament. 5. Ignorance of Prior Art. 6. Investigation of Prior Art. 7. Preliminary Commercial Investigation. 8. Selection of Commercial Designer. 9. Inventor's Responsibility for Commercial Designer. 10. Simultaneous Inventions. 11. Preliminary Protection for an Invention. 12. Lack of Capital. 13. Errors of Judgment. 14. Unscrupulous Inventors. 15. Coöperation. 16. Unscrupulous Patent Attorneys. 17. Infringement Litigation. 18. Premature Patents.

Every week there are on the average one thousand patents granted by the Patent Office at Washington. This number by no means comprises the total of applications submitted. Over twice this number of refusals for every manner of claim are a part of the weekly routine of the department. Each and every one of these applications, whether allowed or not, represents to its respective applicant a certain outlay of money, in many instances a considerable amount, and this before even the first steps of commercial development are attempted. The natural query is: What is the ultimate fate of all these patents?

The United States Patent Office has to date issued more than 1,200,000 patents, and it is quite safe to approximate that not more than ten per cent of this vast number have ever truly seen the light of day. A far smaller percentage have reached the market as commercial successes. Irrespective of the initial expense connected with this annual flood of patents, which, as can readily be seen, is enormous and for the greater part lost, we must consider the millions upon millions of dollars that have been and are still being wasted upon the development of these abortive projects.

We have constantly ringing in our ears the colorful tales of obscure men who have attained to prominence and great fortune through some happy stroke of invention, but the world hears little of the scores of fortunes that are lost, or of the useful lives that have been wasted upon badly conceived or maladministered inventions. The industrial tragedies are lost to view in the golden glow of brilliant achievement, while the actors go down to oblivion under that inexorable law of "the survival of the fittest." There are, of course, included in this great aggregate of inventions covered by patents a certain proportion which were never designed for the market, being improvements of existing methods evolved through practical experience by

men connected with large concerns, and becoming the property of these individual firms or corporations by agreements entered into between employers and employees. Such patents are obtained to prevent competitors from using similar devices, and of course give the owners thereof legitimate advantage over other concerns manufacturing like products. Many large corporations maintain at great expense experimental departments solely for this purpose, and retained in these departments is a large portion of the finest inventive brains of the world. The Edison plants afford a splendid example of this character of organization. Many of the large concerns also maintain special departments consisting of men who are experts in patent law and authorities on the history and nature of all inventions pertaining to their employers' various activities. With the foregoing qualification, it is safe to stand on the premise that not more than one invention in a thousand is a commercial success.

This gigantic proportion of failure goes a long way in making up our great national waste, and could to a considerable degree be avoided if only the simple and approved methods of analysis and procedure were observed. It must not be thought that all failures are due to lack of ability or of genius on the part

of the inventor, or to the absence of true merit in the inventions themselves. Such is far from the fact. Many an invention, doomed for all time to bear the hall mark of total failure, might have been a signal success had it fallen in proper hands, while others, with far less merit, have through the superlative genius displayed in their exploitation reaped a harvest of dollars for those in interest.

The causes which are to the largest extent responsible for this huge percentage of failure are many, and some of a character difficult of definition. The temperament that tends toward creative genius is seldom combined with sound business judgment or intuition, while the element of suspicion is frequently highly developed. This last characteristic has led to unending loss and disappointment.

Only recently a very pathetic case was brought to the attention of the writer, but unfortunately too late for any mending to be of avail. The man had learned his lesson, but had paid a frightful price. Equipped with the most meagre knowledge of mechanics, or the relation and inter-relation of mechanisms, and wholly unversed in the art of designing, he had attempted the solution of a most intricate mechanical problem, an important feature of which had

baffled all who had ever attempted it. Convinced that he had hit upon a most novel conception, and fearful lest his idea be stolen by some unscrupulous person if he sought advice or criticism, he equipped a tiny workshop in his own apartment, and without the slightest attempt at investigation into the prior state of the art in which he essayed to launch upon the career of an inventor, he commenced his experiments. For four long years he struggled in secret, devoting his entire time to the task. In the meantime the few thousand dollars he had managed to save slowly dwindled away. After building and rebuilding, he did succeed in reducing his machine from a complicated affair to a simpler mechanism easy of design and construction. Imagine his consternation when, upon seeking patent protection for his invention, he discovered that he had only produced something essentially the same as that which had been created thirty years before, and had since been put into successful operation. Considerable of his time had been devoted to inventing features of the machine that were most simple of construction in any properly equipped machine shop, and required little exercise of the inventive faculties. Furthermore, there was none of these features which was not anticipated by prior patents which had expired.

The lesson contained in this story plainly illustrates a very vital and almost certain cause for failure, for apart from his ignorance of mechanics and design, had he sought expert and unprejudiced advice in the beginning, he surely would have seen the futility of attempting his invention.

The experience of this inventor is by no means a rare one. It is cited as typical of many. It is therefore most important to lay particular emphasis on the absolute and imperative need, in all cases, of a careful preliminary investigation into the exact state of the art, prior and present, pertinent to the problem in hand, before any time or money is expended on its development. A search of the files at the Patent Office is a matter of trifling expense as compared with the expense of development, and is fully explained in a later chapter. The result of this alone frequently puts a sudden check on unbridled enthusiasm, and sends many a would-be inventor back to pursuits far better adapted to his talents.

There is no avenue of human activity more crowded with men unconscious of the difficulties they must overcome to reach their goal than the tortuous road of the inventor. Ignorance, in fact, plays an astonishingly large part, not only in the conception, but in the

promotion of new inventions. The inventor is often an idealistic dreamer, unable to grasp the true economic value of his problem, and with his eyes focussed on but one phase of a situation, which should be viewed from many angles. Quite as fatal to his success is a lack of knowledge of design, or of a thorough acquaintance with the history of devices kindred to that which he seeks to create.

This clearly shows the wisdom of a definite course of procedure in every case as regards preliminary investigation. After the entire state of the art has been minutely studied, there should immediately follow an exhaustive investigation of every possible ramification of the case in hand, not alone from the technical side, but as to its commercial possibilities as well. How these investigations are conducted on behalf of inventors and investors will be fully covered in a later chapter. Since it really seems that inventors are usually able to secure funds in one way or another for various expenses incidental to their undertakings, it also seems evident that they avoid such an investigation only because they fail to see the vital need of it. Of course, as has been stated, suspicion plays a large part in this connection. The fees appear large at times, and apparently the prudence of such a course of action seldom appeals to them,

although to follow it would in countless cases save years of wasted effort.

The writer is fully aware of the great number of experienced inventors to whom the strictures contained in this volume do not apply, but unfortunately this group make up a very small minority.

The man who is called upon to finance an invention should demand exactly the same course of procedure before risking capital in any such venture. To amplify this statement let us review the methods most commonly pursued by inventors. It is much as follows:

Once they have their idea—usually, in their own minds, the basis of a wonderful and revolutionary invention—their first step in all probability is to engage a draftsman or designer to lay it out on paper. Frequently they attempt this work themselves. An experienced inventor will exercise extreme care in the selection of his designer, and with particular attention as to whether he may have practised along similar lines; others unfortunately feel secure in what the word "designer" implies, and will in many instances retain one of varied or uncertain experience. This latter type of inventor, satisfied that he has invented, leaves the development to his designer. This individual he takes for granted is well versed in the art of technics, and to

him he looks to bring his ideas into being. Since most ideas can take many different forms mechanically, an invention will naturally take that form which is most characteristic of its designer. Finally the plans are completed and look very attractive indeed, regardless of the numerous dimensional errors they may contain, or of how badly the principle of the invention is worked out. Now, with his invention thus propounded on paper, the natural feeling is one of confidence, and as the child of his imagination is about to be born in the form of a working model, success and wealth seem almost within his grasp. So the model is commenced.

It is a proven fact that no draftsman or designer can avoid errors in the laying out of numerous plans, while there are many who in controlling their preparation are given to concealing unworkable features. Such blunders necessitate change after change, while time is being wasted and expense is growing, bringing the patience of the most tolerant and optimistic financial backer to the very breaking point. Meanwhile the inventor, ever eager to prove the value of his invention, must assume entire responsibility and blame for the faulty development. It may easily be two years before it slowly dawns on him that there must be something seriously wrong with his

designer, and he decides, either on his own initiative or through pressure on the part of his moneyed advisors, to replace him by another, who in turn deems himself a greater genius. This newcomer considers the work of his predecessor full of impossibilities, and proceeds with the original idea on a radically different basis. And so the years roll by, until finally we have one idea represented, we shall say, by a dozen different models, by perhaps a dozen different men, not one of which stands forth with sufficient merit to warrant its commercial manufacture. Nevertheless, the inventor will not admit defeat. That well-known aphorism, "Hope springs eternal in the human breast," polished to brightness by the tongues of passing generations, is certainly exemplified in the temperament of the inventor. Patience and belief in self become the callous part of his built-up nature, and he will never let go as long as there is a struggle left in him. Fate has apparently ordained that every idea shall, somewhere, sometime, find someone possessed of sufficient receptive imagination to become its sponsor, who will lend financial countenance to its future possibilities. From out all this chaos a triumph may eventually emerge, but not before a large fortune has been squandered; and in many such cases a few thousands would have sufficed.

More often comes dismal failure in exchange for years of labor, loss of faith in human kind, and much money. Could anything be more convincing in showing the wisdom of instituting a thorough scientific preliminary analysis at the inception of any new invention.

Let us now proceed to another phase of the question, and show the fallacy of attempting an invention without consulting at least one responsible person.

It should be ever borne in mind by inventors that, no matter what problem they may attempt to solve, it is decidedly more than likely that at least one or more inventors are working concurrently with them on the same idea. Where any invention, particularly if it is worth while, does not challenge the inventive skill of more than one individual, it is the rare exception, and far from the rule. It will be seen, therefore, that for this reason many complications may arise when patent protection is sought, and a great number of splendid inventions have been lost forever to those who evolved them, solely through ignorance of the laws governing the granting of patents. Such cases give rise to interferences, one of the most heart-breaking and expensive proceedings in patent practice. The matter of validity of patents and the approved course to follow in obtaining them will be explained later

on in this book. It is necessary, however, at this point, in order to show how the fruits of a valuable invention may be lost to its rightful owner, to bring the following facts to the attention of the reader.

A patent to be valid must not be such that the monopoly, granted by it for the period of seventeen years, would preclude any member of the public from doing that which prior to the invention he or other members of the public have been in a position to do by reason of a common knowledge of the art, prior use, publication or disclosure of the invention. *Publication or disclosure, however, does not include information given to persons confidentially consulted or employed.* The following incident, an actual occurrence known to the writer, will convey the significance of the foregoing.

A short time ago an inventor brought to the office of a most talented patent attorney a new talking machine which he had invented. He considered it superior in every way to any other machine on the market, and whether or not he was correct in this respect, his invention had been most skillfully worked out, and was extremely valuable. An examination of the art failed to disclose that his invention was anticipated by any other patents, and therefore applica-

tion was at once made to protect it properly by patent. Almost immediately after the patent was published an interference was declared. This is what had happened: The inventor had worked in absolute secrecy and had not disclosed his invention to a single person. He had not only worked out his ideas, but had actually reduced them to a machine which worked perfectly. This he had kept under lock and key for a considerable time before consulting his attorney. In this particular instance another inventor had hit upon the same idea, worked it out and applied for a patent, all of this transpiring subsequent to the time the first inventor had reduced his invention to practise. The first inventor, however, had not one slight bit of evidence, beyond his personal word, to prove the date of his conception or anything else in the way of dates in connection with his work. The second inventor had a carefully kept record of dates, all of which he wisely had attested by reliable witnesses. When testimony was taken, the first inventor found to his sorrow that one's word alone, in matters where selfish motives are involved, did not stand in point of law, and while he undoubtedly was entitled to his patent, he could not prove his case, and his invention was lost to him forever.

All correspondence of every nature relating

to an invention should be carefully preserved, and in exact sequence as to dates, as should all vouchers for material, labor, etc. Such evidence when systematically dated and filed cannot be gainsaid. The inventor should at the very outset select a reliable person to act as witness, sufficiently intelligent, and preferably familiar with machines or inventions of a similar nature, to whom every phase of the invention should be explained. Sketches and a description of the invention should be signed and dated by the inventor and by the witness. With such a witness available, the principal steps of development can be proven exactly as to dates, and the testimony of such a witness cannot be refuted.

Lack of capital is undoubtedly, in numerous cases, a vital reason for failure. Seldom is wealth found to be the willing handmaiden of inventive genius. While this element certainly plays a large part, it does not do so to the extent that is generally supposed.

Mark Twain once received a letter asking him to give his endorsement of a book written on the subject of patents and patentees. Clemens characteristically replied:

Dear Sir:—

I have, as you say, been interested in inventors and patentees. If your book tells how to exterminate inventors, send me nine editions. Send them by express. Very truly yours,

Samuel Clemens.

Mr. Clemens sank $190,000 in backing a typesetting machine, which is to-day exhibited in the Sibley College for Engineering as "the costliest piece of mechanism for its size ever constructed." Present-day investigation methods would have saved our beloved Mark his fortune if they could have been put into operation at the outset of this invention.

Lack of judgment and knowledge on the part of the inventor and promoter as to how best to employ the finances at their command, even though it be a limited amount, are more often the cause of failure than the mere lack of funds.

A small group of men, a capitalist among them, were persuaded to finance the development of an automatic ticket-vending machine. The inventor, a very intelligent young man, had had no experience as an inventor prior to the time he attempted this machine. After a certain amount had been invested, the majority of the men interested depended for funds principally on the aforesaid capitalist, who was thus compelled to become the most heavily interested, though much engrossed with other affairs.

The plan of the machine was to deliver automatically one, two or five tickets, in return for the proper coin to cover each sale. It was very complicated and unreliable, and was

costly to construct. Another weak feature of the proposition was that the machine was designed to cover a single and limited field of use, whereas it could have covered four different fields. Each of these weaknesses would have been disclosed, had an investigation been instituted at the very beginning, when the inventor sought capital for his idea. One very important thing would have been discovered, which would have led to an entirely different approach in the development. That was the fact that the patents applied for were valuable over any other patents covering a similar machine, such as are almost universally in use in motion picture theatres. Under such patents it would have been possible from the start to construct a small machine suitable for many purposes, and one that could be manufactured and sold at a profit to any concern having need for a ticket selling and recording machine. The coin control device, which under any circumstances was too expensive and wholly unreliable, could have been eliminated. However, before all these points were brought to the attention of those interested, the money allotted for the venture, amounting to some $125,000, had been spent with practically no result. The men behind it had reached a point where they were naturally enough discouraged, if not disgusted,

and were not inclined to give the proposition further financial aid. So that this enterprise by force of unguided circumstances is yet at a standstill and has been for over two years, although, if handled in the manner just outlined, these patents would have unquestionably proven valuable. This is a very typical illustration.

There is a certain class of inventors about whom it is very difficult to speak in terms of moderation. Many of them are the veriest rascals who defile the paths of progress and bring discredit upon worthy and sincere men who need and should have financial assistance. The writer refers to that not infrequent variety of inventor represented by men who are utterly devoid of scruple or consideration for their backers in the manner in which they handle the funds placed at their disposal. They are often on the lookout for yet another credulous person with a fortune, while engaged in wantonly squandering the funds which they have in hand. In many cases their stock in trade consists of elaborate plans and specifications, which they use as a bait, but which they know in their hearts will never get beyond that state. Proper investigation would soon put a stop to such activities, and the money thus wasted would find proper channels of employment. Fortunately, this class

of individuals is in the minority; it is more frequently the lack of sound business judgment than of principle that makes for failure.

The fact that there are unscrupulous inventors of this character makes it the more imperative that capitalists and backers of inventors should insist upon a thorough preliminary investigation of any development proposition placed before them. As previously stated, such an investigation should cover a careful study of the prior art to determine the patentability; an examination by engineers and skilled mechanics into the designing and general construction with a view to profitable manufacture, and a thorough study of the possible market for the device. If such an investigation is conscientiously carried out, the type of inventor last referred to would find it difficult to obtain capital for carrying out his wonderful schemes.

In many instances the *entrepreneurs* of epochal inventions are able to indicate only the general course for their future development. For this reason all who are called upon to furnish capital for such purposes should look well to the question of just who is best fitted to coöperate with the inventor in perfecting his invention. In many cases no one but the inventor himself sees into the very heart of his discovery, and for this reason the

greatest tact and care should be exercised not to get away from his original idea or principle and thus destroy it. There are cases of just this nature, where those who attempted the development have failed to grasp fully the ideas of the genius who has conceived them, and have spent more than a million dollars before they realized that in the inventor himself rested that peculiar vision and understanding which alone could make the invention a success, or at least must be grasped by the engineers to avoid failure. Such cases are not infrequent, and the following should illustrate the case in point.

Back in 1908 the old Field Museum in Chicago was badly in need of repairs, and it was decided to give the building a coating of gypsum stucco. The old method of applying stucco is primitive and expensive, and on this job a great invention was conceived. Carl E. Akeley invented the cement gun. This invention was destined to revolutionize certain methods of building construction. The gun is designed for "shooting" a coating of cement, mortar, or the like on construction surfaces, as, for instance, on brick, concrete, steel, tile or woodwork. It is operated with compressed air, and the mortar is deposited in a uniform manner with so great a force that it not only adheres, but also expels by its im-

pact all superfluous air and water, and in this way becomes of a density that makes it an excellent waterproofing medium.

Although the first principles of the invention have proven to be absolutely correct, the development of the cement gun saw many trying days for its inventor and backers, due to the fact that the men in charge of the development failed to grasp the problem, and not until the inventor was again called into the councils of those exploiting it did the gun really come into its own. Its future is now established, but more than a million dollars was lost, and the inventor is just beginning to reap the benefits of his genius.

One of the most vital causes of the failure of inventors can be laid at the door of incompetent or unscrupulous patent attorneys. A timely warning in this regard will be sounded in a later chapter, for it can be stated advisedly that under the existing methods of patent procedure the value of a patent depends as largely upon the skillful preparation of specifications and claims as upon the merit of the invention itself.

There are various dangers and possibilities for failure which threaten the inventor who takes out his patent prematurely. The application should be filed as soon as the scope of the invention is fully realized and not be-

fore. Of course, it must always be borne in mind that the inventor should have the advantage of anterior date of application, for, as has been stated, most problems worth solving arouse the ambition of more than one inventor.

The application once filed, the inventor should not seek to have the issue unduly hurried through the Patent Office, and quickly to obtain his patent. He should then be more concerned in perfecting his invention, otherwise he may find that his claims do not fully cover the invention, and that further patents are necessary, which increases the expense and involves the question of foreign patent protection. Worse yet, he may find to his sorrow that he has obtained a narrow and practically worthless patent, which precludes the grant of one broad enough to cover his invention.

At this juncture the writer feels that it will be well to proceed to a general review of the laws governing the practice of patent law.

CHAPTER II.

THE ORIGIN AND EVOLUTION OF AND A GENERAL REVIEW OF THE LAWS GOVERNING THE GRANTING OF PATENTS.

1. Origin of Patents. 2. Abuse of Special Privileges. 3. Henry III and His "Easterlings." 4. Henry IV and Queen Elizabeth Grants. 5. Patent Monopoly Case, Darcy vs. Allin, year 1602. 6. Relief by Statute of Monopolies, year 1623. 7. Present Patent Laws. 8. Rights of Inventor. 9. Patent Interpretation. 10. Bell Telephone Case. 11. Perfection no Requisite to Obtain Patent. 12. Edison's Incandescent Lamp Case. 13. Patentability. 14. Classes of Inventions and Respective Definitions. 15. Process and Machine Patents. 16. Manufacture and Construction Patents. 17. "Composition of Matter" Patents. 18. Design Patents. 19. Reissue Patents. 20. "Disclaimer" Protection. 21. Assignment. 22. Patent as Personal Property. 23. Marking Patented Articles.

Before further discussing the question of patents, it will be found interesting to review briefly the origin of and the several causes leading up to the legislation from which the present-day practise in regard to the granting of patents has been evolved.

What is known as the "common law" entered into the matter only in the most incidental way, either in England or America, prior to such time when enactments of a legislative nature were applied to patents for in-

vention. Property rights did not obtain at common law as far as discovery or invention were concerned. Beyond question, however, there did exist at common law the right by royal prerogative of the king to grant as suited his pleasure such protection to his subjects, at least for a prescribed time. Nevertheless, previous to any such enactment *no right of property* existed under the common law, and without the exercise of this arbitrary power, vested in the crown, the inventor or discoverer enjoyed no rights to the exclusion of others in the product of his genius. Once he disclosed its existence, or the means of reproducing it, it then became public property, and his rights thereto never exceeded those of all others who wished to exploit it. With such power at the king's command, subject entirely to his personal whims and purposes, it is quite obvious that the opportunity for abuse of this power was great. Abused it was, and it would seem that this prerogative was seldom exerted for the public weal.

Favorites at court and greed of gold seemed to be the chief incentives in the granting of these special privileges, and the abuses increased in proportion to the moral fibre of the reigning monarch and those who enjoyed his favor. In the hands of an unscrupulous ruler it supplied a most ready means of obtaining

revenue to defray profligate expenditures at court. When used for such purposes it naturally caused paralysis of trade and brought about commercial decay. It was not uncommon for the affixing of the seal of royal approval upon a bit of parchment to spell complete ruin to some shop or manufactory representing not only large capital, but years of toil and sacrifice.

From the reign of Henry III to that of Edward VI almost the entire control of England's commerce was in the hands of foreigners, mostly men from the Hanse towns. Henry III's love of these "Easterlings," as they were called, was notorious. To them he had granted special privileges and formed a corporation in order to induce them to settle in London. During these three centuries they were maintained and protected by the crown to the exclusion and detriment of the English citizens.

With the beginning of the reign of Edward VI (1551), relief came, and these privileges were greatly restricted. Then for a time the industries of England began to thrive in the hands of her own citizens. Slowly, however, other abuses equally as bad and as injurious to trade began to make themselves manifest. The royal prerogative was given or bartered for mercenary consideration, and the bulk of

the trade of London and of England again became absorbed by the few.

Under Elizabeth this pernicious practice reached its high-water mark. The very necessities of life were controlled under royal grant by a chosen few of her favorites. Salt rose from sixteen pence to fourteen shillings the bushel, while other staples soared likewise through the grafting activities of this favored coterie of monopolists. Along with their arbitrary power came the right to violate personal liberty to the point of searching stores and private property to hunt for such commodities as would infringe upon their unfair advantage.

If we but pause and contemplate the past, we shall often discover, to our confusion and chagrin, that we of to-day are in many ways only feeble imitators of the virtues and vices of our illustrious forebears. We rail against corporate greed and the trusts, while we have only to read history to discover that present-day methods suffer by comparison when placed beside those employed by these distinguished trade buccaneers of 1600. We find that, even after James I had endeavored to help matters by rescinding the rights of monopoly by grant, a group of London merchants formed a gigantic trust for the con-

trol of foreign trade, and succeeded in raising and lowering the price of imports at will.

Before Parliament took steps to correct the situation arising from these many abuses of the royal prerogative, private individuals carried the question of their rights before the court of the King's Bench in the form of infringement suits. It will be interesting in this connection to cite the case of Darcy vs. Allin (1602), where the patent of monopoly was defeated and the validity of the letters-patent was denied.

In the thirteenth year of her reign, Queen Elizabeth granted to one Ralph Bowes the exclusive privilege of making, importing or selling playing cards, for the period of twelve years, which was subsequently extended to the plaintiff, Darcy, an assignee of Bowes. Darcy brought suit against Allin to restrain him from manufacturing playing cards. It was not contended that Bowes had invented playing cards. It was contended that under the grant made to him, by virtue of the Queen's prerogative, he had the exclusive monopoly of the trade for the period mentioned. In other words, it was not contended that Bowes had conceived anything, or that he had discovered or invented anything which had not been known before. Neither was it contended that the king had not the right to

grant exclusive privileges for limited periods of time, where the grantee, by his own charge and industry, wit or invention, introduced any new trade into the realm, or any engine that was never used before, and tending to the furtherance of the trade, and for the good of the realm. In such cases, the king had the undisputed right to grant a monopoly patent for a reasonable time, as consideration for the benefit the grantee brought to the commonwealth; otherwise not.

In this case the defendant denied the right of the crown to make such an exclusive grant, and contended substantially that the liberties of the subjects in this regard were maintained to them by the Magna Charta.

The question of prior knowledge or use was discussed, and it was contended that even where letters-patent had been granted by the sovereign for alleged inventions, they were invalidated where it could be shown that the particular article protected had been known or used within the kingdom before. In support of this the case was cited where a monopoly was granted for knives with bone hafts and plates of lattin, to a Mr. Matthey of Fleetbridge, he being alleged to have brought the same from "beyond the seas." Other knives of similar character were shown to have been in use in England prior to the introduction of

those in question, and the defendants were not restrained.

The case of Darcy vs. Allin was decided in favor of the defendant, and the right of the sovereign to grant an exclusive monopoly for anything other than an invention or importation previously not in use within the realm was denied. In 1603, at the beginning of the reign of James I, came the first real relief from the evil of monopolies, which culminated, in 1623, in the Statute against Monopolies, by which it was enacted that all monopolies were contrary to the laws of England, and were declared null and void. There was, however, embodied in this statute a wise exception (Section VI), and in the provisions therein contained will be found what might well be considered the true foundation of the laws which to-day govern the practice of patents, both here and abroad. This section was as follows: "Provided also, that it be declared and enacted: That any declaration beforementioned shall not extend to any letters-patent or grants of privilege for the term of fourteen years, or under, hereafter to be made of the sole working or making of any manner of new manufacture within this realm, to the true and first inventor of such manufactures, which others, at the time of making such letters-patent and grant, shall

not use, so as also they be not contrary to the law nor mischievous to the State by raising prices of commodities at home or hurt of trade, or generally inconvenient; the said fourteen years to be accounted from the date of the first letters-patent or grant of such privilege hereafter to be made; but that the same shall be of such force as they should be, if this act had never been made, and of none other."

We shall now consider the present laws which govern the granting of patents in the United States.

In the sense of the old common law a patent granted for a useful invention does not constitute a monopoly either under our laws or those of England. It is a grant upon the part of the Government to the author of such an invention of the exclusive right for a term of years of practising that invention. This grant is made by the public as consideration for the benefit to the public resulting from the invention. Such benefit accrues in two forms: by the practise of the invention under the patent; or the opportunity to practise it, which becomes the public's right upon the expiration of the patent.

The undisputed and moral right of the inventor to enjoy the exclusive rights to his invention for a limited period of time; and the

great incentives to invent; and the large benefits that come with such an incentive are fully recognized in most countries. The laws of the United States are the most liberal of all in this respect. It has been to a considerable measure this liberality which has made this country preëminent in the world of invention. On the other hand, it is this very liberality, splendid though it is, which is to a large degree responsible for the unnecessary waste discussed in the opening chapter of this book.

The rights of the inventor in the United States are based solely upon the power given to Congress by the Constitution of the United States and upon Federal legislation. This Federal power, of course, comes from the powers and privileges which the States have conferred upon the National Government through the Constitution.

Section 4886 of the revised statutes states that:

"Any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, or not printed or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in pub-

lic use or on sale more than two years prior to his application, unless the same has proved to have been abandoned, may, upon payment of the fee required by law and other due proceeding had, obtain a patent therefor."

Embodied in this brief section is substantially the basic fabric of the patent law of the United States as it exists at the present time. Nevertheless, these lines are required to be interpreted and re-interpreted in nearly every suit in which the question of patent validity of an invention is involved. Furthermore, each case rests upon its own merits or demerits, and there is no branch of litigation in which each individual case requires so independent a view as that which concerns the question of patents.

This section defines to a certainty who is entitled to a patent. It also defines those things which are subject to patents, but numerous cases rest upon a border line, which renders a just interpretation very difficult. It should be thoroughly understood that few patents can be said to be valid until their validity has been given the test of litigation. This brief section has been the subject of volumes of decisions, and will continue to be as long as any such statute exists.

When a person has an invention for which he desires a patent, he must comply with

certain conditions laid down by statute. Inasmuch as the patent granted is of the nature of a reward for the introduction of a new manufacture, it is granted conditionally on the inventor's making a true and full disclosure of his invention and the mode of performing it, so that men skilled in the particular art may, without having to investigate or solve the problem of its difficulties, know how to carry it out for their own and the public's benefit after the expiration of seventeen years. For this reason the inventor must file at the Patent Office a specification setting forth clearly what his invention is and the mode of performing it. When this is done, it is the duty of the Examiners in the Patent Office to thoroughly examine the prior art relating to the invention in question, and carefully consider the claims of the application, and see that his claims do not cover inventions shown or described in prior patents, or devices or features which already are public property or the subject-matter of prior grants. In this way, the Government attempts to insure validity of the patent it may grant and, therefore, every patent issued is considered prima facie as valid. It is practically impossible for the Patent Office to know all that has been done in a particular art and, occasionally, claims are granted which later

are found to be invalid in view of prior use, or prior patents or publications not discovered or known to the Patent Office Examiner. If the validity of the patent is questioned, the matter is taken up and determined by the Federal Courts. The courts, as a rule, are fair in their consideration of the inventor's rights, and it is the general practice to hold a patent valid unless there is convincing proof to the contrary.

It should be clearly recognized that just what constitutes patentable invention is far from being as easy of definition as the average layman would suppose. It is true that Section 4886 is brief and explicit. It defines absolutely who is entitled to a patent. It also defines absolutely those things which are subjects of patents. That these two points are clear, no court in the United States may question. It must be remembered, nevertheless, that courts interpret, and that the highest tribunal can not give a set or infallible rule governing doubtful cases.

A border line, that intangible frontier of the patent world, exists as certainly as does the great Continental Divide. Upon this line many of the most valuable, and for this reason the most bitterly contested, patents rest secure, but this security only came as the result of judicial opinion. Thus far this line has de-

fied accurate definition. To know this ideal boundary is to know what is and what is not patentable invention.

When the authorities at the Patent Office at the time of an application for a patent are in doubt as to whether or not this line of demarcation has been trespassed, they usually and rightfully bestow the benefit of such doubt upon the applicant, and allow the claim. If subsequently the courts are called upon to pass upon the validity of such a patent, and in their minds this doubt still exists, their decision will be influenced in great measure by the consideration as to whether or not the invention has proved to be commercially valuable and successful. The reason for this attitude is found in the assumption that for an invention to be successful commercially there must reside within the invention itself an inherent cause for such success. Take, for example, the renowned telephone cases, which illustrate this point, as does also the well-known litigation in connection with Edison's patent for the incandescent electric lamp. Parenthetically it might be stated that where it is plain that great public benefit will result from an invention, it requires very slight evidence of invention to secure a patent. To enjoy it is another matter.

In the matter of the Bell telephone patents

we find that there was a mass of alleged anticipatory testimony submitted, some of it very convincing. The court also regarded some of the testimony with suspicion, but Bell had this great advantage. He had described a means, possible of successful operation, of transferring to an undulatory current of electricity the vibrations of the speaking voice in such a manner that the articulate speech was conveyed to and received by a listener on the line of such a current. Here beyond question was one of the mighty inventions of the age. The public had never before been given such an invention, and it certainly would have required conclusive evidence of anticipation to have deprived Bell of his rights to his patent.

Here is the fifth claim of the Bell patent: "A method of and apparatus for transmitting vocal or other sounds telephonically as herein described, by causing electrical undulations similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth." Upon this broad claim the Bell Company rested their entire case.

At the time Bell applied for his patent, he had never really transmitted spoken words telephonically, so they could be understood distinctly at the receiving end of the line.

Neither had he given the public a commercially operative device, nor had he ever constructed one himself. Nevertheless, in rendering the Court's decision, Chief Justice Waite said: "In his specifications he did describe accurately, and with admirable clearness, his process; that is to say, the exact electrical condition that must be created to accomplish his purpose; and he also described, with sufficient precision to enable one of ordinary skill in such matters to make it, a form of apparatus which, if used in the way pointed out, would produce the required effect, receive the words, carry them to and deliver them at the appointed place. The particular instrument which he had and which he used in his experiments did not, under the circumstances in which it was tried, reproduce the words spoken so they could be clearly understood, but the proof is abundant, and of the most convincing character, that other instruments, carefully constructed and made exactly in accordance with the specifications, without any additions whatever, have operated and will operate successfully."

It is reasonably sure that prior to his application for a patent Bell had not been as successful in actual experiments as some others who had experimented along these lines before him, but no one had reduced this

invention to practise, either on paper or in the form of a device, to the extent that Bell had brought it.

The Court said, *inter alia*: "Some witnesses have testified that they were unable to do it (construct an apparatus from Bell's patent); this shows that they, with the particular apparatus which they had, and the skill they employed in its use, were not successful; not that others, with another apparatus, perhaps more carefully constructed or more skillfully applied, would necessarily fail. * * * When the question is whether a thing can be done or not, it is always easy to find persons ready to show how not to do; if one succeeds, that is enough, no matter how many others fail. * * * The law does not require that a discoverer or inventor, in order to get a patent for a process, must have succeeded in bringing his art to the highest degree of perfection. It is enough if he describes his method with sufficient clearness and precision to enable those skilled in the matter to understand what the process is, and if he points out some practical way to put it in operation. This Bell did."

It cannot fail to interest the reader if, in order to elucidate further the question under discussion, he is given a brief review of the case of the Edison Electric Light Company vs.

The Columbia Incandescent Lamp Company, on motion for a preliminary injunction which was refused. It will be well to state at this point that in every suit in which Edison's patent issued in 1880 for the incandescent electric lamp has been at stake, his broad claims were ultimately sustained.

The defense was based upon the following alleged facts: That a German, Henry Goebel by name, possessed of some knowledge of electricity which he had acquired in Europe, had come to New York City, prior to 1854, and had opened a small shop in the lower part of the town. Here he pursued a sort of desultory trade in the repairing of watches, and also of telescopes and other optical instruments. It seems that while yet residing in his native land, the idea of producing light by means of passing an electric current through the medium of a film, rendered incandescent in a vacuum globe, had been suggested to him. After he came to this country he employed his odd moments in working out this idea, and succeeded in making, as early as 1854, films from strips of bamboo which he encased in air tight globes, and by connecting with a current, produced what was substantially an incandescent light. His lamp, though crude and differing in form, was, in its fundamental fea-

tures, much the same as those now in common use.

Goebel exhibited his lamp in his shop window as a curiosity to attract trade. It appears that he also exhibited the device about the city in the evening, suspended beneath a telescope, which he set up in the public squares, charging a modest fee to those who wished to look at some wonder of the heavens.

Some forty years elapsed before the world was to hear of Goebel's effort. He then constructed several of these lamps, using the same tools and materials, and caused the Edison Company not a little anxiety, for it was thought by some experienced patent experts at the time of the suit just cited that it was highly probable that Edison might be shorn of the honor of being the inventor of the incandescent lamp.

Section 4886 reads: "Any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, etc." is entitled to a patent. This surely leaves no doubt that any one, be the inventor black or white, male or female, minor or adult, native or alien (provided of course that the other requirements of the law are complied with), enjoys the right to a patent. It does not say, on the other hand, what invention is. Primarily, this, the most difficult

of all questions in patent practise, is left to the Patent Office. Ultimately it is for the courts to decide. There never can be a fixed rule, and in border-line cases the court will take into consideration the success of the invention and its value to the public, and if possible will resolve all doubts in favor of the inventor and the validity of the patent. It has been decided that for an invention to be entitled to protection it must be the product of some exercise of the inventive faculties, and not simply the result of employing the constructive faculties of the mind. Let the reader ponder over this distinction, and he will in a measure appreciate what often must be the problems that confront the inventor and the attorney who is called upon to prosecute his claims.

The word "patentability" is one to conjure with. Its exact significance is something few inventors have been fortunate enough to escape. Nearly every case requires that it be approached from a different angle or point of view.

Under Section 4886, patents are granted for four classes of inventions, viz: useful art, machine, manufacture, and composition of matter. To simplify a consideration of these, they may be further condensed into three classifications, viz: process patents, machine

patents, and product patents. In the patent law sense, an art is a method or process; machines form a distinct class, while manufacture may be resolved into one large class, and may be termed a product.

In patent practice, and as interpreted by the courts, the word "art" has a restricted meaning. In the same way a process must be distinguished from a principle. A process can be patented—a principle can not. Therefore, in determining what is and what is not a patentable process very fine distinctions must be drawn if we are to keep within the contemplation of the Act. The mere use or employment of a particular element of nature to do or operate a particular thing would not in itself be a patentable process. In all cases the thing accomplished must come as the result of some exercise of the inventive faculties of the inventor or discoverer. The adaptation or use of an electric current for printing intelligible characters at a distance was decided not to be a patentable process. This case (O'Reilly vs. Morse) is very celebrated, and the decision conveys this distinction very clearly in a negative sense. Chief Justice Taney, in his opinion on this case, remarked: "No one, we suppose, will maintain that Fulton could have taken out a patent for his invention for propelling vessels by steam,

describing the process and machinery he used, and claimed under it the exclusive right to use the motive power of steam, however developed, for the purpose of propelling vessels. * * * Neither could the man who first discovered that steam might, by a proper arrangement of machinery, be used as motive power to grind corn or spin cotton, claim the right to the exclusive use of steam as a motive power for the purpose of producing such effects."

On the other hand, if some force of nature, known or unknown, is applied to a material or physical object in a novel manner, and brings about heretofore unknown results, the inventive faculties have of a certainty been brought into play, and such a process would be subject of patent. It is not always essential that the product obtained shall be a *new* product, provided the operation of the known force upon the physical object is new in the manner employed and described. The practical application of a known force to a new object is a new art, and the practical application of a new or heretofore unapplied natural force is a patentable process. An art may require one or more processes or machines in order to attain a certain result or manufacture. The term "machine" embraces every mechanical device, or combination of me-

chanical powers and devices, to perform some function and to produce a certain effect or result. Where, however, the effect or result comes as a result of chemical action, by the operation or application of some natural element or power, or of one substance to another, such modes, methods or operations are termed "processes."

Processes are usually discovered; machines are invented. Such arts as vulcanizing, tanning, smelting, etc., are carried on by processes as distinguished from machines.

In contradistinction to the word "art," in the patent law sense, the word "machine" carries with it a much broader meaning than is conveyed by the common acceptance of the term, and its definition is much less recondite than that of "process." What a machine is everyone can define. In the common acceptance of the word, it is a device composed of one or more parts for performing mechanically given operations. Patents are constantly being issued for improvements on machines in their most minute details. Whether the machines are new, or sufficiently novel over the prior art, or the improvements are novel and useful, and show true invention: these are the questions considered for the most part where machine constructions are concerned.

To give some idea of how broad is the mean-

ing of "manufacture" in a patent sense, it will be found that under this class patents have been granted for the construction of houses and many major constructions of buildings. While almost as broad as its derivation implies, it must be remembered that it does not include machines or compositions of matter.

Good examples of what is patented under the class of "composition of matter" are substitutes for leather, rubber, etc. A composition of matter is generally a product obtained from the chemical action of its ingredients. It may, however, take the form of a product composed of various parts of matter mechanically united. To be patentable, it must in its entirety produce different results from the aggregate, independent results of the respective ingredients; that is to say, the ingredients in the combination must lose their individuality, and bring about different effects in the combination than they produce separately and as independent organisms. This class of patents gives rise to much litigation and controversy.

Design patents are provided for under the Revised Statutes in another section than those just reviewed. This section (4929) reads as follows: "Any person who has invented any new, original and ornamental design for an article of manufacture, not known or used

by others in this country before his invention thereof, and not patented or described in any printed publication in this or any foreign country before his invention thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon the payment of the fees required by law and other due proceedings had, the same as in cases of invention or discoveries covered by Section 4886, obtain a patent therefor." The term for design patents may be for three years and six months, for seven years, or for fourteen years, as the applicant may elect. Design patents receive their protection on account of their appearance and ornamental effect, and not on account of any functional utility. The patentability of designs is determined by a very different method than that employed when the identity of a functional patent is to be determined. Their identity is determined by the effect on the eye of an ordinary observer; the question being, Does the alleged new design appeal to the average observer as being different from the design with which it is being compared? Expert comparative testimony is rejected.

There are in patent practice what are

known as reissues. These are provided for under Section 4916 of the Statutes.

"Whenever any patent is inoperative or invalid, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his own invention or discovery more than he had a right to claim as new, if the error has arisen by inadvertence, accident or mistake, and without any fraudulent or deceptive intention, the Commissioner shall, on the surrender of such patent and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specification, to be issued. * * *"

The defect may arise from the fact that the applicant claims too much, and wishes to file a more limited claim; on the other hand, he may not have claimed as much as the specification would warrant. In many cases the invention is defectively described. In such cases the most expert advice is necessary, and delays are dangerous.

The rights of an inventor are further protected by what is known as a "disclaimer." (Section 4917). Where a patentee has claimed more than that of which he was the true inventor or discoverer, if the part is material, and the claim occurred by reason of inadvertence, accident or mistake, and without any

fraudulent or deceptive intention, he may file a disclaimer of such parts of the thing patented as he shall not elect to claim, and his patent shall be valid for all that part which is justly his own. Such proceedings are generally had either to avoid or enforce infringement. The latter becomes necessary before damages can be recovered, for the reason that that part of a patent to which a disclaimer should be entered could not be infringed.

Were no provisions made whereby a patentee could sell his patent, or grant licenses thereunder, his patent would be of little value to him, provided he did not wish to engage in the manufacturing business himself. Section 4898 provides that every patent or any interest therein shall be assignable in law by an instrument in writing and that a grant may be made covering the whole or any specified part of the United States. Great hardship and loss are likely to result, however, from the fact that three months' time is allowed for the recording of the assignment. A much shorter time would be ample. Take for example:

"A" executes an assignment to "B", in consideration for $10,000 paid upon the delivery of the deed. "B" has made a title search, which discloses no assignment of record. Within three months, "C" records an assignment

from "A" for the same patent, executed and delivered prior to the date of the deed to "B". "A" is as financially irresponsible as he is dishonest, and "B" has lost $10,000, while "C" serenely holds title to the patent. Exceptions might be made, where a deed must come from abroad, but otherwise thirty days would seem ample to cover all legitimate contingencies. In all matters of assignments, trustworthy legal talent should be employed unless the patentee has had long experience in such matters. One should regard with extreme caution the man who advertises to execute assignments for the modest fee of five dollars.

Patents are personal property, and form a portion of the patentee's estate. They cannot be attached and sold under common law procedure, but are liable to a creditor's bill in equity, and if the judgment upon which the bill is based is not satisfied, the patent rights may be sold under the order of the court.

Under existing laws, if an inventor, either from philanthropic, patriotic, or other motives, wishes to dedicate his invention to the public, he must bear the entire burden of the expense, including the usual fees and cost of development. Were this not the case, the Patent Office might be flooded, especially in time of war, with worthless cases, to the detriment of the regular business. Of course many inventions,

some of them quite valuable, are unwillingly dedicated to the public through some bungling in the prosecution of the applications.

The law requires that all patented articles be plainly stamped "Patented," and with the date that the patent or patents were granted. If like notice be placed on the package containing the article, or affixed in some manner to the article itself, so doing constitutes the same thing as actually stamping the article. Failure to comply with this regulation does not invalidate the patents, but no damages can be collected for infringement, provided the infringement is not persisted in after due notice has been given. Many articles are marked "Patented" after the patent which protected them has expired, and by so doing the manufacturer incurs no legal consequences, but so to label an article which in fact is not patented, constitutes a serious criminal act.

In the following chapter will be given a general outline of the steps necessary to procure a patent for an invention.

CHAPTER III.

PROTECTING AN INVENTION OR DISCOVERY BY PATENT.

1. Patent Solicitor. 2. Copies of Patent. 3. Petition and Oath. 4. Drawings. 5. Specifications. 6. Title of Application. 7. Claims. 8. Division of Claims. 9. Board of "Examiners-in-Chief" Appeal. 10. Commissioner of Patents Appeal. 11. Court of Appeals. 12. Fees. 13. Time of Applications in Patent Office. 14. Abandonment and Revival of Applications. 15. Forfeited Application. 16. Interference. 17. Limitations of a Patent Grant.

The first thing for an inventor to do in order to secure a patent is to obtain the services of a reputable and capable patent solicitor. Do not seek him through the advertising columns. The man who is intelligent enough to invent does not seek his physician through that medium. Seek unprejudiced advice from someone whom you think is in a position to recommend the proper person. The number of inventors who are capable of prosecuting their own cases is limited to the point of being negligible. This of course does not apply to such concerns as employ a regular staff of patent experts. The first thing such an attorney will ascertain is whether the inventor has made a careful study of the prior art, and he will then examine the data which

have been procured. If he is not satisfied with the thoroughness of this investigation, he will have another careful search made from the files at the Patent Office. The imperative need of this preliminary investigation was fully covered in the opening chapter.

The United States Patent Office leads the world, except, perhaps, Germany, as regards the thoroughness of examination into the novelty of an invention before allowing a patent. The files of the office are always available to the public. All printed matter, books, magazines, descriptions of foreign patents, and all references of every possible anticipatory nature are so arranged, under heads and subheads, as to make all references for a given case most accessible, if such exist. Copies of patents can be obtained from the Patent Office for the nominal cost of ~~five~~ 10 cents each, and by availing himself of these, the inventor can have before him everything which has gone before along the lines on which he is working. Such an investigation, if carefully and intelligently conducted, will be equivalent to the search which will be made by the Patent Office examiner to determine the patentability and novelty of the invention.

The rules of practise are very clear as regards the subject of drawings, and the applicant's attorney will see that the drawings sub-

mitted are prepared by a competent draftsman and that they comply as closely as possible with these rules. If the inventor, without consulting an attorney, should have drawings made for this purpose, the draftsman should be informed of the use to which they are to be put. As models are no longer required, or accepted, except at the specific request of the Patent Office, it is very important that the drawings be prepared in a manner which completely and clearly discloses the invention. The inventor should never allow his application to be filed until he has most critically examined a copy of the drawings illustrating his invention, and assured himself that they conform to his ideas, and that they bring out all the novel features of his device. Remember that a drawing can be read and interpreted in only one way, and that there have been cases involving the validity or scope of a patent which have been decided by the Supreme Court of the United States by what was shown in the drawings. Well executed drawings are also an important feature when capital is sought for an invention.

The specification and claim or claims are the really vital and essentially important parts of the application. The latter constitute by far the most important part, for the patent is based upon the claims, which should

be carefully worded to define the applicant's invention, an example of which is contained in the specification and shown in the drawings. The scope of a claim may be modified by the wording of the specification, for the specification and drawings are considered in interpreting claims, but an applicant must never expect that his patent will cover any feature not included in the claims, no matter what is included in the drawings or specification. Neither can any new matter be incorporated in a pending application. These are important points little understood by many inventors, but these and other matters of form can safely be left to the competent attorney who will readily advise the inventor as to his best interests. There must be no intentional reservations or omissions in the specifications. Any such withholding of facts is in direct opposition to the spirit of the law which grants the inventor a monopoly for a term of years in order that the public may have the full benefit of the invention when such term expires. It is very necessary that the description be prepared with the greatest care, and that it be precise and explicit in every detail, so that anyone skilled in the art would be able to carry out the invention without difficulties. The reader will remember how important this was in the suit involving

the Bell telephone patent, and the remarks of the Court on the subject. Prolixity should be avoided. Strive for a "happy medium," and be sure that your ideas are fully covered. The better informed the inventor is on matters pertaining to patent law the better he will be able to assist his attorney and to see that his interests are being properly cared for. The inventor should study his art from every possible angle. There are cases where lengthy specifications, including references from scientific journals or proceedings, are permissible.

The writer should perhaps have mentioned the title, which in many cases is more important than would be supposed. The title for a patent should never be vague, but should convey a direct and suggestive significance. This insures it proper classification, and prevents much confusion for those who subsequently make searches with a view to purchases or in ascertaining the state of the prior art. Frequent changes are required by the Patent Office where titles do not properly describe, and there have been cases where patents have been entirely lost sight of for this very reason. It has been held that *an applicant should be permitted to retain a title which he believes peculiarly fitting or desirable, unless such title is*

in fact inaccurate, or there is some other substantial reason why he should not.

The claim is the vital and pivotal wedge of the patent, and the greatest care should be exercised in the preparation. The keenest and most expert skill is required to lay out properly the claims for a patent. It requires even greater skill so to manipulate them with attention to the prior art and rules governing patentability that they may be allowed. It matters not how clearly the specification may state the novelty of the invention, the scope of the patent never exceeds what is set forth in the claims. Its commercial value is vested in the claim or claims and in those alone. In this fact lies the cause for thousands of worthless patents. It is a very simple matter to get a patent through the Patent Office, where perhaps only one claim out of the several embodied in the specification is allowed, and it is imagined by the inventor that his patent covers all that he sought. In many other cases the claims are so badly prepared that the inventor does not get what he was entitled to, in some cases getting a very narrow patent where it was possible for him to have secured a very broad one. It must be remembered that the Patent Office examiner is the servant of the public and it is not his prerogative to

point out to the inventor how he can secure advantage over his client, the public.

For this reason it is necessary to impress upon the inventor the value of bringing into the case the skilled attorney as soon as possible. The inventor is almost sure to be without experience in the prosecution of patent applications, and without skill in drafting claims and determining the scope of claims with regard to references cited by the Patent Office.

Claims should not be a complete description of the invention. The detailed specification is for that. They should embody only a concise and clear statement of the invention, covering every feature of the invention as far as possible in view of the prior art. Proper practise should be rigidly observed, and particular attention paid to possible infringement or equivalents.

In many cases the question of division of claims is involved, and it must be borne in mind that two or more independent inventions cannot be claimed under one application. A careful avoidance of this mistake will mean a minimum of unnecessary expense and complications with the Patent Office. Division, when the additional expense is not warranted, can always be avoided by anticipating it in the first instance. Of late years the Patent Office has

become very strict in the matter of division in certain classes. This makes the expense of fees very high for patents covering complex mechanisms, and fine discrimination is necessary to decide just what patents are absolutely required properly to protect the machine without needlessly adding to the cost. Nevertheless, if the inventions are valuable, the broadest possible protection should be secured regardless of cost.

It frequently happens that inventors keep constantly adding improvements to a certain machine, taking out additional patents whenever possible to cover these features, eventually getting a very complicated mechanism, often to a point that it might be termed "top-heavy." An expert analysis on the part of a skillful mechanical engineer might disclose a means to remodel the machine and reduce it to a very simple mechanism and yet embody all of the improvements which have been evolved and added to the original. The writer knows of a new motion picture camera which is destined to revolutionize motion picture photography. In this instance the inventor has produced a second model, embracing all the advantages of the original, and many additional improvements, and yet has so simplified the whole that it can be manufactured at one-third the cost of the camera first designed.

If, as can easily be the case even with a carefully considered and properly prepared application, the claims are rejected in whole or in part by the Examiner, the applicant is entitled to the following recourse. It is not uncommon for the examiners to be wrong in their decisions, and to reject claims to which the applicant is actually entitled. It would be most unjust if such errors could not be adjusted, and for this reason the law wisely provides that where an applicant has had his claims twice rejected he may take his case to the Board of Examiners-in-Chief, a quasi-independent body, composed of three experts carefully selected for their particular fitness for such duty. This Board, in the case of an appeal, will consider the entire record of the case as set forth in the notice of appeal and the Examiner's statement in reply to said notice. If in their judgment, and in view of their findings, they are convinced that the examiner has erred in his decision, they will reverse his decision, render a judgment in favor of the applicant, and allow the claims. The cost of such an appeal, irrespective of the attorney's fee, is ten dollars.

If, however, the Board of Examiners-in-Chief renders an adverse decision, the applicant can then, upon payment of the Govern-

ment fee of twenty dollars, appeal his case to the Commissioner of Patents.

From the decision of the Commissioner of Patents the applicant has one last appeal, and may have his case presented before the Court of Appeals of the District of Columbia, the highest tribunal to which the case may be carried. This involves a docket fee of fifteen dollars and the cost of printing the record.

Regardless of the cost in Government fees the legal expenses connected with appeals are usually very heavy, and the inventor should exercise great caution before taking such action. It should first be determined whether the claims sought are really essential to the proper protection of the invention; then the relation of the claims to the prior art cited by the examiner, and on which the rejection is based, should be very thoroughly studied, to ascertain the chances of success. The reliable attorney will advise his client in these matters and frankly discuss with him every phase of the situation with a view to saving the client unnecessary expense.

As a rule cases of abandonment are the result of neglect or incapable prosecution. The law requires that cases must be completed and prepared for examination within one year from the date the petition is filed. By this it is not meant that the prosecution of a patent

must be completed in one year, as we have mentioned cases which have been pending in the Patent Office for years. The law allows one year from the date of each action of the Patent Office in that particular case. It is best in most cases to take advantage of the full time allowed, as the term of the patent commences with the date of issue. There are many causes that can be the reason for these delays, such as litigation or other extenuating circumstances.

By certain responsive actions, clever inventors and lawyers have succeeded in keeping applications pending in the Patent Office for years for the sole purpose of being eventually bought off, when an opportunity presents itself to enter an interference. Patents which are pending are never open to the public for examination, and are therefore impossible to reckon with when an examination of the prior art is made. Of course, an expert investigator can often obtain valuable information concerning projected inventions, which would not be disclosed by the search made of the records of the Patent Office. In this respect, however, the inventor must take his chances, and he can never tell when an interference will be entered. The importance of carefully preparing for such a contingency was pointed out in Chapter One.

When an application becomes abandoned for any cause the applicant may have it revived if it can be clearly proven that the delay was beyond the control of the interested parties.

The writer knows of a case where a situation involving a fortune was completely saved, but only because of the fact that an application for a patent had been tied up in the Patent Office for twenty years on account of protracted litigation. The inventor had long since died without ever receiving an issue of his patent. Without a patent covering the claims incorporated in this dormant application, the rights to which were purchased from the estate of the inventor, the machine (a voting machine) which was projected could never have been placed on the market, inasmuch as the all-important feature of the whole was anticipated by the acquired patent, which, had it been issued in due course, would have long since expired and been open to use to all who wished to apply its principle. The salvation of this project came as the direct result of an expert investigation instituted upon the request of an interested individual approached for additional capital for development.

A forfeited application differs from an abandoned application in that the issue is withheld solely for failure to pay the final

Government fee. After a patent has been allowed the applicant is granted six month's time in which to pay this fee. If this requirement is not met within the allotted time the application becomes forfeited. The remedy comes in the form of a renewal, and the original fee for filing is forfeited and must be again paid. There is great danger in this, as forfeited or abandoned applications are not cited in reference, and should another make application, setting forth the same or similar claims, no notice of such application will be given to the party who first applied.

The term "interference" is applied to a proceeding instituted by the Patent Office to determine who is the true inventor, where two or more inventors make application for a patent covering the same idea or ideas. If two or more applications are pending disclosing this condition of affairs, the Patent Office will on its own motion declare an interference. Notices are then mailed to the applicants, and testimony must be taken bearing on the dates of conception, reduction to practise, etc., in strict accordance with the prescribed rules governing such contests. The writer cited a typical interference case on page 19. Interference cases have often been tainted with perjurous and trumped-up testimony, and are at best a most expensive and exasper-

ating proceeding. They must be argued by counsel and the merits of the case are decided by the Patent Office on the testimony submitted. The Patent Office Tribunals hearing these cases endeavor to render fair and impartial decisions on the evidence presented. It sometimes happens that the first inventor fails to establish his case because of lack of proper evidence to legally establish his dates, and sometimes an inexperienced attorney fails to handle the case properly. It frequently pays to settle the case between the parties and buy out the other party. If this is done, concessions should be filed such that the real first inventor obtains the interfering claims, otherwise if the patent ever gets into court a fraud may appear and invalidate the patent. If an application is rejected upon reference to a patent issued less than two years prior to said application, the applicant can enter an interference by filing a request together with an affidavit that he had reduced the invention to practise prior to the filing of the patent.

Inventors seldom realize the limitations of a patent grant or the many setbacks they may encounter after they have received an issue. The general impression seems to be that with the possession of a patent comes a complete and unquestionable license for the exclusive

prosecution of the inventor's conception of his invention, irrespective of the claims secured. Such an idealistic state of affairs seldom or never exists in practice.

The Patent Office Examiners endeavor in their examination of the art to cite all references pertinent to the invention under consideration. They are not infallible, however, and the classification of patents in the Patent Office files is not perfect, therefore, it occasionally happens that a patent is allowed to issue with claims to which the inventor is not entitled. It frequently happens that to manufacture under a patent of this character means a serious infringement of some other patent. It is, therefore, of vital importance to the patentee, and more particularly to the capitalist and backers of the patent, that they should employ a competent attorney and expert to supplement the Patent Office examination and thoroughly investigate the prior art by an independent search to determine the validity of the claims in question.

As has been clearly stated before, the matter of validity can be settled only by the courts. There are great disadvantages in this, and evils that arise therefrom might in a great measure be corrected by wise legislation. Under the present system of patent law practise, the inventor is put on the defensive,

a situation which would be impossible under a system embodying the main principles of the German system in this regard. Many an inventor has forfeited his rights, or parted with them for a pittance, simply because he was unable to stand the financial burden placed upon him by protracted litigation. It has been conclusively proven that patents have comparatively little value unless they have been passed upon by the highest of patent talent (involving large fees) or until they have run the gamut of the courts, which is after all the only true test of their worth. This is rapidly becoming the point of view of the modern business or moneyed man. Thus the existing patent laws introduce inventors to difficulties which often accompany them through life, not infrequently blighting their lives and robbing them of their better attributes.

All the foregoing serves to emphasize the fact that there is no phase of industrial activity where the services of capable and conscientious specialists are so requisite as in the development of new inventions, and none in which the public is more entitled to legislative reform in order that men with original ideas shall be fully protected and encouraged.

CHAPTER IV.

FOREIGN PATENTS.

1. Foreign Right Promotion. 2. Indiscriminate Patents Abroad. 3. Business Abroad. 4. Life of Patent Grants. 5. Rules for Foreign Applications. 6. International Convention Governing Patents. 7. Examination of Inventions in Different Countries. 8. Value of Protection. 9. Trade Mark Registration.

The reader should now have gleaned from the pages of the foregoing chapters the necessary understanding of the laws which govern patent practise in the United States. He has seen how, despite their apparent simplicity and liberality, many an inventor has found that they have only enticed him into difficulties. The writer now wishes to voice a note of warning with regard to applying for foreign patents. Few inventors are aware of the many requirements they must stand ready to meet, if they wish to enjoy benefits from obtaining patents abroad.

When the United States Patent Office grants a patent for an invention, as far as the Government is concerned the last dollar of costs has been paid. The owner thereof may, or may not, as the case may be, enjoy his full rights thereunder for the full period of its

term, seventeen years. He may work it, assign it, accept royalties on it, or allow it to remain idle, as he disposes. He will never be called upon, unless new legislation is enacted, to pay a cent of taxes of any kind for his privilege. He has only to champion its validity or defend it against infringement.

With that first flush of enthusiasm born of achievement an inventor is apt to cajole himself into the belief that his accomplishments are to set the entire world agog, and he will hasten to obtain patents in every country where patents are issued, without the slightest consideration of the advisability of so doing. He naturally enough assumes that the first cost is the only cost, as he found to be the case at home, and only too frequently the unscrupulous attorney does not find it to his own interest to disabuse his mind. "Where ignorance is bliss, 'tis money in my purse," is his legal motto, if we may be pardoned for taking liberties with the adage. On the other hand, the reliable attorney will tell him that in most countries he will have an annual tax to pay, in the majority of instances increasing in amount each year, in default of which his patent becomes forfeited. He will be told that in most of the foreign countries the patentee is required to work his patent (actually manufacture within the realm) within a pre-

scribed time, usually three years. Such information might chill the enthusiasm of his client for foreign patents, but the conscientious attorney will always consider the best interests of his client and advise him against unnecessary expense.

It would seem quite logical to suppose that if an invention is worthy of patenting in one country, it would therefore be a good subject for patent wherever there may be found a ready market. This is in some measure true, but the existence of these markets and the peculiar conditions which surround them must be given most deliberate consideration and determined on scientific principles.

It is a common occurrence for patents to be taken out in all countries having a certain minimum population, quite regardless of the suitability of the device to these particular countries. To take out patents on an invention which has to deal only with mining, in a country which does not engage in mining, is obviously as absurd as to patent some expensive luxury in a country the poverty or frugality of whose inhabitants is well known. Nevertheless just such things occur. In the promotion of companies to handle the foreign rights of an invention, these rights are valued in many instances solely on the basis of population, an arrangement which causes

the Russian rights to be estimated as ten times the value of the Dutch rights, while as a matter of fact there might be a most limited or no demand for the article in Russia, while Holland might afford an exceptionally fine market for just that particular thing.

In order to ascertain what foreign patents should be taken out, the inventor or those who represent his interests should consult with some firm of unquestioned standing that has specialized in exploiting patents abroad. There are such firms, most of them with a network of foreign connections affording them especial facilities for determining the suitability of the invention to the several countries. The infinite number of factors entering into such findings are quite beyond the grasp of the ordinary inventor. There might be a big demand for an article in some particular country, but conditions there might be peculiar unto themselves, so that no manufacturer on the ground would purchase the patent or even work it on a royalty basis. Absence of the proper kind of labor would be a good reason, or the industry might perhaps be so divided that there would be no concern large enough to handle it successfully. There might be a host of local reasons standing in the way. Under such conditions it would be a wanton

waste of money to apply for patents in such a country.

Let us, on the other hand, take for granted that there does exist a good market for some patented invention in certain foreign countries. This being the case there are questions that the inventor should put to himself: Am I, or are my backers, in a financial position to establish factories abroad, advertise, and organize a selling force? If not, are there foreign firms who will purchase my rights, and if so am I equipped to negotiate with such firms successfully? If the inventor cannot answer these questions satisfactorily, without attempting to deceive himself or those interested, he had better leave the foreign field alone, and endeavor to dispose of his rights to a well established concern that has the necessary capital and other facilities for making a success of the business. Not the least of these facilities is a thorough knowledge of the business methods of each particular country.

As a general rule it will be found that the expense of equipping a foreign plant and of creating an organization abroad is so great that, if not actually prohibitive, it still will not yield adequate returns on the investment. It is usually only the large corporations, such as the General Electric, Westinghouse, Ford, American Radiator, Eastman Kodak, etc.,

that have enough capital and talent to work the foreign field to advantage.

Should the inventor decide, however, not to dispose of his patents to a concern in his own country, the wisest course for him to pursue would be to intrust his foreign negotiations to some firm of recognized standing that makes a specialty of handling such propositions. Concerns of this character usually maintain offices in various foreign countries, and before attempting to sell a patent, or place it on royalty, will have practical demonstrations conducted for the benefit of the possible customer, to prove the worth of the invention and its adaptability to their needs. Another advantage in employing such a concern lies in the fact that they, having a reputation abroad based on past transactions, will command the confidence of their clients in a way an unknown American inventor could not. The greatest care should be exercised, however, in the selection of such a firm, because once chosen its members must be entrusted with information of a most confidential nature and given a free rein in the arrangement of terms. Beware of the man who informs you that the Europeans are always on the *qui vive* for any American invention that looks at all promising. It has not infrequently happened that an inventor by indiscriminately securing pat-

ents abroad has so crippled himself financially as to be unable to put his invention on the market at home.

The following case which came to the attention of the writer is pathetic almost to the point of being humorous, although the unfortunate man who played the title role must indeed be an optimist if he ever sees more than the bitter side.

A certain inventor, possessed of very limited means, had conceived a complicated but meritorious device having to do with automobiles. His device was good, worked perfectly, and although it was in the nature of a luxury, still it should have had a future if a proper plant could have been equipped for its commercial manufacture. Instead of conserving his resources to place himself in a position to raise the funds required for this purpose after obtaining his United States patent, this credulous man was led to believe by his attorney that the automobile owners of Europe were nervously waiting his invention, and would never rest in peace until their cars were equipped with his device. What he did not lead him to believe was that under the laws of the various countries he would be compelled to pay an annual tax or forfeit his rights. Neither did he inform him about their requiring him to manufacture within their midst.

The law says nothing about the necessity of a lawyer's so enlightening a client, so why should he be annoyed by such formalities? We have mentioned his kind earlier in this chapter, and will discuss him *in extenso* in the next.

There are about seventy-five countries issuing patents, and our inventor tried to miss as few as possible. The more important countries in which he took out patents will suffice for illustration, namely: Canada, Great Britain, France, Belgium, Germany, Austria, Italy and Russia. It might be well to mention Guatemala, for it figures in the end of the story. The total cost of securing his patents caused a marked shrinking in his bank account, but they were a handsome lot of documents and he considered them well worth the cost. Now that he had, as he supposed, made himself secure in these various countries, he felt that there need be no hurry as to when he should elect to begin equipping their motors. He was not to enjoy his contentment on this score for long, for the various countries seemed to feel differently about it. Much to his surprise he received a notice at the end of the first year that unless a tax of $23.00 was paid on his French patent, the same would be forfeited, and that in such an event he had paid out his good money only to show the

French people how to make his device. He further found that he would have to keep on paying taxes for the entire fourteen years allowed under the French grant, making a total of $322, regardless of first cost. Worse still, he must begin manufacturing in France before another year rolled around.

"Strange," he thought, "my attorney said nothing to me about this. I had better investigate the laws of the many other countries where I have patents."

It occurred to him for the first time that this would have been the proper thing for him to do at the very beginning. He was not long in finding out that other countries, not wishing perhaps to be outdone in politeness by the French, had very similar laws, in some instances much more expensive. The total taxes he would have to pay in Germany, Austria and Russia alone amounted to $2,439. He had not figured on equipping factories all over the world to satisfy the requirements of the different governments. Yet this was what he must do, or surrender his rights. In the meantime things were not going well with him at home. His invention had not created the furore that he had expected. Having spent all his ready money, this unfortunate inventor mortgaged his real estate, borrowed to the extent of his credit, disposed of his furniture

and finally the roof over his head. When heard of last he was trying to sell his Guatemalan rights at what he considered a sacrifice to raise enough money to prove that he had something worth selling in the form of an invention. And regardless of all this, the motor cars purr noiselessly around the globe without any apparent need for his device.

There are, of course, many instances where foreign patents are most important. To the larger modern manufacturers a group of foreign patents is quite essential to insure a profitable business abroad, and this feature is particularly valuable when trade conditions are poor at home. There have also been instances where an inventor, not being able to get the serious attention of the American manufacturer, has been compelled to seek recognition abroad and has been very successful there. Nevertheless, except in rare cases, the opportunities for the inventor are greatest in the United States, and in the opinion of most successful manufacturers, the better policy is to expend the money required for foreign patents and the equipping of factories on developing the industry here, and to depend upon whatever export business can be procured.

Throughout the civilized world the grant of a patent is the only form of monopoly which

has the sanction of the law and of public opinion. In order, however, that the public should not be deprived of the benefits of a natural progress in the arts and sciences, the terms of these special privileges are limited to a period of years, after which the public is entitled to the free use of such inventions or discoveries.

In the United States the period allowed is seventeen years; in Canada, eighteen; in Great Britain and Australia, fourteen; in Germany, Austria, Switzerland, France, Portugal, Italy, Russia, Japan, Norway, Sweden, Denmark, Argentina, Brazil, and many other countries, fifteen; in Spain, Belgium and Mexico, twenty years. It would appear that the longest term is allowed by Colombia, where a patent at the discretion of the Government may be granted for fifty years. The shortest term allowed by any country obtains in Uruguay: nine years.

Novelty is, of course, the fundamental requirement of patentability in all countries. It must also be "useful." What constitutes patentability according to the standards of the United States patent laws has been discussed at length, but in the various foreign countries it will be found that the respective patent offices have widely divergent views as to just what constitutes a "new" invention or discov-

ery. This point is of great importance to inventors who contemplate foreign patents. In some instances "new" means that the device or process has never been "worked" in the country in question; in others that it has never been published in the country. The status of the invention in other countries has no bearing in such instances. The most common test is whether or not there is sufficient disclosure to enable an expert to manufacture from such publication.

On the other hand, in certain countries the ruling is that if an invention has been worked or written about in another country—and this includes even the official patent publications—it shall be denied patent protection. For this reason, the American inventor who wishes to obtain patents in such countries, must apply for same simultaneously with his United States patent.*

Most foreign countries, however, are more liberal in this regard, and extend to the inventor a specified length of time after the issue of a patent in his own country, in which

---

* The reader will now see the significance of the reference on page 27, pointing out the fact that a narrow patent issued in the United States, although possibly correct here, will be a fatal bar to a broad patent in a country such as cited.

to apply for a foreign grant. A certain few have special rules governing patents of importation, and in some instances, in fact generally, the life of a patent expires concurrently with expiration of the home patent.

An International Convention for the Protection of Industrial Property now exists, of which convention the United States is a member, together with the following countries: Great Britain, France, Belgium, Italy, Japan, Hungary, Holland, Denmark, Brazil, Norway, Mexico, New Zealand, Portugal, Greece, Spain, Servia, Santo Domingo, Sweden, Switzerland, Cuba, Australia, Austria, Germany, and a number of European colonies and dependencies.

Under this convention, the first application for a patent in any of the subscribing countries gives to the applicant protection for twelve months from the date of the application in all countries of the Union. In some of the countries, however, which have subscribed to the Convention, if anyone manufactures the product prior to the filing of the application, he may continue to do so without paying any royalties to the patentee, even after his patent is secured. The patentee, whose patent is granted under this International Convention is given three years from the date of application in which to begin to

"work" the invention, regardless of whatever the local law is in this respect.

In most highly developed industrial countries the examination system is used, in varying degrees similar to that of the United States Patent Office. France is quite a notable exception, as no attempt is made to examine into the merits of an invention. This is also true of most minor countries, where little industrial development exists. In one or more Latin-American countries the action of the Government is entirely arbitrary in the matter of granting patents, the term of the grant, and the amount of fees and taxes demanded. Even greater care is necessary in the selection of an attorney for the prosecution of foreign patents than in the United States, as what constitutes a well drawn claim in one country may be of no value whatever in another.

The value of the protection which should come with a patent varies with the country of issuance. In a few countries a patent affords very complete protection, particularly in Germany, where it is guaranteed by the Government until a successful suit is brought against the Patent Office for annulment. In many others, including the United States and Great Britain, the Government refuses to guarantee anything in a patent, and merely gives the patentee the exclusive right to the use of his

invention for a period of years, but leaves it entirely to the inventor or patentee to protect his rights. There are undoubtedly existing to-day in this country scores of patents which would not hold water if suit were instituted against an infringer, who can present every manner of defense to discredit the validity of a patent. This is far from the case in Germany. Lack of novelty, unpatentability, or absence of proper description, is not a defense in an action for infringement, and after the expiration of five years a German patent is incontestable for any cause. An infringement constitutes a criminal act. If such a law obtained in the United States, it would soon put a stop to the operations of the professional infringer.

In those countries which make no examination—France for instance—the applicant takes out a patent entirely at his own risk as to whether it possesses any validity whatever or infringes a prior patent.

In Great Britain and other European countries foreigners who fail to work the patent issued in that country can, in the public interest, be compelled to grant a compulsory license or otherwise forfeit the patent. In most European countries the Government has the prerogative of purchase for use for Governmental purposes, chiefly military and naval.

Where this is done, or licenses are exacted, reasonable compensation is allowed.

Trade Marks.

The great importance of completely protecting a business name by registering trademarks covering it cannot possibly be overestimated. Without such protection a manufacturer could not hope successfully to build up an export trade. Registration in the United States gives absolutely no protection abroad. It is quite a common practice to "pirate" and counterfeit American marks. For this reason registration should be made as soon as possible. Registration is granted to the first applicant in Germany, Sweden, Hungary, Portugal, Japan, and most of the Balkan countries. This is also the case in about one-half of the Latin-American countries, including Argentina, Chile and Uruguay.

It is to be deplored that in many countries the laws do not always recognize the person who is morally entitled to a trademark. This permits any unscrupulous schemer, if he first registers a mark, to become the legal owner thereof, although he may never have manufactured or sold the product which it covers. Thus manufacturers who have built up a reputation for a certain product to the extent that it is internationally known by a certain trade

name, have, when they have sought a foreign market for their goods or device, discovered that their mark has been pirated, and find themselves placed in the position of being infringers and lawbreakers. Although such a condition of affairs would hardly seem possible in any civilized community, yet this very thing has happened again and again, and the rightful owner must either compromise and submit to such blackmail, or relinquish his rights, as far as that particular country is concerned, to the name which he has created. Mexico has been particularly distinguished for encouraging this form of commercial brigandage.

The writer has touched but briefly upon the subject of trademarks, but wishes particularly to emphasize the importance of the manufacturer or inventor fully acquainting himself with the various laws of foreign countries in this respect.

CHAPTER V.

PATENT ATTORNEYS.

1. Credulity of Inventors. 2. Responsibility of Preparing Patent Applications. 3. Qualification of Patent Attorney. 4. Advertising Patent Attorneys. 5. Reliable Patent Attorneys.

To an extremely large number of would-be inventors the mere word "patent" has a magical sound. To them the word spells "open sesame," and a patent is an Aladdin's lamp to light their way to palaces of untold wealth. They actually regard the possession of such an imposing document in the light of a diploma from the Government, marking them off in strong contrast to the vulgar herd, much as the green turban of the Mohammedan who has made a pilgrimage to Mecca distinguishes him from his less fortunate brother. This really pathetic frame of mind is little to be wondered at if we will but peruse some of the alluring "dime novel" literature distributed broadcast by a small army of advertising patent solicitors.

It would seem that there is no weakness peculiar or common to mankind which cannot be and is not profitably exploited by those adroit gentry who advertise to do almost anything from curing consumption in sixty days

and obtaining divorces without publicity, to securing patent protection or money refunded. Those who proffer these beneficent offices to the public are one and all actuated by the same purpose, the obtaining of "easy money" from the credulous and gullible. Most of us are familiar with the late P. T. Barnum's classic observation apropos of this very credulity, and the correctness of his judgment is confirmed by the millions of dollars which annually find their way into the coffers of the aforesaid gentry. It is this credulity which keeps the inventor poor, impedes the machinery of the Patent Office, and fattens the purse of the unscrupulous and the advertising patent solicitors.

The laws dealing with the granting of patents in the United States are so liberal that they permit any citizen or alien to prepare his own patent papers, quite irrespective of his ability or training for such work. For this reason many a valuable invention has been lost, and all its potential possibilities gone for naught through the attempt of an inexperienced man to prosecute his own patent claims. Above all other considerations the inventor should understand that the important thing is not merely to obtain a patent *per se*, but to secure one which will afford him real protection. Such patents can rarely be obtained ex-

cept by persons who have made a professional study of the patent question, and of wide experience in patent practice. The work is at once technical, intricate and exceedingly difficult, as the foregoing chapters should clearly indicate. Because of this it is found that there are a great number of men engaged in patent practice who are wholly unfitted to engage in this branch of the legal profession because they do not have sufficient technical education in mechanics and science, and lack the necessary skill and experience. Any lawyer in good standing can, regardless of his qualifications, register, and engage in patent law, and any other person can become registered as a patent attorney, by presenting sufficient evidence to show that he can be of service to inventors in the prosecution of applications for patents. A certain proportion of these incompetent attorneys are honest men, unconscious of or unwilling to admit their limited ability or knowledge. A far greater proportion is made up of individuals of varying degrees of scruple and conscience, who feel a much keener interest in their fees than in the welfare of their clients. The balance of the incompetents are absolute scoundrels who prey upon the unsuspecting until their crooked practices come to the attention of the authorities of the Patent Office and they are dis-

barred. Many of these legal wolves are still at large. There have been instances where such men have changed their names after being disbarred from practice, in order that they might for a while longer continue their predatory careers.

It would be impossible for the authorities at the Patent Office to keep themselves posted as to the characters of the thousands of men who have dealings with the Department. It is only when some flagrant misconduct is brought to their attention, such as an attorney filing applications for the same patent claims on behalf of more than one client at the same time, or similar nefarious practices, that they feel called upon to act. It must be understood that the routine work of the Patent Office is so enormous that it does not permit of any studied effort to safeguard the interests of those seeking patent protection, in so far as it relates to the selection of a patent attorney. Such surveillance does not come within the province of the office, and if the inventor does not conserve his own interests by the proper selection of his legal advisers, no one else will. The importance, therefore, of an inventor's making most careful inquiry into the qualifications, both moral and technical, of the attorney he retains is obviously vital.

It is doubtful if there is any profession

where, apart from skill and knowledge, that element known as "moral hazard" plays such an important part as in the practise of patent law. The inexperienced inventor, when he seeks the services of a patent lawyer, should give careful attention to the following considerations:

First—Integrity,
Second—Proven Ability,
Third—Experience,
Fourth—Circumspection.

The importance of the first consideration cannot possibly be underestimated, for to his attorney the inventor must disclose every detail in connection with his work. He becomes a confidential adviser in the deepest significance of the term. As regards the matter of ability, the inventor should ascertain from proper sources the past record of his solicitor in connection with other claims, and such information will be readily available concerning any reputable attorney. It is hardly necessary to lay particular stress upon the value of experience as it plays the same part in every line of human endeavor. It will be well, however, again to call attention to the wisdom of selecting an attorney who has had wide experience along lines kindred to the invention under consideration. Circumspection is abso-

lutely essential. Inaccurate or slipshod methods have no place in the proper investigation of an art, or in the preparation of patent applications; in fact there can be no circumstances where the slightest inattention to details may be more fatal. Remember that the examiners at the Patent Office will not call attention to errors or omission, provided they do not trespass upon the rules of the office. Also remember that in the hands of an incompetent or dishonest solicitor the most meritorious invention may be rendered worthless to the one who has conceived it. Ask a patent attorney of high standing, and he will tell you that the average patent issued to-day has little or no value to its owner, as the specifications and claims are so poorly prepared. The inventors have simply paid out good money to show others of experience the principles of the inventions; having dedicated to the public all of those features of their inventions, not covered by proper claims, the benefits of which rightfully should have been enjoyed by the originators.

Before entering into a detailed discussion of the activities of the advertising patent solicitors, the writer begs to put the following questions to the reader: Have you ever known a surgeon, practitioner, or medical specialist of high standing, enjoying the respect of his

community and the profession, who has created this respect through the advertising columns? Have you not known of scores of undesirables who have depended upon this medium to obtain a livelihood?

Such individuals are constantly being denied the use of the mails by the Federal authorities. So great have been these abuses that the intelligent public quite naturally regards with suspicion any professional man who resorts to newspaper advertising to secure clients. Such methods are hardly compatible with real ability. The reader must now form his own conclusions. The analogy should certainly be apparent.

There are patent solicitors who conduct their work on an ordinary quantity production basis. Such solicitors can not be considered as giving value or dignity to this profession, which is of such great need to the progress of our inventors and the industries for which the former are responsible. It is a known fact that what often appears to be a large organization of patent solicitors is the nest only of young under-paid clerks who follow a certain prescribed form of operation to manufacture patents. The boss, owner or leader of them is some man who emerged from the roseate field of adventurers, but not

from the expert offices of our worthy patent solicitors.

The following is typical of the form of advertisement so often encountered in the classified columns of many leading magazines and periodicals:

PATENTS! FREE! Obtained or FEE returned. No charge for search as to patentability.

Write for our three great books:

"HOW TO INVENT AND WHAT TO INVENT,"

"HOW TO SECURE A PATENT,"

"FORTUNES IN PRIZES AWAIT INVENTORS."

All free upon request. Send sketch or model. Our patent sales department gets full value for our clients.

SWINDEL & MYTH,

284 Caveat Bldg. Washington, D. C.

Fortunes have been made out of a large portion of the unsuspecting public by just such advertising methods, supplemented by a system of follow-up letters, with no higher aim than to deceive trusting individuals and to filch from them; and this is combined with an utter disregard for the quality of service they profess to render. Frequently the methods they employ barely come within the law, and cases are by no means rare where the criminal statutes have been actually violated.

Let us analyze the advertisement used for the purpose of illustration. To start with, the offer of a free search is an absurd humbug on its face. Such service has a certain money value ranging from five to twenty dollars, according to the amount of work required. As a rule, five dollars should cover the expense of a preliminary examination and copies of patents pertaining to the one under consideration. It is better to pay the reliable attorney a search fee of ten or twenty dollars, or more if necessary, with the assurance that he will devote a reasonable part of his valuable time to the consideration of the inventor's problems, and assist him to determine the relative patentability of his inventions. For the sake of an example we shall take it for granted that the reader has conceived an idea which he thinks is sufficiently novel to make it the

subject of a patent and can be put on the market with profit. We shall also take it for granted that he is wholly unfamiliar with the proper procedure to ascertain the proper course to pursue. Seeing such an advertisement, he writes to Messrs. Swindel & Myth, enclosing a drawing of his invention, and requests that they also forward their free books. He shortly receives a reply, stating that they have made a preliminary search (whatever that may have been), and that in their opinion his invention has great merit. They state further that if he will forward five dollars they will make a special search (this being the actual search), in order to determine definitely its patentability. In the meantime he will have received their books, and if impressed by their contents he will forward the money in order to receive their "Certificate of Patentability" which he is assured will be of substantial assistance to him in seeking aid from friends or others to secure funds for defraying the expenses incident to obtaining a patent. He will then receive their opinion and Certificate of Patentability, supplemented in all probability by an enthusiastic correspondence relative to the great potential value of his invention, and a request for another payment of twenty dollars. For this amount they agree to prepare

the application papers, including one sheet of drawings, and forward them for his approval and signature, when he must return them duly executed, together with the balance of fees, say twenty-five dollars, for what they term a simple case, and his application will be officially filed. In most cases the opinion will be of the same or of less value than if he had consulted the corner grocer. Nevertheless, the books he has received have warned him against the wiles of the unscrupulous attorney, and have assured him that Swindel & Myth are the men of the hour and among the chosen few to be trusted. He therefore forwards the specified amount, and shortly receives his papers. The specifications and claims apparently cover his invention, so they are returned with the balance of the fees. It is well known that in more than 90 per cent. of applications filed, the Patent Office, upon initial action, rejects one or more claims upon reference to prior patents. These are usually the claims which are broadest in scope, and it is a simple matter for the attorney to cancel those claims which are objected to, and secure an issue covering the limited and restricted claims. It is also simple to appreciate of what value such a patent will be to an inventor.

In all probability this is precisely the character of patent the applicant will receive upon

the payment of the final fee payable to the Government within six months from the time he receives notice that his patent has been allowed. Now if we assume that his invention had no merit, either through lack of novelty, prior use, or existing patents, a reputable attorney would have so advised him instantly. If on the other hand it was worthy of proper protection, it may now have been rendered useless, thanks to the clumsy bungling of Swindel & Myth. It has been explained, however, that a defective patent can be reissued, and if promptly placed in the hands of a competent attorney the situation can usually be saved for the inventor.

The writer does not wish to give the impression that all patent attorneys who use advertising methods, even of a somewhat similar nature to the ones mentioned, are dishonest, or do not endeavor to give the best service at their command. There certainly must be some who are actuated by honest purpose, but, at best, the literature that they issue is a large contributory cause for the thousands of patents that are issued which are valueless and which complicate the work of the Patent Office to a deplorable degree, to say nothing of the tremendous financial waste occasioned.

To return to the advertisement printed, it will be interesting briefly to review the free

booklets offered. "How to Invent and What to Invent" will be found to be a most flamboyant brochure informing its readers that men or women with the ordinary quality of intelligence can become inventors if they will but cultivate their ideas. Unless quoting such geniuses as Thomas A. Edison, George Westinghouse and others, and printing photographs of the Patent Office, and the spacious offices occupied by the firm, together with several pages of well known mechanical movements, is calculated to teach the art of inventing, nothing more than mild amusement can be obtained from such literary efforts, unless the remarkable information that perpetual motion cannot be solved is enlightening. If there is anything left out which should *not* be invented, from ink to buildings, it is hard to discover. The result of all this kindly advice and suggestion makes itself manifest by the thousands of would-be inventors who flood the Patent Office with requests for recognition for every manner of ingenious device to cover the same use. To sum up such booklets, a good rule to follow would be *"What to invent is what not to invent."*

"How to Secure a Patent," and similarly titled publications, give a general outline of the steps necessary to procure a patent, with a careful avoidance of the many difficulties

which confront the inventor and a studied insistence that the firm issuing the book is the only firm which will be able to lead the client to success and wealth. Despite the brilliant and capable patent lawyers who have practised and who are successfully practising in New York, Philadelphia, and other large cities, if one were to believe the statements of these past masters in self laudation, he would be convinced that Washington is the only place in America where the practise of patent law can be properly conducted. To give credence to such drivel is as absurd as to take "Fortunes in Prizes Await the Inventor" seriously.

Another means employed by the advertising solicitors, further to augment their incomes, is to claim to be specialists in "rejected cases."

"Because one attorney has failed to obtain an issue is no reason why we should not succeed," is their modest plea. "When all others fail, consult old Dr. Quack" is quite synonymous. This very frequently appeals to the inventor who has met with disappointment, and as an initial advance fee is demanded, usually five dollars, the aggregate of these small fees alone runs into large figures. If the inventor can be convinced that there is still hope, the solicitor will remain upon his payroll for another space of time. The adage, "A burned child dreads the fire," finds many ex-

ceptions among that class of inventors who take "How to Invent and What to Invent" seriously.

One of the most deplorable practices of certain attorneys, patent selling agencies, and self-styled patent brokers, is the inveigling of inventors to apply indiscriminately for foreign patents which they know full well will be absolutely valueless. It has become a widespread and most serious evil, and every effort should be made by the Federal authorities to stamp it out. Such unscrupulous men urge, after such patents have been taken out, that the inventor apply through them for foreign patents, with the full knowledge that such patents, though obtainable by reason of the fact that in many countries there is no preliminary examination as to novelty, will of necessity be invalid by reason of the issues obtained here.

It is also not uncommon for the attorney to take out a great number of unnecessary patents, covering every little unimportant feature or improvement of a machine or device. The fees of the advertising and wholesale type of attorney for obtaining patents are small, sixty-five to one hundred dollars being usual for an application not involving any special or unusual amount of work, and as the profession is overcrowded with men who attempt

this line of work, many solicitors could hardly exist unless they padded the expense of their client in this manner. Of course a man of high principle would not be a party to such unethical methods. On the other hand, corporations, and others interested in important inventions, spend thousands of dollars taking out patents on seemingly unimportant details of an invention, and consider that it pays to do so. It will be understood, however, that this is done under the direction of a competent attorney.

Many unscrupulous attorneys will encourage a client, for the sake of the fees he can obtain, to apply for patents which he knows to be of no commercial value to the inventor. But it frequently happens that the inventor is to blame, and insists on filing applications for patents on inventions which his attorney advises him are of little or no value.

Reliable Patent Attorneys.

It is perhaps unnecessary to state that no attorney of high standing, nor one who is jealous of his reputation and hopes to attain to prominence in his profession, will resort to any petty practices in order to obtain additional fees.

The writer is personally acquainted with a prominent attorney, an inventor himself, who

gives up considerable of his valuable time to advising men who seek his services against attempting to obtain patents. By profession both an able mechanical engineer and an attorney with many years of experience, this man has devoted much of his time in attempting to correct the abuses which have made themselves manifest in the practice of patent law.

There are many such men who practise before the Patent Office, but unfortunately the services of the majority of our great patent lawyers are not available to the average inventor. They quite naturally command large fees, and in many cases are retained by a few prominent clients whose patent work is of such proportions that these men have little time for general practice. In many cases, however, these prominent patent attorneys have junior associates whose services can be obtained, and their methods naturally follow the trend of their worthy preceptors. If an invention has sufficient potential value to warrant its protection by patent, it most certainly merits being handled in the best possible manner. With patents, as with everything else, cheap service generally proves the most expensive in the end.

There are many competent and efficient attorneys whose efforts are directed to the best

interests of their clients, both as to advice given and in the conscientious and thorough prosecution of patent applications entrusted to their care. Such attorneys are invariably fair in their charges, which are usually based upon the time consumed in the study and preparation of the specification and claims of the application. The same care and thoroughness is devoted to the study of references and the further prosecution of the application through the Patent Office. Unfortunately, inventors have been misled by the advertising type of attorney and have acquired the notion that patents may be secured at so much per, just as the contractor would agree to build a row of houses. It will be understood that some inventions are simple and require comparatively little time on the part of the attorney for preparation and prosecution, while other inventions, even though apparently simple, require an enormous amount of concentrated effort, study and work to get the proper protection and overcome the difficulties and objections raised in the Patent Office. For this reason, it will be apparent that the fees of the reliable attorney cannot be based upon or compared with the fees of an advertising attorney or one who attempts to obtain patents by the wholesale. The conscientious attorney who thoroughly understands the

general sciences and mechanics in particular, both theoretical and practical, and who has had a wide experience in the prosecution of applications, is obviously better fitted to grasp the inventor's point of view and, therefore, is enabled to more clearly present the invention to the Patent Office. He is also enabled to study and understand any references cited by the Examiner during the prosecution of the case, and more clearly distinguish the applicant's invention from the references.

It is the bargain hunting inventor who more readily responds to the wiles of the advertising attorney. It is false economy for inventors and their backers to figure on spending thousands of dollars on the development of a desirable commercial invention, which may require an investment of $50,000 or more to manufacture and market, and expect to save by bargaining with a cheap attorney to take out the patents, which are the very foundation of the business. Of course, a commercialized invention may fail for lack of merit, but, if successful, there will be imitators unless the patents concerned indicate that no expense or effort has been spared to obtain the broadest protection. Such patents are less likely to be infringed, particularly if the manufacturing investment required is large.

Some attorneys, while conscientious in their

efforts for the client, do not have sufficient educational training in science and mechanics or practical designing to fully understand the invention in all its details, and for this reason they rely largely upon the inventor to point out to them what he considers the essential novel features of his invention. It is highly desirable that this should be done under all circumstances, but it is also desirable that the attorney selected should be able more thoroughly to comprehend the novel and patentable features of the invention than could be expected of the inventor. If the attorney is thoroughly skilled in physics, mechanics and general science, as well as having more or less practical knowledge of inventions from the inventor's point of view, such an attorney can usually see much further as to the scope of an invention than the inventor. Such an attorney's experience in drafting claims and preparing the specification and drawings to properly and completely cover the invention, should be emphasized as of much greater importance in securing valid patents than could ordinarily be obtained by the inventor, either alone or in connection with an attorney who does not go into the subject fully, or depends for his information upon the inventor.

CHAPTER VI.

EXPERT INVESTIGATION.

1. Report on X Ignition System. (a) General Information on Ignition Systems. (b) The High Tension Magneto. (c) The Induction Coil. (d) The Wipe Spark System. (e) The Atwater—Kent System. (f) Spark Plugs. (g) X Ignition System. (h) X System Applied to Ford Car. (i) Compression Test. (j) Time Tests. (k) Advantages of X System. (l) Disadvantages of X System. (m) Report on Patent Situation X Ignition System. (n) Conclusion. 2. Report on "Bacon" Multiplying Machine. (a) Findings. (b) Recommendation. (c) Engineering Report. (d) Patent Situation. (e) Investigation of Commercial Field. (f) Findings of a Commercial Nature.

It has been the aim throughout this volume to emphasize the importance of an expert preliminary investigation, supplemented by an exhaustive analysis, before any industrial project is attempted involving the commercial exploitation of a new invention or discovery, or of an alleged improvement on existing devices or methods. The vital need of such a procedure cannot be disputed. This chapter is formulated with the object of showing how such investigations are carried out by firms who make a specialty of this service for bankers and individuals, and who are for this reason equipped with laboratories, shop equipment, and an organization made up of men ex-

pert in the many lines involved. As the particular design of this chapter is to point out to the banker or investor the manner in which such investigations are accomplished, the writer considers that the best method to effect this design is to print in detail the results or findings of two such investigations. In selecting examples for the purpose of illustration, the writer has chosen, first, a project which was well advanced in its development, but had reached a point where those interested saw the importance of such a course before further capital was invested, and second, one which was in its incipient stage.

In each case the investigation was conducted by a firm of industrial engineers, who have made such service an important department of their business. It has been deemed best to publish these reports as much in detail as possible in order to show clearly the thoroughness of such work when properly handled.

In the first case cited the investigation was carried out at the request of bankers who were approached to finance the invention in question, and whose final decision was based entirely upon the findings.

In using these reports other than the original names have been substituted to designate the devices and the parties in interest; otherwise no material changes have been made.

REPORT COVERING THE MERITS OF THE "X" IGNITION SYSTEM.

General Information Concerning the Ignition of Explosive Mixtures, and Existing Ignition Systems.

When inflammable fuel and air are mixed in correct proportion, they will burn, and so rapidly that such burning constitutes an explosion, which is, of course, only extremely rapid combustion. It is known, however, that the full firing of an explosive charge (in the case in question, gasoline and air) does not take place instantaneously. From casual observation it would appear that it does, but theoretically it is known to ignite layer by layer until the whole mass becomes a flame and consequently creates a pressure; hence the power derived for propelling the pistons of an engine. It therefore stands to reason that the hotter the ignition medium, the greater the possibilities for the complete ignition of the explosive mixture in the shortest period of time.

Many ignition systems have been invented for the sole purpose of firing internal combustion engines, all more or less differing in the methods they employ to attain the desired result. The following is descriptive of a few of the most successful systems now in use:

THE HIGH TENSION MAGNETO:

The high tension magneto generates a high tension discharge at the plug points due to opening the primary circuit suddenly at the moment the armature is about to leave the concave portion of its respective pole pieces. This system has proven satisfactory except when the engine is running slowly. This objection is due to the armature not cutting the lines of force with sufficient rapidity; also that the breaker points are not separated quickly enough to cause the peak value of the induced current to rise to its highest altitude. This system creates one spark per explosion.

THE INDUCTION COIL:

The induction coil generates a high tension current, and is perhaps one of the most satisfactory systems in use, its only objection being that the platinum points of the vibrator parts occasionally stick, due to burning, pitting, etc. The flexibility of the induction coil is considerable, inasmuch as a great number of sparks of intense heat can be liberated at the plug points for any period during the travel of the piston. This, of course, depends on the length of the segments provided in the distributor. An induction coil, however, need not be provided with the trembler and associated platinum points, as it will function just as satisfactorily if the primary circuit be broken a number of times mechanically by means of a breaker. The mechanical breaker will open the primary circuit rapidly, irrespective of the speed at which the timer shaft of the engine may be running. This is important, as the quicker the primary circuit is broken, the higher the peak value of the secondary current. The frequency of the average induction coil used for the purpose in question varies from 80 to 200 vibrations per second.

THE WIPE SPARK SYSTEM:

The wipe spark system is used in connection with small engines. Its field is limited, being restricted to engines designed for motor boats. A low potential of approximately 8 volts is conducted to a kick coil composed of a large core of iron, on which is wound a considerable number of turns of copper wire. When the contact points, to which the battery and coil are connected in series, are closed, the current has an unobstructed path throughout the windings, thereby setting up lines of force in the core. When the contact points are again separated, the self-induced E. M. F.'s generated and stored in the coil are liberated—hence the spark at the point of separation. This system providing one spark per explosion is recom-

mended for motor boat engines, because no high tension wires which may become short circuited due to spray are necessary.

THE ATWATER-KENT SYSTEM:

The Atwater-Kent system is composed of one main induction coil, and a distributor and breaker combined. This system has met with great favor among automobile owners, as its upkeep is slight. It operates on 6 volts, and will supply a good hot spark until the batteries are so weak that they can produce only half an ampere or less. No matter at what speed the engine may be running, this system will emit one hot fat spark at the plug points. Furthermore, it is impossible to short-circuit the batteries and primary of the induction coil, no matter at what position the timing shaft may stop.

A number of other systems are now in use, but they are all more or less similar to those outlined. It will therefore be unnecessary to describe them, further than to note that they all create a hot fat spark which is absolutely essential for the ignition of a gasoline vapor mixture, particularly when the mixture is cold, or not of the right proportions in air or gas.

SPARK PLUGS:

Spark plugs used in connection with internal combustion engines must resist 350 pounds pressure per square inch, and must withstand a temperature of 3,000° Fahrenheit, by reason of the fact that they are in contact with the flaming gases during the explosions. Also the insulation between the shell and the middle electrode must withstand a potential of 25,000 volts. A high tension spark intended to ignite an internal explosion engine must be able to jump a distance at least six times the gap between the points of the spark plug. In large engines it has been found advisable to ignite the mixture at two different points of

the cylinder head. This is accomplished by providing for each cylinder, one plug having two insulated electrodes and one standard plug. The plugs after being mounted are connected in series. The spark will then have to pass across the two points of the special plug to ground. While, as has been stated, this method is recommended for large engines, it has been proven that it will increase considerably the power of smaller engines.

THE "X" IGNITION SYSTEM:

In order to determine whether this system as submitted would function properly, it was decided, after much study and several tests, that the Ford car was best adapted for this purpose, particularly that the Ford system could be kept intact, except for a few minor changes, during the time when the "X" system was being tried out, and that all objectionable variables could be avoided during the tests.

THE "X" SYSTEM APPLIED TO FORD CARS:

The system as originally submitted worked sufficiently well to run the car at low speeds, but even under these circumstances the explosions were not regular, and on climbing hills the system had invariably to be dismantled and the original system replaced before the journey could be resumed. The causes for these troubles were diagnosed as follows:

First: The breaker points become foul, due to excessive primary sparking which cannot be eliminated, as to provide a condenser shunted across the gap would prevent the system from working.

Second: The engine must be run at high speed in order to climb hills, and as the system did not function under such conditions, the engine would stall.

In order to determine whether these two difficulties were the only causes of trouble, we proceeded as follows:

After experimenting in the laboratory, new coils were made up and installed in the car. On examining the spark at the plug points they appeared to be functioning satisfactorily at cranking speed. However, when they were again screwed into the cylinder heads, it was found impossible to ignite the mixture, and it was concluded that the spark was not hot enough to ignite a cold mixture. The temperature at the time this test was made was below freezing. The system was then removed and the Ford system again installed when the engine ran perfectly and gave no further trouble.

A number of coils were made up and several condensers of different capacities were provided in order to balance the constants of the circuit so as to create a good spark. At the conclusion of this test and development, a circuit composed of the most efficient detailed apparatus was installed at the laboratory and operated in the same manner as would be expected under actual working conditions. The following will give an idea of the apparatus provided and also of the results obtained.

COMPRESSION TEST:

An air compressor was provided with an attachment in the form of a box having a glass front and apertures in the rear into which four spark plugs were screwed. To each plug in turn was connected the following ignition systems:

"X" Ignition System
Ford
Atwater-Kent
Connecticut
Pittsfield.

The pressure was raised to 150 pounds per square inch, and it was noted that all the systems emitted sparks satisfactorily. Since all engines compress their charges before firing, to a pressure of from forty to eighty-five pounds per square inch, it was decided that all of these systems tested proved themselves efficient from a pressure standpoint.

TIME TESTS:

(The report sets forth in most minute detail the exhaustive and ingenious comparative tests which were made with the different systems, but the writer feels that they are entirely too technical to interest the average reader, and they are omitted for this reason. Each system was given exactly the same tests, in connection with the same engine selected for this special purpose, and the operation of the engine running with the "X" system was very unsatisfactory.)

ADVANTAGES OF THE "X" SYSTEM:

1. The absence of high tension wiring.
2. The cheapness of the kick-coil construction.
3. The small amount of current consumed.
4. The low thermal value of the spark, * * * *

**5. Possible adaptability to motor boat engines, which would however have to be carefully determined.

**The Perfex Ignition System is composed of a similar device; namely, the plug constitutes an induction coil. This system has never been used for automobile ignition, but has given fairly satisfactory service when used for igniting motor boat engines.

DISADVANTAGES OF THE "X" SYSTEM:

1. The majority of automobile manufacturers equip their cars with systems which will provide lighting, starting, and ignition. The "X" system could not be used in connection with the above.

2. In order to prevent leakage of the high frequency discharges the plug would have to be designed so as to completely envelop the Tesla coil, and be of such material and of such thickness that the charge would be absolutely confined. The in-

creased size over the present standard plug would make its application objectionable for the following reasons:

(a) Being topheavy, the tendency would be for it to jar loose from the cylinder head.
(b) It would be cumbersome to handle.
(c) Two wires would have to be attached to each plug.
(d) Greater expense in comparison with standard plug.
(e) The plug would have to be removed from engine to ascertain whether sparks were or were not taking place.

3. The operation of the system depends entirely on the functioning of the condenser, and this apparatus being an open circuit device is not recommended for use in connection with any electrical device when it is used in series with the main circuit, particularly when the operation depends on its charge and discharge.

4. Should the breaker points be in contact when the engine stops, the circuit, composed of the kick coil, would be directly across the battery, and as this is of very low resistance, the batteries would be short circuited and consequently run down in a few minutes. To overcome this objection, it would be necessary to provide in the circuit an automatic cut-out available on the dashboard of the car. Such a device is expensive to manufacture.

5. The primary of all ignition systems at the junction known as the breaker points is shunted by a condenser, which eliminates the intense spark whenever the points are separated. It also eliminates the burning away of the platinum points, known as "pitting." Such a condenser is impossible in the "X" system, as it renders it inoperative.

6. It has been proven by research that the hotter and fatter the spark, the greater the chances of igniting a gasoline-air vapor, particularly when the latter is cold. The spark generated by the

"X" system is exceptionally thin and appears to have little thermal value. In the majority of ignition systems now in use, if the potential impressed on the primary circuit should drop 40%, the ignition would still be ample to keep the engine running. Under the "X" system, in order to maintain satisfactory ignition, the potential must be kept at its maximum, otherwise the induction coil would not be charged sufficiently in the short period of time to completely charge and discharge the condenser; hence the system becomes inoperative.

7. It was anticipated that the "X" system would be cheaper than other systems now in use. In this connection it will be of interest to compare the equipment of an automobile with a twelve-cylinder engine using the "X" system and one using, we will say for example, the Atwater-Kent, Connecticut, or Remy system. For the car using the "X" system, thirteen coils would be necessary, whereas a car using any of the other systems mentioned would only have to be provided with *one* coil.

REPORT ON THE PATENT SITUATION:

As a result of our investigation as to the ignition system disclosed in the applications of "X" Nos. ————, ———— and ————, we enclose under separate cover copies of the following patents: 1,092,398,—1,116,130,—609,250,—869,208, — 1,138,569, — 732,014, — 1,086,565, — 1,093,072, — 763,893 and 884,731.

In examining this matter, we find that the broad idea as disclosed in the "X" application No. ————, is the use of a condenser as the primary coil of a transformer, the device being intended for use in high tension electric currents, for lighting systems and other uses. We find, however, in the prior art as evidenced by the patent to Schiessler, No. 1,116,130, there is disclosed the idea of a condenser as a transformer, which effectually precludes the possibility of obtaining

any broad claims along this line. In the patent to Rogers, No. 1,092,398, there appears to be disclosed every element of the "X" construction in application No. ———— except that the condenser is not the primary of the transformer, though in circuit therewith. In view of the disclosure in the Schiessler construction, we are unable to discover that there would be any patentability result from rearranging the "X" device so as to include the condenser as the primary of the transformer, as clearly disclosed in patent to Schiessler. Furthermore, it will be seen from the patents enclosed that the use of a condenser as an element in a high tension discharge system is old and frequent; in fact, any number of instances of such use can be cited. This particular type of device almost always includes a condenser for this purpose. With this view of the prior art, we fail to see that there is any novelty disclosed in "X" application No. ————, unless it rests in the specific mechanical details of the arrangement of the various parts with respect to each other, which protection would be of no practical value.

In connection with application of "X" No. ————, the disclosure in Patent to Hughes No. 1,138,569 is interesting, the same disclosing a transformer in immediate connection with the spark plugs and having condensers interposed in the ground, and in this connection your attention is called to the patent to Hardy, No. 884,731, which forms part of the spark plug as shown. The disclosures in No. 95,425, therefore, when considered in connection with "X" No. ————, appears to present no patentable novelty, or if any, of such limited scope as to be practically valueless.

Regarding application "X" No. ————, we are compelled to admit that a careful study of the same brings us to a point no closer to the actual operation of the device than apparently was reached by the examiner in his action in this case, the drawing certainly being nebulous and the description anything but clear. However, our opin-

ion with respect to application No. ———— seems to apply to this with equal force, as far as it is intelligible.

With this view of the structure disclosed in the three applications referred to, we are very firmly of the opinion that the "X" system as a whole is devoid of any broad patentability, and further, as far as the details can be understood, is very thoroughly anticipated by the prior art, as shown in the patents sent.

CONCLUSION:

The tests of the "X" ignition system which have been made under actual working conditions, as well as those made in conjunction with other ignition systems of different characters, have proven that the "X" system is unreliable. Neither is it one which embodies any advantages over other systems at present in use, excepting that it eliminates the use of high tension wiring.

For laboratory experiments and medical purposes, high frequency current is well adapted, but for the purpose of igniting internal combustion engines, exhaustive research has shown it to be highly impracticable. Modern motor-car manufacturers strive for simplicity in mechanical equipment, to meet the limited knowledge of the average driver, and it would seem illogical to expect the average driver to understand the nature and operation of a system so complicated and erratic. It would therefore appear that the motor-car manufacturer would look with disfavor on the installing of such a system on his product, especially as his sales depend entirely on the quality of materials and the reliability of the accessory apparatus. After careful consideration of the merits and demerits of the system under investigation, which were brought out by the tests, we are firmly of the opinion that the latter far exceed the former.

From present-day knowledge of high frequency currents, it does not appear possible that means

can be found whereby such systems can be advantageously applied for igniting internal combustion engines.

We are, therefore, of the opinion that the "X" ignition system, from a practical, commercial or technical standpoint, is not a success.

The conclusions arrived at from an investigation into the prior art and general patent situation show clearly the inadvisability of favorably considering this ignition system.

Respectfully submitted,

S——— A——— S———, Inc.,
Industrial Engineers.

The foregoing report demonstrates very clearly the great importance of investigation. It is also quite obvious what the financial result would have been had not the parties contemplating the financing of the project most wisely instituted such an investigation. Fortunes have been utterly thrown away on alleged inventions of far less merit than the one just reviewed. As this case stopped with the findings of the experts in regard to the prior art and its mechanical impracticability, its commercial possibilities were summarily dismissed at the conclusion of the patent investigation and tests.

The following report should be found of great interest and particularly enlightening as it covers practically every phase which enters into an expert investigation, preliminary to attempting to place a new device on the

market. The writer has omitted those portions of the report which he considers are not needed to make the whole situation and the methods employed perfectly clear to the reader.

REPORT ON BACON MULTIPLYING MACHINE

June 29, 1917.

Mr. George M. Bacon,
Salt Lake City, Utah.

Dear Sir:

Your instructions under date of March 22, 1917, requested that we assume for a period of one year the management of your problem, a "direct multiplying machine"—patent application in U. S. Patent Office, Serial No. ———, dated Nov. ——, 1916, for which you supplied us with plans, specifications and other information of a technical nature.

To arrive properly at definite conclusions, we have proceeded to carry out our investigation and recommendations along the following lines:

1. Analysis of the initial plans submitted.
2. Preliminary patent investigation.
3. Investigation of the commercial field.
4. Model making.
5. Manufacture of tools.
6. Manufacture of finished machines.
7. Marketing.

The problem submitted to us for analysis is one where we had to make certain of the first three steps before you could be advised to proceed safely and properly with the expenditures involved in development work.

We have fully stated our recommendations at the close of this report.

FINDINGS:

Our general findings are:

1. That mechanically the device is new in its plan of construction.
2. That from the preliminary examination of the prior art it stands alone, from a patent law point of view.
3. That the commercial investigation fully brings out the fact that no direct multiplying machine has been built or placed on the market, and that there is a demand for a small and a large listing machine of this type.

RECOMMENDATIONS:

Our general recommendation is:

That a small three-place direct multiplying machine be redesigned and built to include all such features as are found necessary to render the machine operative in accordance with the principle laid out in the invention.

During the period of three months, from March 25th to June 25th, 1917, we have been able to cover the following:

(a) Study of the initial plans—or engineering report.
(b) Preliminary patent investigation.
(c) Investigation of the commercial field.

This work was carried out by four departments of this concern; and at least one hundred individuals and heads of concerns, in some way identified with computing machine devices, have been interviewed.

ENGINEERING REPORT:

In examining the preliminary data submitted we have divided the work into two parts:

1. An analysis to determine whether the machine as originally designed would perform its functions.

2. An analysis to determine what changes, if any, would have to be made to bring about a perfect functioning in the machine.

Careful preliminary study proves that in principle the machine will perform its functions substantially as outlined by you, except in two particulars, which would fail of their objects, i.e.,

(a) The order in which the multiplicand and multiplier dials are set.
(b) The order in which the multiplicand and multiplier dials are reset.

(Here follows the detailed report of how these changes and other objections in the design would be overcome, all of which is technical and unnecessary to print in order to render the illustration plain. The engineering report is qualified by the following statements) :

1. The general arrangement of the mechanism is comparatively simple.
2. Regarding approximate sizes of machine, it will be necessary to enlarge diameters of differential wheels slightly, as present diameter of low ratio is impracticable.
3. The machine should be inclined at an angle to facilitate readings. This would increase the height, but the machine may be considered portable if limited to the number of digits we recommend.
4. The principle of the machine will permit of increasing the number of digits by additional differential units and transfer mechanisms.
5. There do not appear to be any unusual problems involved in tooling for manufacture.
6. At the present time it would be difficult to make an estimate on cost of production. This can be done accurately, both as to tools and manufacture, upon completion of final shop drawings.

7. The general design of the machine is such that the finished product may be made very pleasing in exterior appearance.
8. The following are among the mechanical difficulties anticipated:
   (a) Possibilities of excessive friction.
   (b) Lost motion in the intermittent differential gears.
   (c) Possibility of overthrow on the product dials.
9. The machine is capable of functioning as described, but discrepancies may be encountered which can be determined only as the development work and tests progress.

PATENT SITUATION:

We have studied carefully the reference cited in the rejection of Jan. —, 1917, in the matter of the patent application Serial No. ———, filed Nov. —, 1916, with the exception of the Vermehren patent of July 10, 1906, which in the rejection is not identified by a number and no copy of which patent accompanied the papers submitted to us. We have, however, looked up this patent in the Patent Office Gazette and understand its relation to the art. None of the patents cited by the Examiner meets the broad idea of Bacon's invention; that is, employing a plurality of Series of differential gears coöperating with a corresponding series of pinions adjustable radially to the respective differential gears and shafts connected with product dials adapted to be driven by one or more pinions to accumulate the product. This arrangement of gears seems to be new with Bacon, for the Patent Office has not cited anything like it, and in our examination of the art on multiplying machines, we have been unable to find any patent showing a machine operating in this manner. Vermehren shows a staggered arrangement and interconnected gear mechanism in his patent No. 1,134,169 of April 6, 1915 (not a reference), but

in the machine illustrated in this patent he multiplies by partial products instead of full and complete rotation, as is done in the Bacon mechanism.

The Examiner is justified in rejecting most of the claims 1 to 14 of Bacon, in view of the Heberling *et al*, and Vermehren patents, because these patents show that the use of concentrically arranged crown and spur gears corresponding to the differential gears (B) of Bacon was not new with Bacon, and therefore he is not entitled to claims covering the use of such a wheel in computing mechanisms. In view, however, of the fact that with the exception of claims 24 and 25, claims 15 to 26 inclusive are considered allowable, the staggered or diamond arrangement and the interconnection of the differential gears seem to be new with Bacon. In our opinion the claims are too specific, and in further prosecution of the application, an effort should be made to obtain broader claims on the combinations of mechanisms shown to be essential to the proper operation of the Bacon machine. The Examiner objects to the claims on the ground of multiplicity, because the claims recite specifically some old mechanisms. For this reason broader and more generic claims should be inserted.

The specification in the Bacon application contains numerous mistakes and errors in description and should be revised and corrected.

The question also arises in connection with this application of eliminating therefrom all references to the zero resetting mechanism of the multiplicand dials, because this mechanism, as shown and described, is inoperative, and if this feature is retained, it will result in invalidating all claims including this feature or claims relating thereto.

An examination of multiplying machine patents and the claims thereof fails to disclose any claims which in our opinion would interfere with the Bacon multiplying mechanism, or the improvements suggested in the engineers' report. The Bacon machine is not a key machine, neither is it

handle or power operated. For this reason many of the patents of modern commercial machines do not contain claims pertinent to the Bacon mechanism.

So far as we have been able to discover, there are no so-called "direct" multiplying machines in any way resembling the Bacon mechanism on the market to-day. We have heard of several said to be direct multiplying machines under development, but their principle of operation and stage of advancement is not known to us.

Several patents have been issued on machines having some of the features of direct multiplication, and we call attention particularly to the following:

Patent to Saunders—No. 775,939.
Patent to Rosenthal—No. 1,168,745.
Patent to Crumpton—No. 1,174,831.
Patent to Vermehren—No. 1,134,169.

We might mention several other patents on multiplying machines, but we deem it unnecessary since they do not involve mechanism similar to that of Bacon, and those mentioned illustrate what has been done.*

Referring to paragraph 4 on the patent situation, an opinion was submitted based upon Mr. Bacon's specifications, relating to the resetting of the multiplicand dials, said opinion being that this mechanism is inoperative and ineffective as

---

*It is to be noted that the patent report on Bacon does not represent a full and complete independent search, but is primarily based on the Patent Office action. A complete search would include a complete study of U. S. as well as foreign patents. Any search, however, could not include pending applications of other inventors who might have worked out and filed applications on inventions of a similar scope. Such pending applications are likely to be found out by interference proceedings if both parties try for the same claims.

described. From our drawing "A" attached, it will be noted that this fault is obviated.

The patent examination indicates that the application would have to be redrawn to some extent, to cover broader generic claims, and also to cover the additional refinements and improvements that will be added during the process of redesigning the machine. A great deal of refinement is necessary, but we are convinced that ample ground work exists to warrant further study and development with the view of increasing the capacity of the machine, and at the same time keep within commercial limitations. We therefore recommend that no action be taken by your attorneys until December of this year, the latest date for submitting an application to the Patent Office being January —, ——.

INVESTIGATION OF THE COMMERCIAL FIELD:

Our investigation to determine the commercial possibilities of the Bacon Multiplying Machine was conducted in the following manner:

1. By interviewing a large number of adding machine companies and studying the literature they publish.
2. By interviewing all individuals whom we thought were in any important way connected with the manufacture, designing or developing of "direct" multiplying machines.

In the first instance we have interviewed the following adding, computing and tabulating machine companies:

Accounting Machine Co.
Adding Machine Inspection and Sales Co.
Adding Machine Maintenance and Sales Co.
*American Can Company.
Arithstyle Company.
Automatic Adding Machine Company.
*Barrett Adding Machine Company.
*Brunsviga Multiplying and Dividing Machine Co.

*Burroughs Adding Machine Company.
Calculator Mfg. Company, Inc.
*Comptometer Company.
Computing-Tabulating-Recording Company.
Commercial Adding Machine Company.
*Dalton Adding Machine Company.
Denominator Adding Machine Company.
Elliott-Fisher Company.
Ellis Adding Machine Company.
*Ensign Calculating Machine Company.
Ficker Recording Machine Company.
*Marchant Calculating Machine Company.
Mechanical Accountant Company.
*Millionaire Calculating Machine Company.
*Monroe Calculating Machine Company.
*Muller Oscar Company.
National Cash Register Company.
New Standard Adding Machine Company.
Powers Accounting Machine Company.
Ratexa Computer Company.
Ray Subtracto-Adder Company.
Remington Typewriter Company.
Standard Adding Machine Company.
*Sundstrand Adding Machine Company.
Tabulating Machine Company.
Triumph Precision Machine Company.
*Triumphator Calculating Machine Company.
Underwood Computing Machine Company.
Wales Adding Machine Company.
White Adding Machine Company.

Those companies manufacturing machines having multiplying features which claim either direct or indirect multiplication are indicated by a star (*).

Other concerns or individuals claiming development of direct multiplying machines are:

Moon-Hopkins Billing Machine Company.
Bontempi Arithmograph Company.
Koronski.

Among patented machines not yet built, are those referred to in the Patent Report.

The report then gives a general description of the multiplying features of the machines that multiply, and all significant points in connection with these machines, and those approaching the direct multiplier are noted.

In the second instance, the results of the many interviews with prominent men connected with the industry are given, and the consensus of opinion among these experts is that there is no direct multiplying machine at present on the market and that the field and demand for such a machine is enormous. These several interviews are entered exactly as they were received, and no responsibility is taken that they will hold. The report further reads:

> However, we are making our own deductions as to this part of the report, which we make a part of the findings and recommendations.

FINDINGS OF A COMMERCIAL NATURE:

1. That there is merit in the direct multiplying machine.
2. That so far as we are able to find, there are no so-called "direct" multiplying machines in any way resembling the Bacon mechanism, on the market at the present time. We have heard of several machines said to be direct multipliers under development, but their principle of operation and stage of development are unknown to us.
3. That two types of multiplying machines will be in demand—a small inexpensive type and a large listing type.
4. That the high cost of the present indirect

multiplying machines prohibits a large distribution of the same, and that for this reason a moderate priced machine would find a market.

5. That the immediate market demands a small machine with five digits in the multiplier and seven in the multiplicand.
6. That the weight of the small machine should not exceed twenty-two pounds.
7. That it should not cost more than twenty-five dollars, when made in large quantities.
8. That it should sell for at least one hundred dollars, and not more than two hundred dollars.

The report closes with the final recommendation that in order to avoid a large unnecessary expenditure, a machine be designed and built, having but three places each in the multiplier and multiplicand to prove the principle of the invention, and including the mechanical recommendations, after which a complete machine can be built for commercial exhibition.

Mr. Bacon probably represents one out of a thousand who, shortly after the conception of his invention, has gone to great expense to determine and verify the value of the invention before expending large sums in development.

The writer feels thoroughly justified in giving these two reports in the above detail, for there can be no better way by which such methods of investigation and analysis could

be brought out so clearly and understandably. Such work forms the first step in successful promotion, which is discussed in the next chapter.

CHAPTER VII.

EVALUATING A PATENT.

1. Distinction Between an Invention and a Patent. 2. Two Classes of Patents. 3. Forecast as to Value of Inventions. 4. Factors Considered in Forecast. 5. Patent Protection.

One of the most important functions of the industrial engineer is to determine for financiers who are contemplating the backing of a patent, the potential value of their prospective investment.

An invention and a patent must be distinguished; an invention does not need to be patented to be a new discovery and it will facilitate clearness of thought and analysis if we consider the value of an invention as consisting solely in its usefulness to mankind, while the value of a patent consists in the pecuniary profit that the owner thereof can derive from the exploitation of the invention covered by the patent. The strength of the patent, or rather—to speak more accurately—the strength of the patent situation is an absolutely vital factor; by the "strength of the patent situation" we mean the *relative* strength of the patent. A concrete instance will perhaps most readily emphasize the

importance of the distinction; a patent may in itself be absolutely strong, but it may be impossible to use the invention without infringing a prior patent. It may be that the invention covered by the prior patent was not commercially practical and that the prior patent can be bought up for almost nothing and thereby a weak patent situation converted into a strong one. We have dealt with this subject more specifically elsewhere, but the above instance will give an idea of what is meant by the expression "patent situation," or, as it is sometimes called, "the state of the art." Nevertheless the first consideration in attempting to arrive at a valuation of a patent is to determine the profits that may be realized from its exploitation, leaving until later the question of whether or no the patent situation is such that its exploitation can be exclusively controlled by its possessor.

Patents may be rightly divided into two classes:

(a) Those which cover a new product—such as the original telephone, aëroplane, etc., for which a new demand has to be created.

(b) Those which cover improved processes of producing a well-known product or which cover a well-

known article adapted to be made more cheaply.

Some inventions of this second class closely resemble those of the first in that by making an article more cheaply you bring it within the reach of a much larger class of people and so create a new demand. For instance, if Mr. Ford should invent an aëroplane that that he could retail for $100, the market for it would be much larger than the market for aëroplanes today (leaving out of consideration, of course, the war demand). In the case, however, of other inventions the demand is not affected and the demand is not a problematical but a fixed factor. For instance, suppose a new process of baking bread were invented, the extent of the potential market could readily be gauged by finding out how many machines could be sold to take care of the demand for bread; the infinitesimal decrease in the cost of the production of the bread would be such as not to increase the consumption a particle, while it might be such that every bakery would find it necessary to buy the machine. Possibly the best instances of this type of invention are the linotype and the machines of the United Shoe Machinery Company.

In the case of patents of this class the

demand can be forecast with reasonable accuracy. So also the pecuniary value which, always assuming for the time being that the patent situation is satisfactory, can be determined by multiplying the demand by the saving effected. For instance, if the invention is an improved machine which saves $1,000 a year in wages and there is a market for 1,000 such machines, the annual value of the invention is $1,000,000, or $17,000,000 for the life of the patent. The value of the patent depends—always with our original assumption as regards the patent situation—on the proportion of the saving which can be retained by the owners and the extent of the potential market which he is able to capture. For instance, in the case cited above the field may be such that the whole field can be captured and the cost of the machines paid for by the licensees who also pay a royalty equal to half the saving effected; in this case the value would be $8,500,000. Or it might be possible to capture only 10% of the field and necessary to sell the machines outright at a profit of $100 apiece.

The foregoing considerations, however, are rather of theoretic than of practical importance because so many other factors must be considered. They assume that unlimited capital is available; they take for granted a

world-wide organization capable of putting the article on every market simultaneously—assumptions, of course, which are never justified. The typical inventor, in placing a value on his own invention, is far too prone to base his estimate solely on these factors—the profit per article and the extent of the *potential* demand. These are the fundamental and vital factors, but no greater mistake can be made than to consider them the only ones.

The secondary factors are equally vital and the successful man of affairs will always want to consider an invention from the following points of view:

(1) How much capital, time and executive ability will be required to develop the invention to the point where it can be put on the market.

(2) How much of the same elements will be required to exploit the invention when developed.

It will readily be seen that the more these outside elements are required to make a success of the invention, the less is the share of its value that the actual inventor can lay claim to. It is commonly recognized that capital is entitled to some share in the rewards; it is commonly charged that the share of capital is vastly out of proportion to the

share of the inventor; it is commonly forgotten that if the history of almost any successful invention is analyzed it will appear that more inventors' talent, genius, call it what you will, is shown in devising methods for the successful exploitation than in the actual discovery of the invention, and that more often than not it is capital that supplies these qualities.

We have postponed until now the question of the patent protection simply for convenience and not for the reason that it should necessarily be considered last. That will depend on circumstances. If the examination of the patent situation is a simple matter and the determination of the other factors highly complex—as is often the case—it will obviously be prudent first to make sure of the patent protection, as a short examination may show that there is no real protection and a lengthy examination of the factors would therefore be a waste of time.

An examination of the patent situation naturally falls into three parts:

(1) Are there other patents in existence which would prevent the use of the patent in question? For instance, suppose the latter consisted in the combination of three elements, A,

B and C. It might very well prove to be the case that some one else had a patent on the combination of elements A and B.

(2) Are the claims of the patent so drawn that the patent is not only valid but that it affords protection against anyone accomplishing the same result by a purely technical substitution of means?

(3) What are the probabilities of competition developing by means of a new invention?

Emphasis has been laid in the chapter on patent attorneys on the necessity of a good patent attorney having a wide technical knowledge, and it is the possession of this, rather than his knowledge of patent law, that makes his opinion on a patent situation valuable. The industrial engineer has, as a rule, a much wider technical knowledge from the practical standpoint, and an infinitely greater commercial knowledge, so that he is the logical person to pass on the value of a patent. Should a highly delicate point occur in connection with the patent situation, he will undoubtedly call in the best expert advice obtainable, just as he would in any other branch of his work.

CHAPTER VIII.

PROMOTING AN INVENTION.

1. Bankers. 2. Private Banks. 3. Requirements for Banking. 4. Individual Finances. 5. Syndicate Financing. 6. Patent Selling Abuses. 7. Advertising Stock Salesman. 8. Promotor. 9. Reporting Agencies. 10. Commercial Agency. 11. Promotion. 12. Worth of an Invention. 13. Steps for Development of an Invention. 14. Westinghouse, George. 15. Legitimate Promoter. 16. Legality of Promotion. 17. Insufficient Financing.

There has always existed a decidedly erroneous impression on the part of inventors as a class that a perfected invention is a banking proposition. There are even those who imagine that a patentable idea, even though undeveloped, merits the financial co-operation of the banker. Both these fallacious impressions lead to much misunderstanding, waste of valuable time and disappointments.

There are two kinds of bankers represented: Those institutions which are chartered by the several States or by the Federal Government and therefore under the strict supervision of State or Government; and private bankers, made up of individuals who bring capital together to create a considerable investing amount, depending upon the

nature of their financial activities. The former are only permitted by their charters and the banking laws by which they are regulated to invest along those certain conservative channels which will yield a commensurate net profit on the public and private moneys entrusted to their care. This profit is derived from legal rates of interest on loans, and for this reason the collateral accepted must possess a high degree of safety. The earnings therefore depend upon a large turnover of loans based upon large deposits. On the other hand, while private bankers are at liberty to make indiscriminate investments, reputable houses are most careful in the selection of their investments, particularly as they do a large amount of underwriting which is covered by the funds of their clients, the profit thereon coming in the form of a commission depending upon the hazard and the size of the underwriting. Their very existence depends upon the confidence of their clients, both with regard to the securities that they market and the handling of the capital entrusted to their management, otherwise it would be impossible for them to obtain capital to carry on their business. Occasional mistakes of judgment cannot be avoided, but even one error of this nature has sent to the wall many a firm which previously enjoyed an enviable reputation. It

will be seen, therefore, that when the important private banking houses seek private, particularly industrial, investment, it must be of the highest character both as to safety and potential profits. In order to attract favorable attention from such bankers the enterprise must show a satisfactory record of earnings for at least three or four years, obtained from the manufacture of some stable or standard article or device which has definitely proven its general adoption or demand.

Many of the munition plants which sprung up almost overnight after the outbreak of the European war received little assistance from private bankers, and those that did receive such assistance, in most cases proved a great anxiety to the bankers who backed them. The percentage of these plants that have made visible profits is small, and in these cases the success was largely due to foresight and keen managerial ability.

On page 67 will be found a reference to an invention that was saved by an expert investigation that revealed the fact that there was an application still pending in the Patent Office for a patent which it was necessary to obtain to make the device commercially possible. The machine in question is a voting machine, which undoubtedly has a future, and is at present perfected. Its commercial field

is large, and over half a million dollars has been expended on its development.

Nevertheless we have here an example to show why even a perfected invention of undoubted merit is not a banking proposition, in this specific instance for the following reasons:

1. Its assets consist entirely of the estimated value of the patents.
2. No sales as yet, of any amount.
3. No record of earnings.
4. No capital.
5. No underwriting by a financial backer.

Hence it should be thoroughly understood that merit in an invention does not in itself constitute it a banking project, even though it be completed to the last stage of refinement. The illustration cited is not even one for a private banker to consider, even though he is legally in a position to do so. The banker who risks his capital or the capital of his clients following such ventures will not long escape bankruptcy.

Therefore it must be further understood that a State or Federal bank will lend money only to going concerns that can render a statement showing commensurate earnings for a period of years, and a balance or surplus in their favor ample to protect the interests of the bank.

Private banking houses make fewer loans

than the chartered institutions. On the other hand, they will finance private enterprises that can show that their business is earning money but is in need of additional capital to take care of increasing business, or to overcome the disadvantage of widely distributed debt; the plan being to concentrate all such indebtedness into an issue of securities that automatically increases the credit of the concern.

A proposition presented to a private banking house should be submitted in much this form, with such variation as would meet the particular case:

1. Monthly sales for previous two, three or more years.
2. Monthly expenses for corresponding period.
3. Contracts on hand.
4. Balance sheet showing each year's condition, after deducting for depreciation.
5. A concise explanation as to exactly how the additional capital which is sought is to be used, whether for enlargement of business or to liquidate accounts payable.
6. Present capitalization and bonded indebtedness.
7. Proposed capitalization and bonded indebtedness.

It should now be perfectly clear why a new proposition, particularly one based upon an invention, does not possess the requirements of the banker, private or otherwise.

Rumors often become current that a certain prominent private banking house is behind

some particular invention, but it will be found upon proper inquiry that some individual connected with such a firm of bankers is doing the financing entirely on his own responsibility, and independent of the funds of his concern. As a matter of warning, an inventor should not consider it appropriate to expect financial aid from such firms, nor should an individual interested in such banks permit any inference which would identify his own personal investments with those of his own banking house. Such rumors militate against the standing of these institutions.

The only recourse for the inventor, therefore, whether his invention be undeveloped, perfected or in the process of commercialization, is to seek the co-operation of the private individual or a group of individuals, who will join together to form a syndicate or a corporation, based on shares, whereby the inventor, as also the financial men, are paid in shares based upon whatever value, agreeable to those in interest, is placed on the invention and on the money invested.

It must be discouraging to a great number of inventors to find that the really established avenues of finance are closed to them, but greatly as we wish to see the inventor encouraged in every practical way, we should hardly

wish to see our banking houses jeopardize their standing by investing funds in problematical enterprises, no matter how alluring or promising the prospects.

Under existing conditions the inventor is confronted with most trying difficulties when he attempts to turn his ideas into cash, since, unless he be possessed of sufficient funds to carry on his work, he must seek assistance from any source he can find.

We have seen how easy it is for the inventor to fall a victim to the honeyed words and questionable methods of the unscrupulous patent attorney. If the inventor is fortunate enough to escape the webs of deceit woven by these legalized spiders, he must still beware of other traps which are carefully set for the unwary and uninitiated. No sooner has a patent been published in the Official Gazette than the inventor will receive many communications from all manner of concerns offering to secure a purchaser for his invention. Many of the advertising patent solicitors make this a branch of their business, frequently carrying on the scheme under a different name. If the inventor takes any of these offers seriously he will never see his patent sold, but will, as the expression goes, be "sold" himself unless he discovers the trick in time.

One of the methods most commonly em-

ployed by these Patent Selling tricksters is much as follows:

Almost immediately after his patent is issued the patentee is sent a letter to this effect:

"We have noted your patent No. ——, and are greatly interested. If you will consider an offer for your rights, kindly advise us at once."

If the inventor foolishly replies in the affirmative, he will then receive a masterpiece of chicanery in reply stating that their expert considers the invention worth not less than $25,000 (the amount will vary, according to the frame of mind of the mythical expert), but that the purchaser wishes to assure himself of the validity of the patent, which will entail an expense of say $50 to cover the fee of the patent expert. They will generously offer to divide this expense with the inventor. If the twenty-five dollars is forthcoming, the alleged patent attorney will at once declare the patent invalid, and the inventor has no recourse but to charge off the amount to Experience Account.

Many of these patent selling concerns forward contracts to be signed, with the assurance that a purchaser is impatiently waiting to secure the patent. An advance fee to cover incidental expenses is invariably demanded,

and in such fees lies the entire source of the ill-gotten gains of these concerns for, as they never effect a sale, they never receive a legitimate commission. Many of them give bank references, which is another form of advertising humbug. So great have been the abuses along these lines that the Commissioner of Patents has recommended that action be taken by the postal authorities, with a view to denying them the use of the mails.

To avoid losing money in schemes of this kind the inventor should either consign all communications offering such service to the waste basket, or refer them to his personal attorney for attention if he thinks any are at all worthy of consideration.

Another source of danger to the inexperienced inventor is the advertising stock salesman. Such individuals or concerns have sprung up in abundance during the past two decades, and it is really astounding the amount of money they have been able to glean from unsophisticated inventors. In most cases they claim a large following of investors, and hold out very promising offers. In point of fact, this following which they claim amounts to little more than a list of names, these being purchased from firms who make the selling of such lists a part of their business. In some cases these stock selling con-

cerns have their own lists, which they themselves compile from sources good and bad. There is one thing that the inventor can always depend upon in connection with the stock-selling salesmen, and that is that he will invariably be called upon to pay a certain fee in advance, which the salesman claims is to cover certain expenses for printing and advertising. If this be paid, they represent that this is all that will be required of the client, as they expect to get their profit from commissions on the sale of the stock. This sounds fair enough, but it is far from true. There will be a charge of ten cents for every letter they propose to send to their alleged clientele. This list of investors is dangled before the eyes of the capital seeker as something akin to the muster roll of a volunteer regiment nervously awaiting the call to the colors. The number of names included in these lists varies from 2,500 to 5,000, making the cost for such service from $250 to $500. It can readily be appreciated that such offers would appeal to the credulous inventor, particularly when so many of those who consider themselves inventors are far from practical business men. They figure that if 3,000 of these finely worded letters are sent out to 3,000 investors of the type they are led to believe compose the list, it will be a simple matter to raise at

least $30,000 in a very short time, as this would represent a favorable reply from but 300 out of the 3,000, with an average of a $100 subscription from each. It is usually possible for a man to raise $300 by borrowing from friends or parting with his last possessions, and this is all too frequently just what occurs to an inventor who becomes impressed by the offers of the flippant stock salesmen. It looks very fine indeed on paper, but if the $30,000 actually materialized and the stock salesman survived the nervous shock, it is more than likely that his fertile mind would at once become inspired by some other scheme whereby a goodly portion of this ready money would go the way of the advance fee; namely, into his own pocket. However, such a phenomenon is not likely to occur, for the men who practise these methods of raising capital on the letter charge plan are always ready to attempt any project that comes their way, regardless of its merits or demerits. All receive the same treatment, anything being a good proposition provided there is an advance fee in sight. These fees, as in the case of the patent selling agents, are the mainstay of the business, for if they depended upon commissions for a livelihood, they would soon face starvation. No attempt is made at investigating the merits of the propositions sub-

mitted, and for this reason alone it is easy to understand that such methods mean nothing but expense and disappointment to the inventor. Loss of valuable time and the possibility of spoiling the chances of a good invention are also important elements to be considered in this connection.

There have been exceptional instances where these concerns have met with success, but it has been entirely accidental and due to some unexpected response from a few of the recipients of the letters sent or exceptional merit in the invention. So rare are such instances that they may be considered negligible, for where the public is invited to invest in every manner of project, without the prior investigation of merit that is usual with responsible houses, the results are of necessity disastrous both to the inventor and to the few investors who are caught by the rosy promises of the follow-up letters.

Much the same methods are employed by a certain type of promoter who likewise demands an advance fee to cover the cost of preparing and mailing the prospectus, or letters, as the case may be, but who further insists that he be retained in the capacity of company organizer. For this he will demand an excessive fee, claiming that such a fee is virtually the same as would have to be paid

to a corporation attorney for his legal work in connection with incorporating the company that seeks capital. He likewise has an investors' list which he represents will prove most valuable when the stock is offered for public subscription.

These self-styled capital procurers form a very numerous fraternity throughout the country, and much of the evil repute associated with the word "invention" in commercial circles is due to the unscrupulous operations of these cheap schemers. They obtain millions from the savings of the credulous public, all of which goes to absolute waste, since no individual proposition ever obtains the necessary funds expected by the innocent capital seeker, to accomplish any substantial result. Even the money that is obtained is usually and wilfully dissipated in trumped-up expenses and commissions. Where the bulk of this vast amount of money goes is not difficult to surmise. False promotions have left behind them a trail of sorrowful investors almost as numerous as the mourners of our Civil War.

This deplorable condition of affairs could be immeasurably improved if everyone seeking capital would only avail himself of the simplest of existing channels of information, namely, the old established reporting agencies, such as Bradstreet's or Dun's. There are

many well-known commercial agencies that make a specialty of reporting upon the moral and financial responsibility of individuals. The fees are very moderate, and it takes an exceedingly crafty man to deceive the trained investigators employed by these concerns. Much of their work is done for the large life insurance companies in investigating applicants for substantial lines of insurance, and the accurate manner in which the desired information is secured, even to the minutest detail, is truly commendable.

The following is a copy of a report furnished by a prominent New York commercial agency on the standing of one of the common types of "faker" we have just discussed. Other names have been substituted; otherwise the report is printed verbatim.

STRICTLY CONFIDENTIAL FOR YOUR OWN PERSONAL USE UNDER THE TERMS OF OUR CONTRACT.

Gentlemen:

In reply to your inquiry concerning S. S. Blank & Co., — Broadway, we beg to report that the person trading under this firm name (not registered in the County Clerk's office) is an oily-tongued, cunning old rascal named R. M. Blank, aged about 60. Prior to a year ago he resided in an apartment on East 117th Street, where he was either a boarder or sub-tenant, as there was no lease in his name.

Blank shares the office at — Broadway with other questionable characters, among whom are R. C. Down and R. F. Down, who lease the office.

They operate a new corporation called the Downing Corporation of which Blank is Secretary.

Blank has persistently refused to give any interview that would tend to reveal his real character. We know that in 1899 he posed as a real estate man, having an office at — Broadway, at the same time his name appeared as "Manager" in the directory at another address. He first became active in the down-town section in 1898. He then was supposed to have partners, but these men, if they ever existed, we have been unable to trace. Since that time he has been located at at least a dozen different addresses. He flatly refused to discuss these alleged partners, or in fact to give any information concerning his business affairs.

In 1901 Blank was given as President of the Jupiter Power Company, and the Mid-Atlantic Mining and Milling Company, both of which concerns appear to have long since petered out. Among other concerns of which Blank claims to have been fiscal agent, and which have all utterly disappeared since 1908 are:

South Pacific Mining Company.
Delaware Oil Company.
Rio Nuvida Copper Mining Company.
Utica Glass Works Company.
Straw Fertilizer Company.
Moose Mountain Radium Mining Company.

The character of the many inquiries received by this Agency for the past few years, together with the advertisements inserted in the daily papers under the name of S. S. Blank & Co. offering to secure capital, very clearly indicate that the said Blank without any real financial connections, and without, as far as we can discover, any success in capital raising, must derive his income through some plan of obtaining advance fees from people seeking capital which he cannot furnish.

We wish to call attention to the character of the advertising used by Blank.

In the "Herald," Sept., '05, appeared:

CAPITAL ENLISTED—Stocks and Bonds Sold.

We procure capital for industrial enterprises, manufacturing establishments, mining, business and other legitimate purposes.

Stock companies incorporated and financed; loans negotiated; our long experience, our connections and success with capital guarantee quick and efficient service.

00 Wall Street, New York.
Est. 1894.
S. S. Blank & Company,
BANKERS AND BROKERS.

In the "Herald," March, '09, appeared:

DO YOU DESIRE
to
Intelligently Increase
THE EARNING POWER OF YOUR MONEY?

7% offered to investors in the Preferred shares by a large and prosperous nearby firm perfectly sound in condition and management; $50,000 spent in development, hence far beyond the experimental stage; additional capital needed to properly care for rapidly increasing business; opportunities like this are few and far between; speak up quickly, requesting a booklet for full information.

S. S. Blank & Co., Agents,
00 Wall Street, New York.

In the "Herald" of July 14th appeared:

CAPITAL ENLISTED

for manufacturing, industrial enterprises or any legitimate proposition, through sales of stocks and bonds on commission; companies incorporated; established 1894.

S. S. Blank & Co.,
1115 Broadway, New York.
Yours truly,
X'S COMMERCIAL AGENCY.

It is not difficult to imagine, after reading the foregoing report, what would happen to the unfortunate inventor with a small amount of money at his command if he fell into the hands of this wily Blank. The advertisements attached are typical of those generally employed by these financial sharks.

Viewed in its largest ethical sense, promotion is a most important and interesting problem, having for its basis the development of natural resources and the enrichment of the public. This is a salient reason why so many people are quickly interested in any new scheme which seems at all plausible. If promoters aimed primarily for industrial improvement, there would be little cause for complaint or criticism, but far too often even men of a better type than Blank are actuated solely by selfish motives, and are not overscrupulous in the means they employ to obtain their ends. Some do not hesitate to force false interpretations from engineers' reports, making deductions never dreamed of by the authors. Even when not dishonest, promoters are apt to be over-sanguine, extravagant and given to taking undue risks. Their blundering methods are a severe tax on the public and when the day arrives when the prospective investors appreciate the necessity of scientific

investigation, their unbusinesslike activities will be curtailed. Of course, there have been instances where unskilled promoters have accomplished great things in spite of themselves, but such cases are extremely rare.

The promoter who is both efficient and honest will never attempt to exploit an invention which has no commercial worth, that is, something that cannot be marketed at a reasonable price, and at a satisfactory profit to the investor. The marketing of such an invention constitutes successful promotion, but before one proposition of this kind can be found, perhaps hundreds have to be examined. Once a selection is made, a thorough investigation is ordered and the result is used for guidance. Under no circumstances will the promoter assume the responsibility of this sort of investigation, but will delegate the work to experts in this line.

In determining the worth of a new invention it must be borne in mind that no invention has commercial value unless upon analysis it is found to possess the following requirements:

1. It should meet a popular industrial demand.
2. It should be essentially a new device, and not a mere improvement upon something already in universal use. Improvements, unless invented because of specific demand, are seldom worth considering commercially.

3. It should be able to stand upon its own merits and not rely upon coercion to bring about its adoption.
4. It should not be too costly to build or too expensive to operate.

The commercial value of any device once established by its passing the foregoing tests, the actual development of the invention should proceed in the following logical order:

1. No time or pains should be spared to bring about the best design. It costs far less to lay out an invention on paper than to build unworkable models.
2. The models, particularly the first, should be very accurate. The best tool makers should be employed in this work, for if the model is mechanically perfect it may aid in detecting possible errors in design. If both model and design are accurate and the device does not function properly, it follows that the principle of the invention is wrong.
3. No model should be put to industrial use or exhibited with the view of securing capital until a thorough actual test of its mechanical reliability has been made by the inventor or by disinterested engineers.
4. Upon the satisfactory completion of this test, a manufacturing model should be built embodying such changes in the original model as are needed to facilitate the proper manufacture of the various parts and their proper assembling.
5. The manufacturing tools, jigs and fixtures should be made immediately after this last model.
6. A thorough investigation of the commercial field should go forward while the tools, etc., are being made, to approximate as nearly as possible the proper size of the contemplated output. The minimum amount

of the new product should be manufactured, in order that there may not be a worthless overstock on hand should the device prove a disappointment, or in case some radical change be subsequently decided upon over the original design.

7. The product, if a mechanism of many parts, should usually be assembled only on order. A few complete examples may be kept in stock for quick delivery.

The steps indicated are quite definite and may be taken as a safe rule of conduct. Not only do they entirely eliminate the usual hit-or-miss method of exploiting a new invention, but also furnish a basis for calculating the expense involved and the capital necessary, both of which can thus be estimated with a fair degree of accuracy in advance.

In the early part of this chapter it was stated that the inventor, in order to get an invention before the public, must seek the coöperation of an individual or group of individuals who will form a syndicate or company to provide the necessary capital to place the project on a commercial basis. It would seem from a careful consideration of past experience that there is no subject in the field of business less understood than proper financing, particularly of a new project. There have been many men exceptionally distinguished as producers, organizers and salesmen, who were wholly unfitted to cope with the financial prob-

lems incident to their undertakings. That brilliant inventor and organizer, the late George Westinghouse, was a signal example of this very thing, for Mr. Westinghouse made a real success of every enterprise he attempted, except where the financing was concerned. Erring in his early arrangements properly to provide his enterprises with the cash necessary to finance their natural growth, he was on two occasions confronted by serious embarrassment, and finally resigned from the management of the Westinghouse Electric and Manufacturing Company.

There can be no doubt as to the legitimacy or benefits of the promotion of sound or potentially valuable enterprises. It is the legitimate promoter who seeks out the opportunity and converts it into a reality. In its true significance the term "promoter" should be an honorable title. The term as applied to those swindlers who deceive the inventor and prey upon the public by the sale of worthless stock is distinctly a misnomer. "Deluders" would be a much more appropriate term.

The legal status of the promoter is rather an abnormal one, since he is frequently the representative of an enterprise that is his own creation but not really in existence, for often it is not yet being formed or incorporated. The promoter's actions or his promises cannot

legally bind the corporation, although as an individual he can be held responsible to the corporation for the proper consummation of the arrangements concluded in its behalf. Furthermore, he stands in a limited trust relationship, both to the corporation he has promoted and to those who have invested in its securities. Such a relationship forbids his making secret profits at the expense of the corporation, and any reasonable profits which may accrue to him must be known to all concerned, otherwise he is guilty of fraud.

It has been clearly demonstrated by past experience that an entirely new project that has not gone beyond the point of the idea upon which it is based, and therefore has not been subjected to the vicissitudes which it must eventually encounter, appeals strongly to the imagination, and can, if handled with the proper judgment, usually command capital with comparative ease. On the other hand, the same project, after it has weathered the experimental stage, and has proven its merit, will have lost that original element of appeal and will command further support with great difficulty.

One of the commonest errors, therefore, in the organizing of a new corporation, and one which is often fatal to the enterprise, is to begin with insufficient funds to guarantee its

success. Credit is not available for most new firms or corporations for the reasons stated at the beginning of this chapter. Hence when an enterprise which has started off with a promise of large profits is threatened with collapse through lack of working capital, the organizers must seek aid by means of an additional issue of stock, and will find that they are usually met with skepticism or rebuff. All successful promoters are therefore of one mind in regard to the amount of capital demanded at the time of organization.

Here again is shown the importance of an expert investigation into every ramification of a commercial project, for by such an analysis a very accurate approximation of the needed capital can be arrived at, and if due allowance be made for possible contingencies, which can not be anticipated in advance, there should be little chance of failure from the start until the enterprise is firmly established and entitled to credit from banking institutions.

The instances where meritorious enterprises have failed solely on account of lack of foresight on the part of the organizers to provide sufficient capital at the beginning of operations are so numerous that no doubt the reader can call more than one to mind.

The following, recently published in a vol-

ume on business finance*, will serve as a typical example:

"About two years ago I was induced to purchase stock in the Smith Manufacturing Company,** which owned the patents and intended to manufacture and sell an office equipment device. Only one other person was interested and he took an equal amount of stock and was to be the active man at $150 per month. It was nearly six months before we were able to get our dies constructed and sufficient stock on hand to go after the business, and this work took much more money than we anticipated. We also had trouble with our finish and replaced a lot of our devices which we had placed in the first few months. Manufacturing difficulties were finally overcome and we have no further complaints on that score. Our difficulty now is to market the product. Sales for the year have only been about 2,500 units.

Up to this time about $20,000 has gone into the business, and as yet we are hardly making expenses on average monthly sales of $1,000. It has come to the point now where we must find a more profitable method of merchandising, sell out, or liquidate. We would prefer to sell out, but we have nothing very encouraging to offer a purchaser, so it resolves itself into one of the other two. A first-class merchandising man, in whom both of us feel confidence, could be secured if we we were in a position to put in another year. Personally I am convinced that with the right plan of sale, the whole project would be a tremendous money-maker, but we haven't the money ourselves, don't know where to turn for it, and haven't much of a record to fall back upon."

Among inexperienced promoters the tendency is to underestimate the amount of capital

*Business Finance by Lough.

**The name is fictitious.

required, but the real promoter, the man who enjoys the confidence of substantial investors, seldom is caught napping in this regard. In many cases all his profits in the promotion depend upon the success of the enterprise.

It is often the case that an inventor through lack of proper association is unable to get his invention to the attention of those who can properly advise him as to the best course to pursue. In such cases the inventor should consult with his local banker, who could undoubtedly, through his varied affiliations, put him on the right track at least.

CONCLUSION.

In the preceding chapters the reader has been given an insight into the peculiar conditions surrounding the development of a new invention and been told of the manifold difficulties which impede the work of an inventor, often to such an extent that the fruit of his labor is lost to him utterly. Many an embryonic invention of valuable potentiality is remembered only as a failure because it never reached perfection, its superficial defects entirely overshadowing its essential soundness and merit.

Certainly some better means than exists at present should be provided for the encouragement of inventors, and to enable them to get financial coöperation.

It has often been asserted that there can be no law which may be invoked to control the temperamental nature of the inventor. His is a soul beset with doubts and disappointments and frequently worn by struggle. Lack of money prevents his talents from developing to their full extent, and not one of our philanthropic institutions is in a position to give him the aid that is most important to him. Yet it is perfectly conceivable that a sensible

means might be found to lessen his financial burden and handicap, and at the same time benefit our industrial growth.

At the present writing, both Europe and America boast of many institutions for the encouragement of scientific research, but all of these are conducted on purely theoretical lines, and there exists no organization that both encourages research and provides the means of placing the result before the people commercially. It would seem opportune, therefore, and of immeasurable importance that an institution be created for such purpose.

Primarily, the object of such an organization would be to contribute to the advancement of science, but more particularly to encourage and facilitate scientific research along commercial lines. It is creative work of this nature that stands in the greatest need of financial coöperation. Thus the splendid wealth of latent talent, retarded in its development for lack of funds and other causes, would find expression in tangible results and benefits for all.