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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

EDISON AND THE PATENT OFFICE.

Inventors and attorneys whose dealings with the Patent Office have rendered them intimately familiar with its administration must have received, with something like a shock of surprise, the charges recently brought by Thomas A. Edison against its officials. The Patent Office, it is true, has for years been overburdened with pending applications; and yet, its examiners have succeeded in the main in disposing of them with all the celerity that could reasonably be asked for under the circumstances, and with a thoroughness of examination that has added not a little to the Office's reputation for efficiency. So far as we are aware, no such sweeping accusation as that of Mr. Edison's, involving "incompetence, neglect of duty, and mal-administration," has ever been brought against the Office. For that reason the dismissal of all but one of the charges which have been brought brings with it a feeling of relief.

Until the publication of the Commissioner's report, containing an intelligible statement of the issues involved, it is impossible to give more than a meager statement of the actual facts. The controversy involves the validity of Ernst W. Jungner's patent for a reversible galvanic battery, in principle practically similar to the storage battery which Edison invented, and which has been prominently before the public for some three years. It would seem that, following the usual German practice, Jungner, in filing an application in this country, covered his invention in claims which were comparatively few in number and exceedingly limited in their scope. In order to comply with the Patent Office's rules of procedure, Jungner was requested to divide his application, because it was deemed to include two inventions. This was done. Subsequently an interference was declared between the original application of Jungner and Edison's application. Pending this interference, Jungner's alleged divisional application, covering one of the inventions claimed in his parent application, was passed to issue. The substance of Edison's first charge is that the issuing of this patent was fraudulent, for the reason that in Jungner's original application a narrow invention in storage batteries was disclosed, whereas, in the patent issued, a greatly enlarged invention was claimed. In his report the Commissioner concedes that the examiners failed to appreciate the nature of the enlarged description, that they were guilty of no intentional wrong-doing, and that the patent issued should never have been treated as a divided application, because it describes an invention quite different from that originally disclosed. No injury however resulted to anyone by calling the second application a "division."

Edison's second charge accuses the examiners of allowing claims to issue in the Jungner patent which they knew were unpatentable, which they had admitted were unpatentable, and which Jungner himself acknowledged were unpatentable. Only four claims, however, are specifically referred to in this charge. The Commissioner finds that the claims were properly issued, and that they covered patentable subject matter. This second charge can be discussed only after a full statement of the facts has been published. For the time being we must accept the Commissioner's decision as conclusive.

The third charge, in substance, is much the same as the second. It accuses the examiners of granting to Jungner a patent on an inoperative combination with full knowledge. This, like the second charge, was dismissed. It may be mentioned, however, that conflicting affidavits were submitted on both sides as to the operativeness of Jungner's invention, tending to show that the question was at best an open one.

Mr. Edison also took issue with the Patent Office in its declaration of the interference previously mentioned, asserting that the interference was improper, and that it deprived him of the opportunity of proving that Jungner's invention was inoperative. The Commissioner held that the examiner, in view of all the circumstances, had followed a time-honored custom of the Patent Office, and that, so far from having been refused a hearing in proving the inoperativeness of the Jungner device, Mr. Edison had been given every opportunity to prove his point, but had failed to take advantage of it.

From this view of the controversy, necessarily cursory by reason of the inadequate information given out by the Patent Office, it would seem that at best an error of judgment has been committed by one of the examining force—an error of a nature which even a justice of a Federal court might commit.

WIND-DRIVEN GENERATORS FOR FARMING.

The special attention called recently to farming by means of electrical power makes prominent the work being accomplished in harnessing the wind for similar purposes. In Germany, where several experimental electric farms have been successfully established, some attention has been given to the question of utilizing any natural source of power, such as water or wind. Both at Simmern and Quidnau the electric power is derived chiefly from steam engines, although at the former place there has recently been installed a turbine-driven dynamo, which is operated by the power from the river. In the West, where electrical plowing and harvesting have been used both experimentally and practically, the prime mover is operated by steam. Only on the California coast, where long-distance transmission of electrical power is obtained from the mountain streams, has any systematic attempt been made to harness the rivers for direct farming purposes.

The question of utilizing the wind for driving farm machines is of more practical importance to the farmers of the great prairie States than any other. There are no large streams for them to harness, and what few there are generally run low and nearly dry in summer. Water is at a premium in hot summers in the great corn and wheat belt; but wind is abundant. The southwest winds blow incessantly, carrying with them hot blasts of air, which often ruin the crops. This wind has been harnessed by the farmers for years past to irrigate their fields. The windmill has become almost as characteristic of many parts of the central West as it is of Holland. These windmills are employed solely for pumping water from the underground reservoirs, and without them thousands of acres of rich crops would annually be lost.

The variety of these home-made and commercial windmills is so great that the Department of Agriculture recently issued a special bulletin describing them, and giving such additional information as would tend to help farmers in other parts of the country to build similar structures. A good many of the windmills utilized the trees growing on the farms, and the apparatus was nearly all of a unique, home-made nature. But larger and more substantial windmills are now being put up in the rich farming regions, and private irrigation of farms is thus being extensively improved.

Since the investigations by the Department of Agriculture, a good many of these newer mills have been put to other uses than pumping water for irrigation. The wind has been harnessed for generating electricity to use generally on the farm. The first of these windmills were employed experimentally to generate electricity for lighting the barns and homes; but later their success stimulated some to more ambitious efforts. To-day a good many of them are being run to generate sufficient power to operate small motors.

The use of windmill power for generating electricity was tried successfully two years ago in Europe. At Hamburg and near Leipsic there are electrically-driven plants which derive their power entirely from the wind. The windmills are strongly built, and designed to take the wind at any angle. The regulation of the motor is obtained by means of an automatic switch, which cuts out the battery when the wind falls to a low pressure.

In the West windmills constructed for utilizing the power for electric generation are of the ordinary types, built to transmit the full power of the moving air currents to the generator located at the bottom of the structure. As the wind blows pretty constantly through the summer and fall months, there is seldom any lack of electric power for lighting or operating the small motors. In addition to generating electric power, the windmills are made so that the generator can be cut off, and the power can be used directly for pumping water in the usual way. During the months of July and August, when the droughts are at their highest, the need of water for irrigation is more imperative than power for operating farm implements. It is a season of comparative idleness on the farm until harvesting begins. By coupling the windmill to irrigating pumps at such times, the farmers secure double advantage. Later, when the crops are ready for harvesting, the windmills are once more harnessed to the electrical generator, and work with the machines begins.

Several windmills are worked together on some farms to operate the generators, and in this way ten-horse-power motors are working in the field continually. Several motors of two and three horse-power are operated in the field, and better results are obtained in this way than by one large single motor. By distributing the windmills and motors in different parts of the farms, more favorable results are obtained than by any other method.

A single large windmill of the home-made type or of modern commercial form will generate sufficient power to run a two, three, four, or even five-horse-power motor. Even when the wind is low and blowing only five or six miles an hour, sufficient power is obtained to develop two horse-power. When the wind increases to ten, fifteen, or twenty miles an hour, the capacity of the windmill becomes increasingly great. Ten-horse-power motors are then operated with as much ease as the two-horse-power in a low wind.

In order to take advantage of the change in the power of the winds, experiments are being made to adjust the generators to suit the force of the air currents. To accomplish this, a series of dynamos and motors are used, which are coupled together or uncoupled according to the state of the weather.

The possibilities in harnessing the wind for electrical farming are certainly alluring, and the experiments now being conducted indicate general interest in the subject. For the small farmer with a score or two acres of land, this method of using electricity for doing the mechanical work of his farm will prove far more beneficial than for the owner of thousands of acres. The latter will find water or steam power for operating his electric plant more satisfactory; but such installation would prove too costly for the ordinary small farmer. And after all, the small farmer is largely in the majority, and his needs are really paramount to those of the other class.

WOOD ALCOHOL FOR INDUSTRIAL PURPOSES.

The art of manufacturing and refining wood alcohol has steadily improved in this country in the past few years, and it is now equal to grain alcohol for nearly every manufacturing and industrial purpose. Its distribution has been widespread, and our exports of the alcohol have become an important item in the by-products of our forests. Simultaneous with the increase in the distillation of wood alcohol by improved methods has been the increase in its use. There are more than threescore industries that are quite dependent upon wood alcohol for their success, and anything that cheapens its cost and increases its supply intimately affects these industries.

But the cost of manufacturing wood alcohol has been too high in the past to make its use general in many other industries, that stand ready to utilize it as soon as some cheaper method of distilling it is invented. One of these is the burning of alcohol in motors for power production. The steady improvement of the alcohol motor abroad indicates that for certain purposes this form of motor will prove of general value, and in Germany several types of alcohol motors are quite commonly used. But the cost of the fuel must determine in this country at least the success or failure of the alcohol motor. With cheap crude-oil engines and the gas-engine, the alcohol motor would have formidable competitors in the field, and it may be questioned whether the latter will prove universally successful here for many years to come.

The manufacture of wood alcohol, however, has a direct and important bearing on the iron industries throughout the country. The charcoal that was formerly used for the manufacture of pig iron was almost exclusively the product of the charcoal pits established for this purpose. The charcoal iron furnaces of Pennsylvania, New York, Maryland, and Michigan depended entirely upon the charcoal burners for their supply of this fuel, and the cost was always high and exorbitant. It was only when wood alcohol became an important by-product of charcoal that chemical works were constructed to supply the iron furnaces with their charcoal. In New York and Pennsylvania there are over eighty wood-alcohol and acetic-acid plants, which make a business of supplying the iron foundries with charcoal and producing alcohol as a by-product.

The chemical charcoal from the alcohol plants is made almost entirely of beech, birch, and maple trees that are fit for few other industries, and also from the tops and branches of hardwood trees which the lumbermen waste. Instead of destroying the forests, the modern chemical factories are working to preserve the supply of wood, for with the raw material exhausted they would be forced out of existence. It is estimated that fully ten thousand men are engaged in Pennsylvania and New York alone in cutting wood for the alcohol plants, and that their total product amounts to more than a million and a half gallons a year. The charcoal produced by the chemical plants equals more than a million bushels of the fuel per month. This enormous supply of charcoal furnishes the iron foundries with a fuel that is comparatively cheap, owing to the profits derived from alcohol. In recent years it has been said that charcoal is the by-product and wood alcohol the leading product of the chemical plants; but certain it is that, without the distillation of the alcohol from the wood, the cost of the charcoal would materially advance. Consequently, there would be forced an advance in pig iron, and a great many industries would be affected thereby.

In order to increase the supply of wood alcohol, a number of new chemical plants have been established in the last few years in different parts of the lumbering region of New England, where the waste of wood is enormous. In the hardwood forests the waste of trees is large through crowding and the production of many inferior growths. Millions of acres of New England forest lands contain to-day hardwood trees that are too inferior to have any marketable value except for firewood. Their existence in the woods is a detriment to the rest of the trees, and it would be wise to remove them. To utilize these inferior hardwood trees, and also the tops and limbs of the marketable trees, has become a question of paramount importance to the wood-alcohol manufacturers, and the new plants have been established in the forests for the purpose of making them of service. Owing to the value of the charcoal, as well as that of the alcohol, the plants have always been established in iron-manufacturing regions where there would be a ready market for both products.

Besides alcohol as a by-product, the manufacturers of wood alcohol are to-day obtaining successfully and economically acetate of lime from the same kilns. The acetate of lime thus obtained as a by-product is used chiefly for the manufacture of acetic acid. The by-products that can be obtained from a charcoal kiln are almost too numerous to mention, but the two chief ones in the modern chemical plant are the wood alcohol and acetate of lime. These are to-day very profitable in New York and Pennsylvania, where every battery of charcoal kilns has its chemical plant adjoining, so that the smoke which was formerly wasted is now drawn down into the still and utilized. The value of each cord of wood that is used for charcoal to-day is thus greatly increased. Indeed, from seventy-five to eighty per cent of the tree, branches and all, is to-day utilized by the modern, up-to-date charcoal maker.

Our exports of wood alcohol have been large in the past ten years, because of the large supply manufactured in this country; but should the alcohol motor prove of value as a power producer, either the supply of the fuel would have to be increased, or the export trade cut off. The increased use of wood alcohol in the arts and trades would to some extent be checked if the alcohol motor should prove an economical factor in our industrial life. But the supply of wild woodlands suitable for charcoal making, and incidentally for alcohol distilling, is almost unlimited, and there is a possibility of industrial development in this direction that can scarcely be measured to-day. The annual fires in our forests consume wood enough to produce millions of gallons of alcohol, and this enormous waste is only a part of the loss. The lumber mills, in spite of their efforts to utilize all parts of the trees, waste millions of feet of wood that would furnish the charcoal burner with excellent material for his work. By extending the charcoal and wood-alcohol industry to new districts, the wealth derived from our forests would multiply rapidly, and incidentally the cost of wood alcohol might be reduced to a point where it would prove a most efficient and economical fuel for the alcohol motors of the near future. In Germany at least all confidence is placed in the alcohol motor, and exhaustive experiments are being conducted there under the auspices of scientific and industrial societies.

THE INTERNATIONAL AUTOMOBILE RACE.

For the fifth time there has been a race for the International Cup. It was won by M. Théry in his 85-horse-power Richard-Brasier machine over the Sallburg circuit, in Germany, the distance being 348 miles, and the time being 5 hours, 50 minutes and 3 seconds. The average rate of speed of the winner was 60 miles an hour. On the Continent even the war was forgotten for the "blue ribbon" of the automobile world. The scheme of having a circuit like a race track is an excellent one, as the spectators have an opportunity of seeing the machine four times. At the end of the first round M. Théry was 32 seconds behind M. Jenatzy. At the second passage of the two racers before the grand stand, M. Théry was 1 minute and 40 seconds ahead, and his machine tore along the closely-guarded road at a speed that filled the spectators with the greatest possible excitement. As they swept past for the third time, M. Théry was leading by 9 minutes and 35 seconds. When those upon the grand stand realized that the gap was being widened, their interest and enthusiasm knew no bounds, and it is doubtful if the competitors were more excited than the vast audience. Never did a couple of hours seem so long. At last a trumpet call announced that the racer was coming. The suspense at this moment was intense, and finally M. Jenatzy arrived, and was greeted with cheers. M. Théry had started 28 minutes after M. Jenatzy, and at the end of the last circuit but one he was leading by more than 9 minutes. If he passed the line inside of 19 minutes he would have won the cup, but if he passed 20 minutes later than his competitor, M. Jenatzy retained the prize of the "Motor Derby." Then began awful minutes of suspense, five minutes, ten minutes, eleven minutes passed, when suddenly the trumpets sounded. M. Théry flew across the finishing line like a great bomb, and those on the grand stands on both sides of the road gave a mighty roar of welcome to the victor, the German Emperor taking off his cap and waving it in the air. The effort of M. Jenatzy was almost equally good, and this was appreciated by the spectators, who warmly cheered the ex-champion. Troops guarded every foot of the paths and roads leading to the course, and virtually lined the entire circuit. The weather was superb, and the road was in perfect condition. There were eighteen automobiles, representing six nationalities, engaged in the contest.

The winning machine has many novel features. It is of the four-cylinder type, and as has already been stated, is of 85 horse-power; but it can in no way be considered as a freak machine. One of the novel features of this car is a new form of cushion suspension, that is so flexible as to make the car ride easier, and without bouncing on the road. It also has a pressed steel frame with a secondary tubular frame, which carries the engine and the transmission case. There is a triple joint in combination with a slide joint, which makes a perfect flexible connection between the motor and the running gear. The cooler is composed of flat vertical tubes surrounded by fins. No pump is used for the circulation of water, the circulation being obtained by the thermo-siphon system. The clutch is a cone operating in the flywheel. The record of winners in the International Cup Race is as follows:

Year.	Winner.	Machine.	Course.	Distance. Miles.	Time. H.	M.	S.
1900	France, M. Charron	Panhard	Paris-Lyons	351½	9	09	00
1901	France, M. Girardot	Panhard	Paris-Bordeaux	348	9	00	00
1902	England, F. S. Edge	Napier	Paris-Innsbruck	383	10	00	00
1903	Germany, M. Jenatzy	Mercedes	Irish Circuit	368½	6	36	00
1904	France, M. Thery	Richard-Brasier	Homburg Circuit	348	5	50	03

It will be remembered that the International Cup was given by Mr. James Gordon Bennett.

M. CURIE'S WORK ON RADIUM EMANATIONS FROM MINERAL SPRINGS.

M. Curie has been making some determinations of the radio-activity of gases which are given off by mineral waters. Elster and Geitel have already shown that the gases of the air and the soil have a certain electric conductivity and can set up induced radio-activity in other bodies. Later on, it was found that the gases given off from mineral waters also possessed these properties, but in a much greater degree, and it has been recently shown that these effects are due to the presence in the gas of an emanation which is analogous to that of radium. Quantitative determinations of the gases collected at different mineral springs have been made at M. Curie's laboratory, as it is necessary to know the numerical values in order to compare the active power of the different gases. The companies sent the gases to the laboratory in well-sealed flasks. After drying, the sample of gas is placed in a closed brass cylinder which forms the outer part of an electric condenser. The inner part of the condenser is a brass rod placed in the axis of the cylinder and well insulated. The cylinder is given a charge of 200 to 300 volts, and the inner rod is connected to an electrometer. The gas, which becomes a conductor owing to the emanation it contains, allows a certain current to pass from the cylinder to the rod, and this current is measured by an appropriate method. The current is set up as soon as the gas is admitted. It increases somewhat rapidly for several hours, owing to the formation of an induced radio-activity on the inside surface of the cylinder. The current then decreases slowly, and this generally occurs about twenty-four hours after the introduction of the gas. The rate of decrease is the same as for the radium emanation. M. Curie made a table for the gases of different mineral springs of Europe. The numbers correspond to the current measured after leaving the gas 12 hours in the condenser. Given the current and the dimensions of the condenser, he could obtain the quantity of emanation which each gas contains, but it is preferable to compare directly with a standard bromide of radium solution. Thus with a solution containing 0.00001 gramme of radium bromide in a wash-bottle, at the end of a certain time he draws off the emanation which has accumulated, by means of a current of air. The charged air is sent into the condenser and the current is measured as before. This gives a standard of comparison. A few of the highest values of the emanation from different mineral waters may be given here. The water from Bad Gastein (Austria) has by far the strongest emanation, represented by the figure 360. After it come four samples of water from Plombières (France), at 47, 29, 28, 21 respectively. Banis les Bains and Luxeil (France) show 16 and 5.7. There is no doubt that the activity would be twice as strong if taken directly at the springs. A photographic plate is acted upon when left for a few hours under a bell jar with the Plombières water. M. Curie thinks that the action does not come from a radium salt dissolved in the water, but is due to some other cause which is not as yet explained. The presence of the emanation may account for the physiological action of some mineral waters, seeing that some springs have an action upon the system which is not to be explained from their chemical constitution.

CAMEOS AND THEIR HISTORY.

An interesting lecture was recently delivered by Mr. Cyril Davenport at the Royal Institution, London, dealing with the beautiful handicraft dating from Ptolemaic times—cameos. Mr. Davenport maintained that a first-rate intaglio on hard stone was the finest work of art which could be wrought by the hand of man. Intaglios, however, he explained, were normally intended for the purpose of making impressions, being therefore only a means to an end, whereas a cameo was complete in itself. He described the processes necessary to the production of a cameo, including the mysteries of the bow drill, cutting diamond point, and modern gem-cutter's lathe. A short account was also given of the early history of cameos on shells, eggs, and soft stones before the discovery of onyx as the material specially adapted for cameo-cutting. The Græco-Roman, and especially the Augustan, period was rich in cameos, and almost every great Roman wished to have his portrait cut in onyx. One of these, an exquisite portrait of the Emperor himself, which formerly belonged to the Strozzi collection, is perhaps the finest existing cameo. Such portrait cameos were practically indestructible, except by accident. The large cameos—the "Triumph of Bacchus" at the Vatican, the "Agate de Tibère" at Paris, and the "Gemma Augesten" at Vienna—were described in detail, and much curious information was given about the signatures on cameos. When these signatures were in relief they were undoubtedly genuine, but when in intaglio they might be forgeries, and many such signatures were known to have been forged during the Renaissance.

Regarding the glass pastes, the finest instances of glass cameos are to be found upon the Portland vase and the Auldjo vase, both in London, and on the Vase des Vendanges at Naples.

The remarkable change from the classical and mythological designs of Græco-Roman times to the Christian themes of the fourth century, when Constantine the Great became Christian, is curiously illustrated in cameos. Hercules was christened "David," Perseus and the Gorgon became "David and Goliath," and Venuses and Ledas were turned into "Virgin Marys;" and the great "Agate de Tibère" at Paris was only saved from destruction by being called the "Triumph of Joseph in Egypt." Then at the Renaissance they all went back again, and classical art recovered its lost position. The Renaissance cameo-cutters were very skilled workmen, but in spite of their general high level they had not succeeded in making any very important cameo, although the "Hymeneal Procession of Eros and Psyche" realized a high price. They were, however, eminently successful in the setting of gems. Pope Pius II. and Lorenzo de Medici bestowed high and learned patronage in the matter of engraved gems. Two very charming pendants with cameo portraits of Queen Flizabeth represented English work, and fine recent work has also been executed by Edward Burch, Marchant, Wray, and Brett. In Great Britain, however, the art was virtually lost, and Bernardo Pistrucci, chief engraver to the mint, who designed the beautiful group of St. George and the Dragon on the English sovereign coin, was really the last great cameo designer. In France fine work has been done in late years by Adolph David, Henri François, Georges Lemaire, and others.

Three submarines of an entirely new type have been laid down simultaneously at Cherbourg. They are to be known as the "Emeraude," "Opale," and "Rubis." They will have a double hull, as in the case of the "Narval" class. The length of each will be 147.64 feet; beam, 13.12 feet; displacement, 600 tons; motor, 600 horse-power, driven by electric power from accumulators when submerged, and by benzine or other vapor when on the surface; speed, 12 knots. According to the France Militaire, each boat will have two propellers, and carry six torpedo tubes.