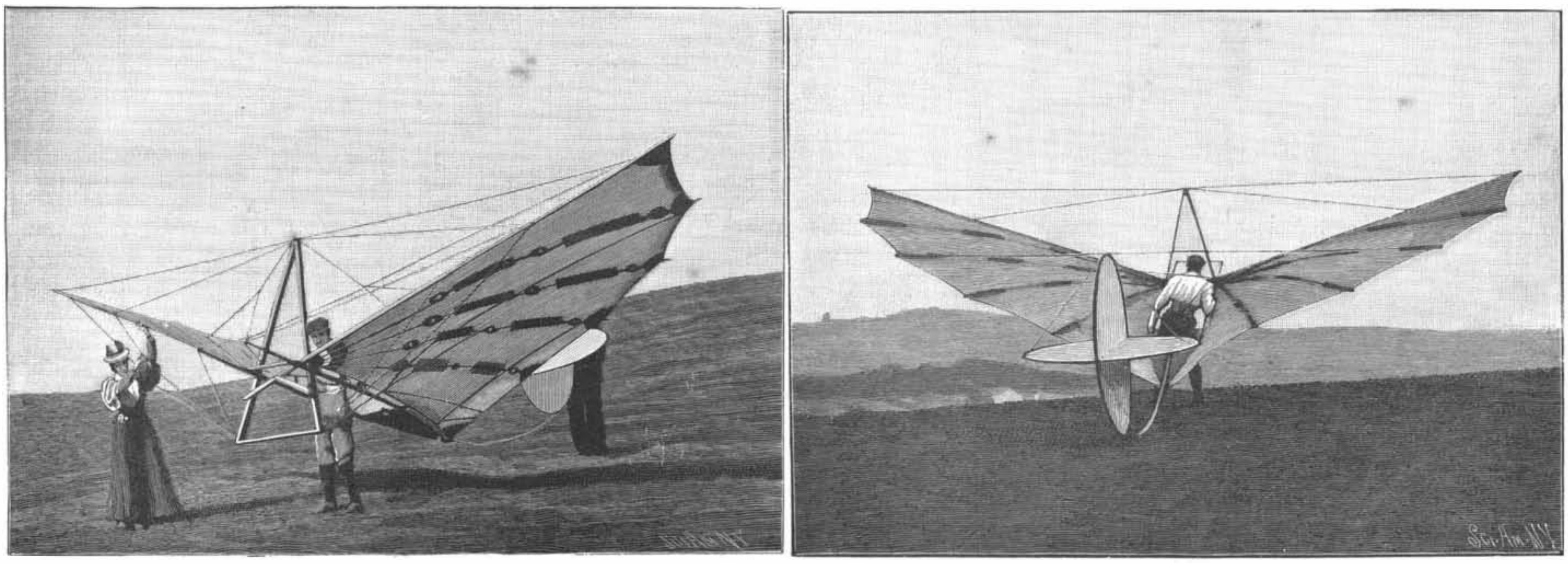
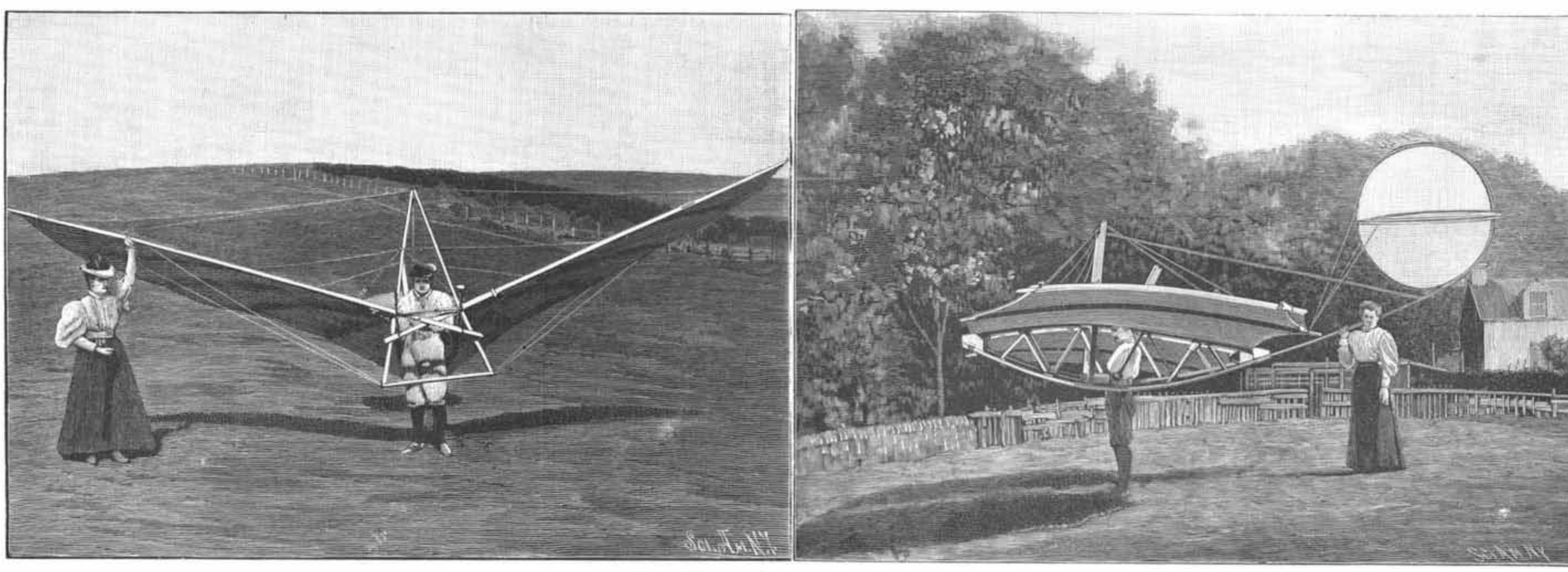
NEW FLYING MACHINE.

Our readers will recollect that we devoted some attention in the past to Herr Lilienthal, of Berlin, and his experiments in soaring. Now it is Mr. Percy S. Pilcher, Lecturer on Marine Engineering at Glasgow University, who, basing his inventions upon that of Herr Lilienthal, has produced two winged creations, and by their aid has taken sundry flights in midair. At times he has risen to an altitude of twenty feet, occasionally hovered kite-like for a space and then descended on the spot he left; while, upon other trials, he has hastened before the breeze for considerable distances ere regaining his feet. Mr. Pilcher's machines are light structures of wood and steel supporting a vast spread of wing and braced with piano wire. The wings themselves, which are made of nainsook—a sort of muslin originally manufactured in India—have an area of 150 square feet; and each machine, as our pictures indicate, possesses a vertical and horizontal rudder of circular shape, the one cutting the other at right angles. The former, which is rigid, serves to keep the machine's head to the wind, while the latter arrests an inclination to pitch sideways—a common vice in all like inventions.

The great difficulty with winged aeronauts is the uncertain quality of the wind, for a steady, unvarying breeze is never to be calculated upon. Indeed, the sudden, unexpected side puff often brought disaster in its train to Mr. Pilcher until he hit upon a means of circumventing it. He now draws his wing tips in with a bend, which renders a flying machine safer and more stable. Speaking generally, these experiments in flying or soaring are being made with a view to master the art of aerial balance and safe landing. Then, when the golden era dawns, when a screw propeller or flapping wings are introduced, and a power discovered to work them, gentlemen like Messrs. Lilienthal and Pilcher will spring gayly aloft to emulate the carrier or tumbler pigeon, and put a girdle round the earth in a morning. May the necessary discovery of a new power be speedily made! Meantime Mr. Pilcher, on a fresh pair of wings with a sail area of no less than 300 feet, pursues his plucky experiments at Cardross, in Dumbartonshire, before numerous admirers.—From Black and White.



THE PILCHER FLYING MACHINE.



THE LATEST FORM OF FLYING MACHINE.

Luminescence.

What has generally been called phosphorescence is well known to be the effect of oxidation in the case of phosphorus itself, and in that of decaying wood or other organic matter which under certain conditions shines in the dark. Wiedemann has shown that the shining of Balmain's luminous paint, and generally of the sulphides of the alkaline earths, is accompanied with chemical action. A long period of luminosity after the removal of the source renders highly probable the existence of what he now calls chemi-luminescence. A large number of substances, both inorganic and organic, have been examined both by direct action of light and by the action of cathode rays in a controllable vacuum tube through which sparks from a powerful electrical influence machine were passed. Careful examination with appropriate reagents before and after exposure was sufficient to determine whether any chemical change had been produced. Thus the neutral chlorides of sodium and potassium, after being rendered luminous by action of cathode rays, were thereby reduced to the condition of subchloride, so as to give a distinctly alkaline reaction. Many substances, moreover, which manifest no luminescence at ordinary temperatures after exposure, or which do so for only a short time, become distinctly luminescent when warmed. This striking phenomenon is sufficient to warrant the use of a special name, thermo-luminescence. Among such substances may be named the well known sulphides of the alkaline earths, the haloid salts of the alkali metals, a series of salts of the zinc and alkaline earth groups, various compounds with aluminum, and various kinds of glass. Some of these after exposure give intense colors when heated, even after the lapse of days or weeks. That the vibratory motion corresponding to the absorption of luminous energy should maintain itself for so long a time as a mere physical process is highly improbable, if not unparalleled. That it should become locked up, to be subsequently evoked by warming, certainly indicates the storing of chemical energy, just as the storage battery constitutes a chemical accumulator of electrical energy. Other indications that luminescence is as much a chemical as a physical phenomenon are found in the fact that the sudden solution of certain substances is accompanied by the manifestation of light, if they have been previously subjected to luminous radiation, but not otherwise; that alteration of color is brought about by such exposure; and that friction or crushing may cause momentary shining in such bodies as sugar. There is no conclusive direct evidence thus far that such luminescence as vanishes instantly upon the withdrawal of light is accompanied by chemical action. But Becquerel demonstrated long ago with his phosphoroscope that there is a measurable duration of luminous effect when to the unaided eye the disappearance seems instantaneous.* Wiedemann now shows that when this duration is considerable there is generally chemical change. Since duration is only a relative term, it seems highly probable that even cases of instantaneous luminescence, commonly called fluorescence, are accompanied with chemical action on a very minute scale, and that all luminescence is therefore jointly physical and chemical in character. We have thus color evoked by the direct action of light, which disturbs the atomic equilibrium that existed before exposure, and the manifestation of such color continues only until the cessation of the chemical action thus brought into play.

The influence of very low temperature upon luminescence and photographic action has been studied by Dewar.† The effect of light upon a photographic plate at the temperature of liquid air — 180° C. is reduced to only a fifth of what it is at ordinary temperature; and at —200° the reduction is still greater, while all other kinds of chemical action cease. In like manner, at —80° calcium sulphide ceases to be luminescent; but, if illuminated at this low temperature and then warmed, it gives out light. At the temperature of liquid air many substances manifest luminescence which ordinarily seem almost incapable of it; such are gelatine, ivory, and even pure water.—W. Le Conte Stevens.

AUSTRALIA has a population of less than 5,000,000, but economists declare it could support 100,000,000 with ease.

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* Becquerel, Comptes Rendus, xcvi, 121.

† Chemical News, lxx, p. 252, 1894.

Horseless Carriages in France.

The time seems approaching when automatic road carriages, propelled by steam, electricity, or petroleum, will come into general use and take away from the patient horse the worst part of his daily toil. The odds, at present, seem to be rather in favor of petroleum. A most interesting competition has recently taken place in France between varied specimens of motor carriages. The course prescribed was from Paris to Bordeaux—a distance of 358 miles—and back again, any vehicle to stand disqualified if it consumed more than one hundred hours on the road. The big prize of the day—40,000 francs ($7,720)—was for four-seated carriages, which was won by Les Fils de Peugeot Frères, while Messrs. Panhard & Levassor secured second place with a two-seated carriage, making the round trip in twenty-four hours and fifty-three minutes.

The winning conveyances were propelled by gasoline, and the rate of speed was about 15 miles an hour, which is regarded as an extremely creditable performance, the long lines of hills being taken into account. These hills appear to have proved too much for the carriages propelled by electricity, of which only one got through, the others having abandoned the contest. One of the steam carriages was brought to a standstill at Versailles early in the race, owing to an accident, and the others lost time by frequent stoppages of five and ten minutes, made for the purpose of taking in coal and water. The electrical conveyances had also to stop, from time to time, to renew their dynamic charges, but the petroleum machines carried enough force for a twenty-four hours' run, and on the return journey the run was made without a single stop. In comparing the merits of the different propelling agents, the palm must, so far, be awarded to petroleum, which is clean and can be easily carried. The ordinary feeder used for short distances contains less than 4 quarts of oil, which will last over a journey of 20 miles, or two and one-half hours. For long distances, a receptacle capable of holding enough petroleum for a run of at least twenty or twenty-four hours is provided.

We hear also of bicycles propelled by petroleum, in which great interest has been exhibited, and half a dozen of such machines started in the race to Bordeaux, one, at least, holding its own among the larger vehicles. It is believed that light petroleum bicycles, tricycles and even four-wheelers, will soon come into general use, which will tend to relieve lady cyclists from the necessity of wearing short skirts. Altogether, it seems that petroleum is destined to become the popular agent for solving the problem of traffic and conveyances without horses in the streets of great cities and on smooth country roads.

It has already made astonishing headway in the uses and industries of the world. In Japan it has become almost the sole illuminant, and on the Caspian Sea the Russian steamers burn nothing else for their engines.

In commenting on the success of the horseless vehicles propelled by petroleum, in the race between Paris and Bordeaux, a leading English journal says:

"Why is it that we are so slow in this country to take up improvements of such immense social importance? Ours is the land of machines and machinery, of skilled inventors and colossal enterprises, yet in many respects England lags behind the whole civilized world in availing herself of the discoveries of science. There is not as much use made in the whole of London of the telephone as in any one single quarter of Washington City, and there are prairie towns in the west of the United States more magnificently lighted by electricity than the best street of London. Electric tram cars and tram cables may be seen in many and many a city abroad, while here they are still novelties. Years ago the tourist might have watched a detached electric or petroleum phaeton quickly threading the thickest crowd of carriages in the Place de l'Opéra, at Paris; and now we have Frenchmen again, instead of the countrymen of Watt and of Stephenson, acting as pioneers to the new age which will certainly effect the deliverance of great cities from horse traffic, and of the horses themselves from a cruel and destructive use of their strength.

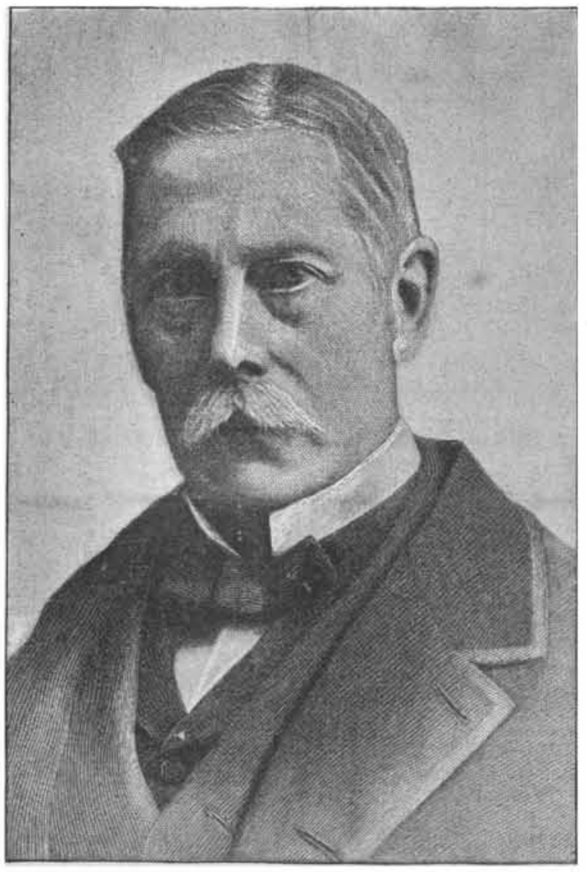
"It is a circumstance which has been frequently commented on, that there are no horseless conveyances other than cycles and a few cable tram cars in London. The reason is said to be that the law restricts the adoption of horseless vehicles in England to a very great extent. They are all subject to conditions upon which alone locomotives of primitive construction, steam rollers, etc., are suffered to go through the streets. A man must go before with a red flag, and the speed must be under four miles in the country or two in the town. The restriction was probably very well before the days of rapid transit, and it may be very well yet in its application to heavy locomotives. It was no doubt intended to guard against accidents due to the frightening of horses. But horses, like human beings, soon become accustomed to new and strange sights, and are nowadays seldom frightened even by the railway locomotive; besides, it is absurd to class a light carriage with a road locomotive or steam roller, because its motive power is steam, gas, petroleum, or electricity. But since the successful experiments recently made in France, London seems to have caught the gleam of a ray of hope that horseless cabs and omnibuses may soon be seen in her streets. Mr. Shaw-Lefevre, president of the local government board, has introduced into the House of Commons a bill intended to permit such carriages to be used, and they will no doubt soon become a common sight in the streets of London, as they are now in the streets of Paris, Havre, and other French cities."

C. W. CHANCELLOR, Consul.

Havre, June 24, 1895.

SIR DOUGLAS GALTON, PRESIDENT OF THE BRITISH ASSOCIATION.

Captain Sir Douglas Galton occupies the honorable post of president of the British Association in succession to the Marquis of Salisbury. He has justified his selection for this compliment by long and valuable services in various fields. Son of the late Mr. J. H. Galton, of Worcester, he was born in 1823. He was educated at Rugby and at the Royal Military Academy, Woolwich. Having joined the Royal Engineers, Douglas Galton soon showed his abilities. He had to do with the removal of the wrecked Royal George before he was twenty; then he served in the Mediterranean and on the Ordnance Survey. The first of a long series of secretariats began in 1848, when he acted in this capacity on a royal commission relating to the



SIR DOUGLAS GALTON, PRESIDENT OF THE BRITISH ASSOCIATION.

use of iron in railways. He next was appointed Inspector of Railways; in 1857 Chairman of the Commission dealing with submarine cables; and in 1862 Assistant Under-Secretary for War. But merely to recount all Captain Galton's services would be wearisome. He has had connection with commissions and congresses innumerable, while for twenty years he has been General Secretary of the British Association, over which he will soon be presiding at Ipswich. He was created C.B. 1865, and knighted in the Jubilee year. Sir Douglas has managed, by genial suavity allied to wide knowledge, to accomplish excellent work, as well as to make many friends.—Illustrated London News.

Teaching of English in College.

Disgraceful is a strong word, but, in the opinion of Professor Goodwin, of Harvard, it is a proper word to apply to conditions in his own and other similar institutions. "The college," he says, "must do something to redeem herself from disgrace," the disgrace being the paltry knowledge of the English language possessed by many of the students. Equally severe criticism is made, on the same point, of Uncle Sam's Military Academy at West Point, by the Board of Visitors for the year 1894. While highly commending the work of this institution in many respects, the Board's report laments the "lack of facility of expression" on the part of many of the cadets. The Committee on Discipline and Instruction were "painfully impressed" by the English examination, and recommended that more time be given to this language and its literature, only two hundred and ten hours being allotted to such study during the four years' course. The Visiting Committee on Composition and Rhetoric of Harvard University made similar criticism with respect to that institution in 1892 and again in 1894. Commenting on these facts, the Public Ledger, Philadelphia, says editorially:

"The responsibility for this regrettable state of affairs rests partly upon the colleges and universities, and partly upon the preparatory schools. The West Point Visiting Board recommend a more stringent English entrance examination, and if all the universities would insist upon this, the preparatory schools would give more attention to the subject. As long as it is assumed that the student has been well taught in English before he enters college, the preparatory schools will exploit foreign languages and the higher mathematics at the expense of English. The universities cannot be expected to instruct students in the fundamental principles of the mother tongue; but they can, and should, insist upon a searching examination in English when the student applies for admission.

"It has been said with great force that nobody can be thoroughly grounded in his native tongue unless he has some knowledge of a foreign one; but the first duty of the academies is to teach our youth how to use the language of Milton and Shakespeare with propriety, if not with elegance. That there is great need for better English instruction in all our schools is quite evident. The ordinary vernacular of the street shows that plainly enough, and the youth who can write a flawless English letter of any length is an exception. Our tongue does not come to all of us in its purity like an inspiration. If we would learn its peculiarities and show its pitfalls, we must make it the study of a lifetime and must lay a good foundation at a very early age."

[FROM NATURE.]

Alteration in the Colors of Flowers by Cyanide Fumes.

It is well known that the yellows of some insects are turned to red by the fumes from potassium cyanide; but I have not, after some inquiry, been able to obtain any literature describing the effects of such fumes upon the colors of flowers. The reactions I have observed are very curious, and while it seems improbable that they are hitherto wholly unknown, it may not be amiss to direct attention to them.

A few lumps of the cyanide are placed in a corked tube covered with a little cotton, and the flowers are placed on the cotton. It is probably necessary that the day should be hot or the tube slightly warmed. The pink flowers of Cleome integrifolia and Monarda fistulosa turn to a brilliant green-blue and finally become pale yellow. A purple-red verbena becomes bright blue, then pale yellow. The purple flowers of Solanum slæagnifolium go green-blue and then yellow. The white petals of Argemone platyceras turn yellow, the natural color of A. mexicana. The pale yellowish flowers of Mentzelia nuda turn a deeper yellow. Flowers of Lupinus argenteus, var., turn pale yellow. White elder (Sambucus) flowers turn yellow. The scarlet flowers of Sphæralcea angustifolia turn pale, dull pink, resembling somewhat a natural variety of the same. Any of your readers will doubtless obtain similar results with the flowers growing in their vicinity.

T. D. A. COCKERELL.

Las Cruces, New Mexico.

Painting Iron Work.

In a recent communication to the American Society of Civil Engineers, Mr. E. Gerber gives the results of a careful investigation into the present state of a number of bridges which had been painted with one of several classes of paint. In all cases rust was found to a greater or less extent, occurring always in spots in the center of clean metal. Most of this, however, was thin, and was as bad in new structures as in old. It was, however, found that the iron oxide paints adhered more firmly to the metal than the lead paints, only one case being found in which the latter adhered well and was tough. It is, however, suggested that much of this brittleness was due to adulteration of the oil by turpentine, benzine, or other petroleum products. There is more likelihood of such adulteration with lead paints than with iron, as they are more difficult to spread, and there is thus more temptation to dilute the oil. In some cases bridges coated with iron oxide eleven or twelve years ago were still in good condition, without having been repainted. Only two of the bridges examined had been painted with carbon or asphaltum paints, but the condition of things in these two cases was found to be not altogether satisfactory, as in neither case was the coating tough and adherent. The metal had, however, been protected by them. Mr. Gerber considers that too little attention has, in the past, been paid to thoroughly cleaning the metal before the first coat of paint is applied. Most of the rust spots found had apparently been there from the outset, and had done no harm so long as not too far advanced. The best plan of securing clean surfaces, in Mr. Gerber's opinion, would be to coat the metal with linseed oil as it left the rolls.