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INVENTIONS AND PATENTS

THE status of the inventor within the government service, of his invention and the administration and utilization of the same, presents a problem that has been growing increasingly acute during the last decade.

The pressing need for some one government agency to undertake, under a unified, comprehensive system, the administration and industrial development of patentable inventions and patents originating in the government bureaus was formulated by Dr. F. G. Cottrell, of the Bureau of Mines, in a paper, entitled "Government Owned Patents," presented to the American Mining Congress, in November, 1916.

Dr. Cottrell was brought to the full realization of the highly unsatisfactory situation of the government inventor through his experience with some patents of his own. It was his desire to make the public the sole beneficiary of these, but for reasons which will appear below, there was no practicable way of accomplishing this. Donation to the government was not feasible because there was no government official or agency authorized by law to accept assignment of patents; so he finally conceived and brought into existence a non-dividend paying corporation,[1] and to this assigned his patents for administration and license. A fundamental stipulation in its certificate of incorporation was that the profits, over and above actual running expenses, should be used for the advancement of research, and thus a public double benefit was effected.

This new departure in economics has been in successful operation for several years and the achievement has pointed the way for and has justified the attempt to try out an experiment along similar lines in the government service; and this has culminated in a bill

[1] Research Corporation, New York.

which has been introduced in Congress and which provides as follows:

S. 3223 & H. R. 9932.

A BILL authorizing the Federal Trade Commission to accept and administer for the benefit of the public and the encouragement of industry, inventions, patents, and patent rights, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Federal Trade Commission be, and hereby is, authorized and empowered to accept assignment of, or license or other rights or powers under, to develop, to issue or refuse to issue licenses under, to encourage the industrial use and application of, and otherwise to administer, on behalf of the United States, under such regulations and in such manner as the President shall prescribe, inventions, patents, and patent rights which said commission deems it to the advantage of the public to be so accepted, as these may from time to time be tendered it by employees of the various departments or other establishments of the government, or by other individuals or agencies; and to cooperate, as necessity may arise, with scientific or other agencies of the government in the discharge of the duties herein set out.

Sec. 2. That the Federal Trade Commission be, and is hereby, authorized and empowered to collect fees and royalties for licensing said inventions, patents, and patent rights in such amounts and in such manner as the President shall direct, and shall deposit the same with the Treasurer of the United States; and of the total amount of such fees and royalties so deposited a certain per centum, to be determined by the President, shall be reserved, set aside, and appropriated as a special fund to be disbursed as directed by the President to remunerate inventors for such of their inventions, patents, and patent rights contemplated by this Act as may prove meritorious and of public benefit.

Sec. 3. That the Commissioner of Patents is hereby directed to grant all patents and record all assignments and licenses contemplated by this Act without the payment of any fee.

As is well known, the government has for years been fostering and developing scientific research among its workers, and this phase of its activities has reached a very advanced state of efficiency and productiveness, as exemplified, for instance, by progressive improvements in the machines and methods of husbandry resulting from the labors of the Department of Agriculture; by the safety appliances and highly developed technical devices used in our mines; by the advancement in the methods and processes of metallurgy, and by the ever-increasing volume of chemical and other exact scientific discoveries issuing from the government laboratories.

But many valuable contributions to knowledge and a whole mass of scientific facts and principles developed in the course of the numerous and varied investigations carried on by the government have failed to reach and benefit the general public, because of a lack of the means of translating them into actual, practical service. There has always been an obstruction in the way of making them adequately and fully available to industry, because there has heretofore been no administrative machinery for exercising this function.

Various views have been held by government officials concerning the legal status of patents and patentable inventions developed by government employees in the course or as a result of their regular duties. In the process of litigation in patent cases certain doctrines of law have been laid down in court decisions with regard to shop right, implied license, etc., but these have not been uniformly understood or applied in the government service. It is a fact, however, that the law in regard to the ownership of patents by government employees (excepting employees of the Patent Office) is exactly the same as it is for the employees of private individuals or corporations.

A wide range of policy and point of view has existed among the departments and even among the different bureaus of the government as to whether the inventor in government service should be compelled to donate his invention to the government, with or without first patenting it, or whether he should donate it at all; whether in the first event he should receive any compensation therefor, or not, and whether he has the right to develop his patent himself, or to sell it to another; and questions of ethics in this connection have frequently arisen. Such considerations as these have been dealt with piecemeal, arbitrarily, and

often very incidentally and with some specific and immediate need in mind.

Thus, in certain bureaus of the service employees are required to dedicate their inventions or patents to the government outright, even in the absence of legal authority for the procedure; in others they are prohibited from taking out patents at all; in others, if they take them out, they must dedicate them to the public; in others, again, the employee may retain title to the patent and make what profit he can with it in the open market, but the government reserves the right of free license thereunder. In some cases this free license is restricted only to the bureau in which the invention originated, the patentee being at liberty to profit individually from the use of his invention by other branches of the service.

Then, again, in the same division, or bureau, the requirements on the individual will vary according to the nature of the service for which he was specifically employed and the character of the invention, *i. e.*, whether the invention was evolved in the course or as a result of his regular duties, or not. These illustrations represent merely a few of the many questions arising with regard to the existing relation between the government and its employees in the matter of inventions and patents.

If the employee dedicates his invention to the government it can not fully benefit the public, because, as has been stated, there is no existing instrumentality for translating inventions protected under government-owned patents into practical, industrial service, and they become practically a waste product.

If a patent be dedicated to the public unconditionally, the public is generally the loser, as has been indicated above, because protection to the capital required to exploit the patent is lacking, and because a patent so dedicated, though possibly pioneer and fundamental may be in such a form that a subsequent patent taken out by another, less generous inventor on an improvement practically essential to its effective application may operate to exclude its free public use. Also, in this contingency, its successful use by the government, itself, is prevented, unless the government assents to whatever conditions the owner of the improvement may impose. If for any reason this should be deemed inadvisable, the government can, of course, use the improved invention without express license, just as it can use any other patented invention, as provided by Special Act of Congress, June 25, 1910, Stat. 851. But the situation thereby created is unsatisfactory, because such action entails litigation before the Court of Claims to determine a reasonable compensation to the patentee, in addition to which the approval of Congress by special enactment must be had before the compensation can be awarded. This is a formidable, costly and tedious business, both for the government and the plaintiff, and besides, works particular hardship and loss to the latter. Indeed, unless the compensation involved should be large it would probably be consumed in the process of securing it.

The tendency of the generally unsatisfactory situation here outlined has been to discourage inventiveness among government workers, and the considerations enumerated call loudly for some settled, definite and equitable disposition of this involved matter, particularly in view of the enormously increased activities and needs of the government and the business world brought about by the demands of the present war, and the unprecedented need for inventions which has ensued. It must be realized that the development and administration of inventions and patents involve business problems which should be handled in an intelligent business-like way. The present haphazard, futile manner of treating them makes for lost motion and waste of effort.

The Bill here under consideration grants the authority to try out essentially an experiment in constructive economics which, if successful, can not fail to lead to results of fundamental importance, and which, if unreasonable compensation to the patentee, in successful, will, by reason of the measure's purely permissive character, be self-elimina-

ting. It will be an inexpensive experiment, since its operation is aimed to be self-supporting.

The whole system of administration comprehended under its provisions will have to be constructed with the most sedulous care by men specializing in the work, keeping prominently in mind the cardinal fact that this is a matter of research and development. The value of the experiment, indeed the span of its operation, depends upon the wisdom and circumspection with which it is handled. Being something absolutely novel in patent legislation, there are no standards and no information for guidance, and these must be acquired as this administration proceeds, by experiment, just as in any other form of research work.

This Bill provides for centralizing the administration here planned. If this were left to each bureau of the government to work out as it saw fit, the authority thus scattered would result in endless confusion, duplication of effort, increase of expense and, through lack of proper equipment, failure to provide the means for constructive economic work on any adequate or feasible scale. This is practically the present situation and is what this Bill is aimed to correct. It is infinitely better to focus administration in one agency, providing service common to all, in and outside the government employ, such agency having the ability through enlarged opportunity, to specialize in this work and thereby to develop into a power for really great accomplishment.

Assisted and supported by the cooperation of all in interest and, through the larger perspective acquired by the study and correlation of the problems of all, this system insures the working out of administrative details in the most comprehensive way, making possible that sort of team work in the realm of invention that proved so necessary to success in this field during the world struggle just ended.

In this connection, Professor Millikan has already pointed out in Science,[2] that one of the important facts demonstrated by the war was that inventive genius working without direction and correlation proved comparatively futile. Not one invention in the military field out of ten thousand offered the government by isolated inventors proved of any value whatever. It was only when the best scientific brains of the country were mobilized, through the Council of National Defense, into definite groups, each group specializing in some particular field, all being in cooperation and in close touch with similar groups of the Entente, that the weight of American inventive genius as a most important factor in winning the war began to be felt. From that moment, the submarine, the real problem of the war, was doomed. This grouping and coordinating of the country's scientists developed a vast amount of inventive material, the major part of which has a direct peace bearing of immense value, but which is in serious danger of being lost through the want of such an agency as herein contemplated to conserve, develop and administer it and to translate it into industrial application and use.

There are several special phases of the patent situation affecting the government and its workers as well as the public, which the economic administration here provided will fundamentally improve. For instance, there is at present no disinterested organization extensively studying the economic aspect of patents after they have left the patent office. The information available in this field has been derived solely from members of the patent bar, from manufacturers and from inventors. But each of these classes represents a special interest with a particular and partisan viewpoint and need. This bill, however, creates an agency which is peculiarly well equipped to study the subject in the broad light of patent administration on behalf of the public.

Again, it sometimes occurs in the government service that an invention is developed that the government would like to make use of, or to introduce for the benefit of the public, but which has an application not

[2] Science, September 25, 1919, p. 285, et seq.

broad enough to interest manufacturers. An instance of this is the Gibbs breathing apparatus which has proven so efficacious in mine rescue work. Heretofore, there has been no satisfactory way of accomplishing the production of such a device, there being no agency authorized to negotiate the business. Under this bill this agency would be provided.

There is another, allied type of invention which is of great importance to scientists, and so indirectly to the public, and which will secure development under this administration. This concerns improvements in scientific instruments and apparatus. The sphere of employment of these things being comparatively restricted, their manufacture does not ordinarily attract capital, and certainly yields no great profit to the inventors.

A situation in the patent field unsatisfactory to the government is encountered in certain cases where investigations are conducted jointly by experts of the government and those of outside agencies, such as universities, technical schools, state institutions, and industrial concerns. More and more of such cooperative work is being done, to the great benefit of both the government and industry. During the course of it, inventions are sometimes evolved through the mutual efforts of the cooperators, and patents are granted therefor.

Now, it is highly important, if not absolutely imperative, that such a patent, or group of patents, be administered and developed as a unit, but the problem is at once presented as to how this shall be accomplished, to the end that the maximum benefit to industry shall be secured, the patent shall be guarded against falling into adverse hands, the control of the government over the production of its experts shall be maintained, and, at the same time, the equitable interests of the inventors shall be conserved. It is conceived that the solution will be found in the administration here provided.

Perhaps no discoveries in history exceed in importance those made in the last century concerning the nature of diseases, their prevention and cure, yet the people who have made these discoveries have frequently gone unrewarded. The salaries of pathological professors are, as a rule, barely more than pittances, although their work is of transcendent importance to the human race. Increased practise through possible gain of prestige, by accomplishment, does not make up to these men the reward which should be theirs, and even the money thus acquired is no real reward, but remuneration earned by additional labor. Indeed, pathological work often tends to detract from the earning power of physicians as people are only too prone to regard research workers in the field of medicine as faddists and charlatans. The discovery of vaccination, by Jenner, almost ruined him. This situation influenced the British government to provide him with a pension.[3]

This leads to a further phase of the patent situation that has bearing here. It is contrary to the ethics of the medical profession for its members to patent new devices and curative agents. The consequent absence of patent protection eliminates control of these things, though control in many instances is vitally necessary. Great harm has been worked by the manufacture of medicines getting into adverse hands, and it has been necessary in some cases to have special legislation passed to relieve the situation.

Under the measure here proposed such inventions, fraught with great possibilities for good or ill, may be wisely administered for the welfare and protection of the public. To quote from an editorial written upon this Bill in the *Journal of the American Medical Association*, December 20, 1919 page 1887:

> It has been regarded as against the principles of medical ethics to patent instruments or medicaments for personal gain. However, as was pointed out recently in *The Journal*, this does not mean that patenting per se is wrong; in fact, it is at times desirable to patent new discoveries, especially drugs, in order to insure reliability. The problem has been how to make available the patented product in the interest both of the public and of medical science. It would seem that the proposed bill

[3] SCIENCE, November 14, 1919, p. 461.

suggests a means, acceptable to the medical profession, for the control of patents in the fields of medicine and surgery; the success will depend on the wisdom exercised by the Federal Trade Commission in the method of granting licenses. Judging from the recent activities of this body in the licensing of former enemy owned patents (such as barbital, procain and arsphenamin), a wise policy will probably be followed. The bill, as proposed, gives opportunity for the medical research worker to obtain recognition, and possible emoluments, for distinctive contributions, without making him subject to criticism. It contains many constructive possibilities and should receive the endorsement of those interested in the altruistic success of science.

Along allied lines in veterinary medicine, processes for producing serums for prevention of diseases among farm animals have been worked out from time to time in the Department of Agriculture. It is very necessary to control these by patents properly administered in the public interest to prevent exploitation of, and loss to, the public.

In the interest of, and in justice to the inventors in the government service, let it be pointed out that save in rare and exceptional instances, they have derived little or no material return from their inventions. It is a general custom among industrial employers to reward their employees directly for valuable inventions which they evolve in the regular course of their duties, either by sums of money, as bonuses, or by increase of salary, or by gift of stock or some other tangible form of interest in the business, as a recognition of merit and a stimulation to further effort. This has proved a sound business policy. Nothing analogous thereto has existed in government employment, except that general excellence of service has always been a determining factor in routine promotions. Furthermore, inventors in the government service have had to pay out of their own slender means all charges incident to the granting of patents assigned by them to the government. This has been in the past a means of preventing applications for patent protection to worthy inventions.

Scientific workers, of which inventors form a class, are notoriously deficient in commercial instinct and experience. Even under the most favorable circumstances they are rarely ever able to properly develop and commercialize their inventions. How hopeless, therefore, is the chance of government inventors getting any benefit for themselves and for the public out of their inventions under the condition of uncertainty of status and lack of development and administrative control now prevailing in the government bureaus.

In the matter of licensing, as provided by this Bill, it it not the purpose here to give unduly a monoply to any one. Indeed, this whole thing will be so directly open to public examination and check that it is not at all likely such a thing would develop. The main idea in this respect is to do two things. To supply the public with a commodity or a device at a reasonable price, and, at the same time, to aid in building up American industry; providing protection to those best qualified for production, but allowing enough licensing to induce competition and thus to stimulate healthy advancement.

An analogy here might be found in the banking laws of Massachusetts, Wisconsin and of some other states, which provide for just enough banking facilities to insure proper and adequate administration in this field, it being recognized that an excess in the number of banks means the carrying of too much overhead for the business done, which is a bad business policy liable to lead to disaster. Under these provisions, before a new bank can be established it is necesary for its organizers to prove to the banking commissioners that there is a real need for it in the region where it wishes to operate.

Again, the patents comprehended under this legislation may be regarded as much the same sort of monopoly as a public franchise; for instance, the charter for a street car line. Only as many car lines are permitted in a city as there is a real need for.

It is believed that the provisions of this Bill form a basis for a plan broad enough to work out the solution of the sort of problems referred to above, no attempt being made to

obtrude mandatory regulations in any present system for coping with them. Under it the relation between the inventor in the government service to the government itself is clearly established, and the inventor will be encouraged by the knowledge that he will not be deprived of credit for the work of his genius, and, in the event of his invention proving of actual public service, he will receive some material return therefrom. No question of ethics can arise to embarrass him and he will be relieved of all care and expense in the administration and disposal of his patents.

The government derives its advantage under this measure in the stimulation of inventive productiveness among its workers, in the control it obtains thereof, and in the valuable experience it gains in this field of practical economics, which will very probably be reflected in improvements in patent law.

The public reaps its benefit by having cleared away the obstacle heretofore existing between the inventor's genius and the full and proper industrial application thereof, thus liberating and giving impetus to invention, with consequent increase of productiveness, tending toward improvement of working conditions and general prosperity.

ANDREW STEWART

BUREAU OF MINES

THE USE AND ABUSE OF THE GENUS

I SHOULD hesitate to burden the readers of SCIENCE with another technical discussion on nomenclature but the question which I wish to bring to the consideration of systematists is not a technical one and has nothing to do with Codes nor with priority.

We are all painfully familiar with the changes that are continually taking place in generic names, both of animals and plants. Such changes fall, roughly speaking, into two categories:

(1) Cases where an older name for the same group is discovered in some overlooked work and is substituted for the one in general use.

(2) Cases where a generic group is subdivided, the old name being restricted to one of the subdivisions and new names given to all the others.

The first sort of change is necessary and is governed by a definite code of rules which is rapidly effecting international uniformity, so far as such cases are concerned. The second set of changes, however, is entirely dependent upon personal opinion, with no hope of uniformity or finality. Generic groups are separated from one another by all degrees of difference and there is no standard by which the amount of difference may be consistently measured. Consequently no two systematists will be in agreement as to how many groups may be recognized in any given family.

Ever since the time of Linnæus generic groups have been undergoing disintegration until in some families the ultimate condition has been reached of a generic group for every species. When this stage has been attained we have lost all trace, in the scientific names of any relationship whatever between the species. The binomial name in other words has become useless and we might just as well have a mononomial. The very object for which the generic name was proposed has been lost.

To illustrate the point further, suppose that we subdivide an old genus into three, and use three generic names where previously we used but one, we emphasize, it is true, that there are differences between these three groups, but by the very same act we obliterate the fact, formerly indicated by the single generic name, that there are resemblances which join these three groups together as compared with other groups in the same family. One of these facts would seem to be of quite as much importance as the other and by the creation of the new genera we lose quite as much as we gain. We should carefully guard against allowing our enthusiasm for the discovery of differences, to blind us to the fact that the real object of systematic research is the discovery of true relationship.

Now the whole trouble in this matter—and a vital flaw, to my mind, in our system of nomenclature—is that we try to make a double use of our system with the result that it is