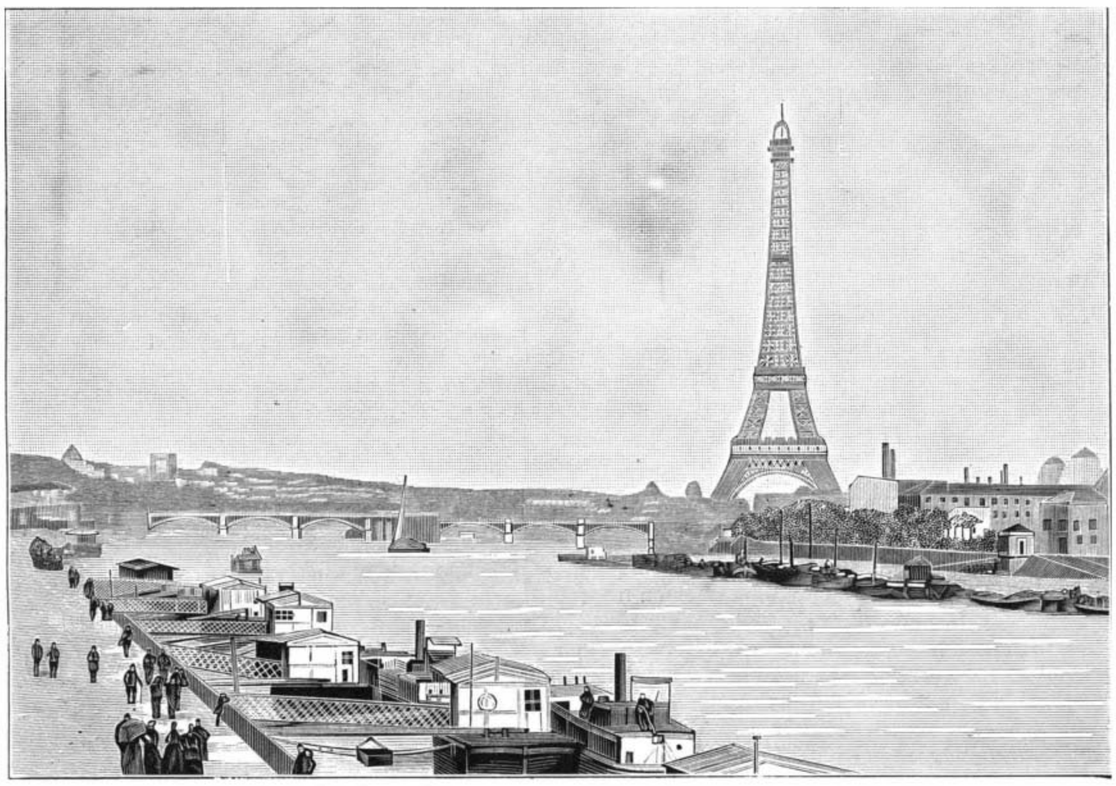
to carry one hundred passengers each, while the cars of the Otis elevators carry only fifty each, but their speed is double that of the others. The top lift, a vertical distance of 493 feet, is made by elevators on the Edoux system, in which the carriage is worked by an enormous piston. Those who go above this distance to the lantern will have to climb a spiral staircase.

The total height of the tower is 984.24 feet, or 300 meters, but the inclined or curved part of the legs considerably increases the length of travel of the elevators in these portions, a vertical height therein of 372 feet making an actual length of the curved part of 493 feet. The angle of inclination in this portion varies from 54 degrees at the start to about 80 degrees at the finish, but the carriages are so hung as to always accommodate themselves to the varying angle, so that their floors will be kept even. The steps leading to the different landing places are made to fold up when the car is traveling.

The great hydraulic cylinder of the Otis elevator, which is placed in the foot of the tower, perpendicularly to the cross pieces, is 38 inches in diameter and 41 feet long, while the circulating pipe, valve, and water chest are all 9 inches in diameter. In this cylinder is a piston fed with water from reservoirs placed on the stage where the vertical portion of the tower commences, or at a vertical height of 372 feet above the lower end of the cylinder. The piston rod operates on a carriage bearing guide wheels and multiplying pulleys, cables thence connecting with stationary multiplying pulleys, and the carriage being suspended by six ropes of steel wire. One of these ropes alone is designed to have sufficient strength to bear the carriage full of passengers without breaking. The carriage is partly counterbalanced, and rises or falls twelve feet for one foot movement of the piston. Under the cabin is a safety brake, with the jaws working automatically in case of rupture or of the elongation of one of the ropes.



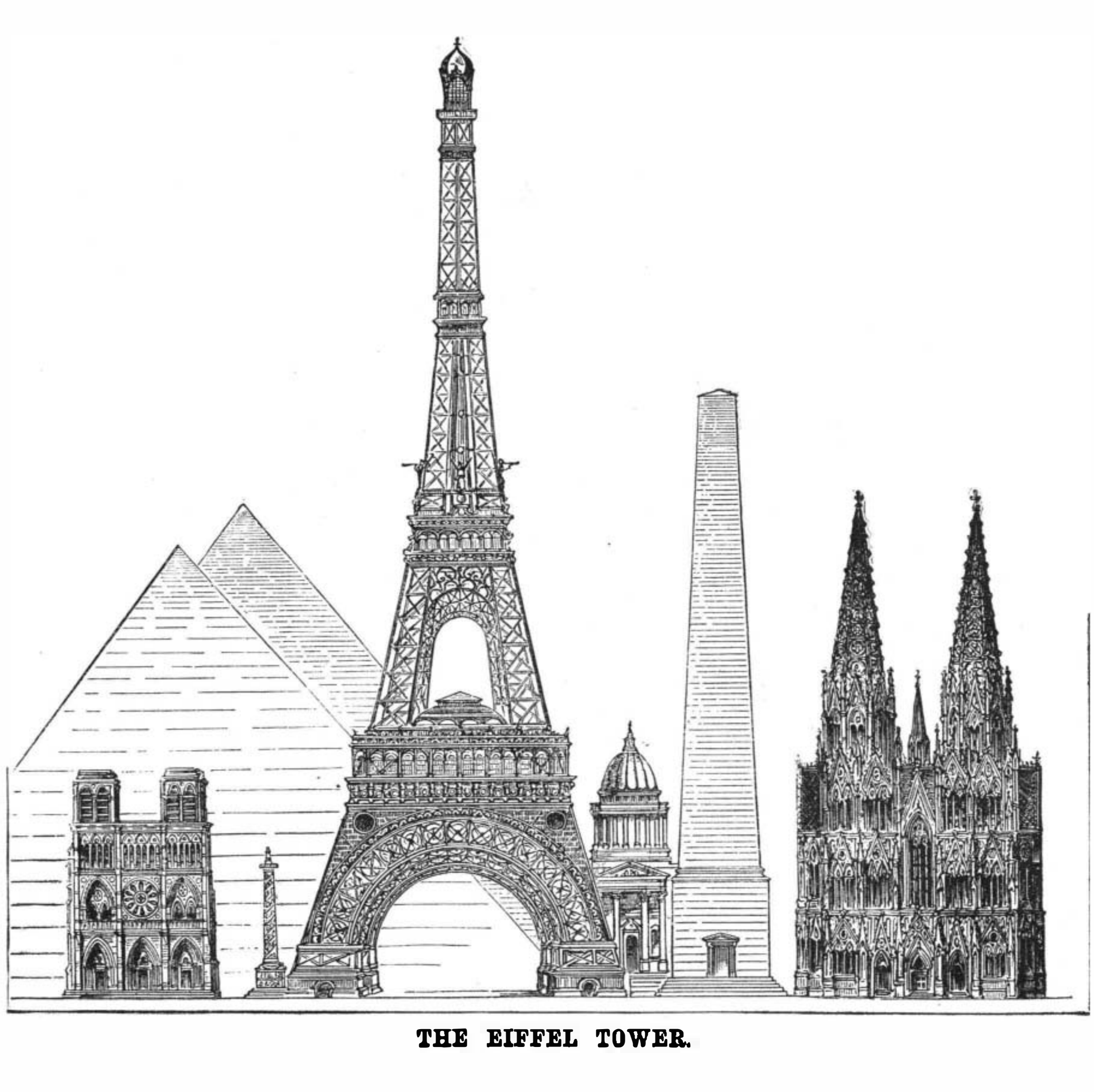
ASPECT OF THE EIFFEL TOWER AT A DISTANCE OF TWO MILES.

THE EIFFEL TOWER.

One of the most notable objects of this year's exposition in Paris will certainly be the Eiffel tower, named for the constructor Eiffel, and finished March 31. The reader knows that this immense and bolt iron structure, which is 984 feet high, is by far the highest building in the world. In the accompanying illustration we show the Eiffel tower in connection with some of the highest structures of the world, all being drawn on the same scale. Only by such a comparison as is made possible by this cut can one realize the size of this new wonder of the world.

The highest structures of ancient times are the pyramids of old Egypt, the highest and best preserved of which are the pyramid of Cheops, near Ghizeh (450 feet high), and that of Chephren (448 feet high). Both of these are less than half as high as the Eiffel tower. Heretofore the highest building in Europe was the Cologne cathedral (about 522 feet high), and the highest in America the Washington monument (about 555 feet high). Both are greatly surpassed in height by the Eiffel tower.

To give the reader an idea of the comparative heights of the Eiffel tower and the buildings nearest it, we have shown in the picture a few of the highest structures in Paris, viz., Notre Dame (223 feet high), the dome of the Pantheon (272 feet high), and the Column Vendome (144 feet high).—*Illustrirte Zeitung.*



THE EIFFEL TOWER.

THE UNIVERSAL EXPOSITION OF 1889.

Without having seen it for one's self, it would be impossible to imagine the amount of work that has been done in two years at the Esplanade des Invalides and Champ de Mars, which are connected by a covered gallery on the bank of the Seine. The Universal Exposition of 1889 will be the greatest and the most imposing manifestation of human industry that has ever been carried out up to the present. The entire world will figure in it, and the representatives of all countries will come to it in a crowd.

On passing through the structures accumulated here and there, and the innumerable galleries, and on visiting the machinery palace, and admiring the Eiffel tower, that dominates the whole, we could not repress a genuine feeling of patriotic joy; for the exposition will be a triumph for France and for Paris.

The Esplanade des Invalides will offer a peculiar attraction to the visitor, and everything that he sees there will prepare him in some measure for the wonders of the Champ de Mars. A multitude of varied buildings form here, as a whole, a most attractive sight. Among them is the palace of the Minister of War, with the military exhibit. The palaces of the Tunisian and Algerian sections opposite it are also most remarkable, though less monumental. Alongside of these structures an edifice is reserved for the administration of post offices and telegraphs; further on there are other structures designed for the exhibition of the Dutch Indies and of the islands of Java and Sumatra; then come the pavilions belonging to the sections of the French colonies—Cambodia, Annam, Cochin China and Tonkin, etc.

On the Invalides side, we may mention the large building of the panorama of Paris and, at the other extremity, the gastronomic pavilion. And now let us leave this spot, already so well filled, in order to cast a glance over the Champ de Mars.

Among the structures of the Champ de Mars, two will be especially beautiful. We mean the machinery palace and the 300 meter tower, the effect of the latter of which is absolutely grand and majestic. The machinery palace is entirely finished, as far as the architectural part properly so called is concerned. The supports for the shafting are placed upon their beton foundations, and some days ago a beginning was made toward moving in the host of machines which are to animate this immense structure, the largest that has been built up to the present, and which does honor to its engineers, its architects, and its decorators.

At the right of the Champ de Mars rises the palace of liberal arts, and, to the left, the palace of fine arts. Twenty years ago, either of these structures would alone have nearly sufficed to contain a universal exposition. Between the two palaces are laid out gardens that are to be illuminated at night with floods of electric light, and in the center of which luminous fountains will play. A little beyond these two palaces are the pavilions of the city of Paris, where the visitor will enter the galleries of the various groups by passing under a central dome of very majestic proportions.

In front of the Champ de Mars, the Eiffel tower, placed upon its four iron pillars, forms the arch of triumph of science and industry. Its aspect, now that it is finished to its definite height, can be judged of and appreciated. Its early detractors are mute, and the approbation of engineers and artists is unanimous. When regarded from a distance, the 300 meter tower appears graceful, slender, and light. It rises toward the heavens like a delicate lattice work of wires, and, as a whole, it is all full of poesy. When it is approached, the structure becomes monumental, and when the base of the colossus is reached, the spectator gazes with admiration and meditation at this enormous mass, assembled with mathematical precision, and forming one of the boldest works that the art of the engineer has ever dared to undertake. This surprise increases when he ascends the staircases of the tower. Before reaching the first story, he traverses forests of iron uprights, which offer fantastic entanglements; then, in measure as he ascends, he is astonished at once at the immensity of the structure, its apparent lightness, and the splendor of the panorama that it permits of contemplating. Apart from the undoubted interest that attaches to the Eiffel tower, as much from the standpoint of its metallic structure as from that of its height, we can now no longer deny that the gigantic work is absolutely beautiful.

Sunday, March 31, while descending the tower stairs after the ceremony of placing the flag upon the summit of the cupola, we had the pleasure of hearing one of our most distinguished members of the Academy of Sciences exclaim that this iron monument was certainly the most astonishing production of our age. It is for our epoch, he said to us, what the great pyramid, which interprets the efforts of an entire people, was for the ancient world. All the resources of contemporary art have had to concur in its execution. The work that Mr. Eiffel will have had the glory of carrying out is, in fact, the expression of the applied science of our time.—*La Nature.*

The Habits of Ants.

Although the following fact relative to the habits of ants is well known, I have never seen it described with the marked characters and in the clearly defined form in which I have just observed it. I think it will interest the readers of this journal.

Saturday, July 14, 1888, while the sun was shining brightly, I was walking on a road running north and south, and which, at a point that I had reached, skirted a garden wall. I soon observed at my left, toward the wall, a whole legion of brown ants of quite a large size that were moving with a quickened pace, and in good order, in the same direction. The column was about 8 inches in width and nearly 16 feet in length. It started from a piece of ground a little higher than the roadway and covered with grass and weeds. From this it descended by a foot path inclined more than 45 degrees, at the center of which it turned abruptly at right angles in order to follow the road. I quickened my pace and reached the head of the column, which was very sharply defined, and followed it attentively in order to see what could be the object of the expedition, for it was clear that it was a question of the carrying out of a well determined plan. I had already remarked with surprise that, during the march of this army, several ants, seeming to have changed their mind, were retracing their steps and traversing all the ranks; but I soon saw them turn about again, after advising with some of their companions which they had sought. Having reached the large garden gate, the head of the column stopped, and all the new comers grouped themselves in a circle of wide diameter. It was evident that the ants had united in a council of war, and that they were debating upon some plan of prudence to follow. The circle, in fact, soon opened, and the ants began to pass under the leaves of the gate, no longer in a serried column, but scattered over a wide space, and walking more slowly and with deliberation. I saw them move in the direction of a grass plat, and here I lost sight of them. I was feverish that day, and out of humor, and I walked along gloomily, thinking of what I had just observed. I thought it was some unfortunate colony that had exiled itself from its domicile in order to seek more propitious skies. I was thoroughly deceived. I had just witnessed a premeditated pillaging expedition.

Returning by the same route in the course of half an hour, I saw my ants triumphantly starting for home, each holding in its mandibles a large ant's egg, doubtless of another species. Each was proceeding on its own hook, and endeavoring not to lose its prey. Was it, in fact, prey that they had just sought for their table, by a barbarous refinement of taste? Or was it, rather, eggs that they wished to have hatched in their own domiciles in order to convert the young ants into slaves, of which, by a just retribution, they in turn would become the slaves, by losing the habit of working? Was it an odious act of rapine and violence that I had just witnessed, or must we admit that ants thus deprived of their progeniture willingly resign themselves to their fate and are predestined thereto? At all events, the defense, if defense there had been, could not have been very energetic. The pillagers were not pursued, and not a wounded individual appeared among the victors.

The first part of the drama had saddened me, but had left me with a false notion; the end saddened me more yet. I consoled myself, however, by saying to myself that if these slave-making ants are not better than their similars among men, they at least understand their true interests better. They do not maltreat their victims very much, since they eventually become the humble vassals of the latter. And then, thought I, too, perhaps the naturalists who have well observed these captures of one race by another have not awaited the end. Ants of a large brown species exist that capture eggs, and it must be, then, that either they are not robbed of their entire progeniture, or that the slaves some day or another go back home, dividing in their turn the victors of the day before. Perhaps one of these days I shall see a procession of smaller ants proceeding quietly toward their original abode.

Since the epoch in which Descartes, by an inspiration (this time inauspicious) of his genius, tried to reduce animals to the state of machines, and in which Malebranche, his fanatical disciple, carried this idea to the point of extravagance, and since the epoch in which Buffon, in contradiction to his pompous tirades on the qualities of the dog, horse, etc., endeavored to prove that all is instinct and mechanism in the animal, a considerable progress has been made in this line of questions. No more than any astronomer to-day disputes the plurality of the worlds does any naturalist longer dispute the manifestations (often very elevated) of intelligence, reasoning, and other psychical faculties, not in the animal kingdom taken in a lump, as done by many persons in order to deny the fact more easily, but in certain species and certain individuals of such species. Man being considered (by himself, be it understood) as the highest type of animate and living nature, it might be thought that these inferior beings, which, in certain respects, are comparable to him, would be the very ones that, by their organization, resembled him most. Although, in fact, that is the case, generally speaking, we nevertheless meet with exceptions that seem to us true enigmas. What more different from our own than the organization of an ant? And yet, in the scene that I have described, we find ourselves in the presence of acts in which instinct as a prime mover is no longer merely in the background, and which suppose reasoning, prolonged observation, and means of communication between individuals that no one would have suspected *a priori.*

The two ant hills that I speak of—those of the pillagers and the pillaged—are very distant from each other, and one of them is in an inclosure. I follow the same path daily, but I never observed ants traversing it before. Instinct may say to the large brown ants that there exist other ants capable of doing what they themselves do not wish and know not how to do; but here the revelations of such instinct stop. In order to satisfy it, the *incapable* ants must plainly have had explorers to go to a distance to look for a colony of workers, to boldly enter the latter's quarters in order to see when the laying of eggs would take place, and then return home and report the time thereof to their companions. Such information must have been communicated quickly to the entire colony, and the order to move must have been perfectly understood, since the head of the column was advancing in good order and with a quick pace. Moreover, this legion must have had guides that were very sure of their business and of the objective point to be reached. The ants that turned back and quickly traversed all the ranks, to see if everything was proceeding according to rule, probably knew that among their kind, as among our own, intelligence and the sentiment of duty are not the same with all. The council of war held in the circle before the attack of the camp to be pillaged is a proof of a well-reasoned prudence. No unwise head in command said: "All is ready."

In what precedes, I do not intend to teach the reader anything new. He will find in the well written work of Brehm some remarkable observations on the habits and aptitudes of ants. The reason that I have entered at some length upon this subject is because I had never seen a succession of acts more varied displayed among these little creatures, and all combining to lead the spectator to the same forced conclusion. To have seen nothing but mechanism and blind instinct in the scene that I witnessed, I should myself have had to be endowed with scarcely anything else than these two motors. The reader will certainly join me in this conclusion.—*G. A. Hirn, in La Nature.*

Great Speed of Ocean Steamers.

The new Inman and International liner City of Paris recently completed her first round voyage to and from New York, and although she has not exactly broken the record, she has done remarkably well, and gives every promise of accomplishing the task which, by general consent, has been set to her. The following is from *Engineering.* First trips of fast steamers are usually very commonplace performances, by reason of the many stoppages made in the machinery to bring about desirable changes dictated by the experience gained from day to day, and it was not therefore expected that the City of Paris would even do so well as she has done. It is true that the record was broken in her maiden voyage by the America, the production of the same eminent naval architects and marine engineers who have designed the hull of the City of Paris with all its grace of outline and the machinery with all its novelties; but owing to these very novelties, which include the principle of forced draught, previously untried in a large liner, it was not expected that the vessel would break the record at once. But there is no need to apologize for her performances; she has beaten all previous maiden voyages, and that by a long way. Indeed, she was within a couple of hours or so of the fastest run home on record, and this is eminently satisfactory.

Although the homeward journey was the faster, it may be well for the sake of consecutiveness to deal with the outward passage first. She left Queenstown on April 5, and arrived at Sandy Hook on April 11, and in spite of two days of heavy wind and sea and two days of fog, she covered the distance in 6 days 18 hours 53 minutes. When three days out the port engine gave way, owing to the packing of the piston rod getting wrong, and the vessel was propelled by her one engine for more than five hours. This reduced the day's running to 390 miles. Otherwise the machinery worked very well, and it is noteworthy that the amount of coal consumed was even less than in the case of the City of New York. It is very satisfactory to note that toward the end of the journey the speed gradually increased, presumably due to greater confidence on the part of the engineers, and consequently more being taken out of the engines. The steaming of 498 miles within the last complete 24 hours of the voyage is a guarantee of the capabilities of the vessel. In giving the daily runs of the City of Paris we give also the runs of the Etruria on her fastest trip, made in June, 1888, with the remark that she has had several years' running, and has improved with age, so that it is not exactly for comparison that we give the figures, but rather to indicate what the City of Paris must and probably will do before long.

ETRURIA.	Miles.	CITY OF PARIS.	Miles.
Monday	455	April 5	378
Tuesday	458	" 6	415
Wednesday	496	" 7	402
Thursday	485	" 8	390
Friday	503	" 9	410
Saturday	457	" 10	498
		" 11	344

The passage time of the Etruria was 6 days 1 hour 47 minutes, having left Queenstown at 1 P.M. on Sunday and arrived at Sandy Hook 10:25 P.M. on the following Saturday. Calculating that Friday was of 24¾ hours, the mean speed on that day was 20·3 knots per hour—a splendid sea speed. If her first trip to New York were placed alongside the first Atlantic run of the City of Paris, which might be perhaps a fairer comparison to the latter steamer, then the difference would be in her favor by nearly a whole day, and if the City of Paris improves as has the Etruria, what are the possibilities? This style of reasoning we do not care to follow, and we will therefore leave it to the imaginative reader.

The homeward journey, as we have already indicated, is a much more pronounced success. The time taken from Sandy Hook to Queenstown was 6 days 5 hours 55 minutes. She left Sandy Hook at 9:10 A. M. on the 17th ult. and arrived at Queenstown at 7:40 P. M. on the 23d ult. After she left Sandy Hook the engines were slowed for 24 hours. The weather experienced was strong easterly winds with high head sea and some fog. The best day's run was 470 knots, a very good record for less than 24 hours. It is very remarkable that the Umbria crossed the Atlantic three days in front of the Inman liner, and the comparison between the logs is very interesting. Here they are:

CITY OF PARIS.	Miles.	UMBRIA.	Miles.
April 17 (part day)	442	April 14 (part day)	344
" 18	432	" 15	446
" 19	440	" 16	439
" 20	461	" 17	454
" 21	460	" 18	451
" 22	470	" 19	447
" 23 (part day)	150	" 20 (part day)	301
Voyage, 6 days 5 hrs. 55 min.		Voyage, 6 days 3 hrs. 50 min.	

The Umbria had fresh breezes throughout. The Etruria three weeks ago took 6 days 9 hours to cross, her log giving the longest day's run as 440 knots. The Umbria, in November last, made the record 6 days 2 hours 32 minutes, having left New York at 2:29 P. M. on Monday, November 12, and arrived at Queenstown 10:1 P. M. on the Sunday following. She thus beat by 2 hours 18 minutes the record of the Etruria in July last. The logs of these two voyages are given, with that of the City of Paris, in the following table:

UMBRIA.	Miles.	ETRURIA.	Miles.	CITY OF PARIS.	Miles.
Nov. 13 at noon	380	July, 1st day out	334	April 17	442
" 14 "	454	" 2d "	460	" 18	432
" 15 "	442	" 3d "	452	" 19	440
" 16 "	454	" 4th "	454	" 20	461
" 17 "	464	" 5th "	445	" 21	460
" 18 (34 hrs)	632	" 6th "	456	" 22	470
		Part 7th day	280	" 23 (part)	150
Time, 6 days 2 hrs. 32 min.		6 days 4 hrs. 15 min.		6 days 5 hrs. 55 min.	

It will, therefore, be seen that the City of Paris has but 3 hours 23 minutes to take off her time, so that the chances of her breaking the record can be easily appreciated.

[To the above we have now to add the third and last trip of the City of Paris, from Queenstown to New York, when the ship accomplished the fastest voyage ever made, namely, 5 days 23 hours 7 minutes. She left Queenstown May 2 and reached New York May 8. Her daily distances are reported to be as follows:

	Miles.		Miles.
May 3	445	May 6	505
May 4	492	May 7	511
May 5	504	May 8	398

The average speed was about 23½ knots. The distance from Queenstown to Sandy Hook is 2,855 miles.]

California Fruit Statistics.

The value of the California fruit crop this year is estimated at $24,000,000, of which fresh and dried fruits amount to $6,500,000 each, and raisins and citrus fruits $3,500,000 each. The wheat crop is estimated at 70,000,000 bushels, worth $52,000,000; barley, $5,500,000; vegetables, $3,750,000; wool, $6,000,000; dairy products, $7,500,000; wine, $4,000,000. The total of all products, not including manufactures, amounts to $185,000,000.

Electric Door Openers for Use in Asylums.

BY M. J. WHITE, M.D., SUPERINTENDENT OF THE MILWAUKEE HOSPITAL FOR INSANE, WAUWATOSA, WIS.

The idea of providing some means of instantaneous release for inmates of asylums, in the event of fire or panic, has occupied my attention and study for some time past. The necessity of furnishing some certain method of release will be quite apparent, tending as it will to relieve apprehensions existing in the minds of many patients—notably new admissions of a mild type of disease, and convalescent patients, both of which classes are quick to appreciate their surroundings, and for whom the terrors of fire are very potent. Reflecting, as they do, upon the fact that they are locked on one side and barred upon the other, the disquietude occasioned by their situation must certainly be prejudicial to the chances of a speedy recovery, at all events it militates against the equanimity which might obtain were their fears on that score relieved.

The utility of this system will be readily appreciated by all familiar with the management of institutions of this character, more particularly by those connected with the smaller asylums, where the number of attendants is apt to be proportionately small, as it effectually removes the risk of attendants becoming panic stricken, and in consequence forsaking their charges. I was most forcibly impressed on this subject of speedy release in case of fire by a conversation with a female patient in this asylum—a woman of superior intelligence. In the course of conversation, she said to me, "Doctor, what is to become of me if a fire should break out on this ward? I am virtually caged in this room." I replied, "You would immediately be released by the attendants in charge of the ward." She returned, "I wish I could persuade myself that such would be the case, but unfortunately I am tortured by the doubt that the 'girls' would lose their presence of mind and, thinking only of their own safety, would leave us to our fate." I allayed her fears as best I could, but the impression remained with me until I decided to leave open the doors on that ward—a convalescent ward—which I did, with a few exceptions.

I then considered that this way out of the difficulty was not solved in the case of the great majority of the inmates, and accordingly I began to reflect upon the subject of securing some means of controlling all the doors instantaneously and simultaneously, and which, moreover, would place the safety of the patients in most trustworthy hands. I entered into correspondence with superintendents of various asylums throughout the country to ascertain if any system was in operation, mechanical or otherwise, whereby a number of doors could be opened simultaneously. I received negative replies in every case. The system in use in penal institutions was the only one known, and that was to be deprecated on account of the association suggested. The idea of using compressed air was then entertained, and was abandoned for that of electricity.

I consulted with an electrician, and together we ascertained that a door opener operated by means of electricity was in use in large apartment houses, having superseded the mechanical device formerly employed, but that its operation was confined to one door. It was argued that if a single door could be controlled by this means, an indefinite number could be operated similarly, provided sufficient battery power were used. The lock referred to was sent for, put in place and connected, and it operated satisfactorily for a time, suddenly it failed, and upon investigation it was found that the lock not being incased, small particles of dust and plaster had dropped into it and crippled its working mechanism.

Moreover, it was determined that the lock was not built with an idea of resisting sufficiently force which would likely be exerted upon it, also that the spring push, which was secured higher up on the door, was too much of a toy affair and could be tampered with by patients so inclined. Another lock was procured, which was stronger in every way, in construction, and possessed the advantage of embodying the lock and spring push in one piece, also being so constructed as to render it incapable of being toyed with or its mechanism to be interfered with by mischievous patients. The same objection presented, however, viz., it not being incased. This we remedied by means of plates on all sides.

I addressed the board of trustees of this asylum on the subject of providing a means of certain and speedy egress in case of fire, setting forth the dangers of relying solely upon the presence of mind of the attendants in such emergencies, dwelling on the defective condition of the mechanical locks which have been in constant use since the establishment of the institution, moreover, explaining minutely the perilous situation of the patients, which could not be fully appreciated by those dwelling in houses where window grating was unknown. I also endeavored to impress sufficiently the fact that the number of attendants was of necessity proportionately small, and the time consumed in unlocking doors separately, provided the attendants preserved their composure, would be necessarily considerable and possibly hazardous.

The gentlemen of the board, appreciating the force of the arguments adduced in favor of the system, and being strongly alive to the necessity of neglecting no practicable means to provide protection to the inmates, granted me the power to equip ten doors and operate them for a period sufficiently long to demonstrate beyond a doubt the feasibility of the scheme. Ten doors were accordingly fitted out in this manner, and they have been in successful operation for a considerable period, and give undoubted promise of fulfilling the work required of them.

I will describe briefly the device used and the method of its application for use in asylums. The lock is set into the door jamb, and operates in connection with the bolt of the mechanical lock, which is of course situated in the door. In this manner, the bolt of the mechanical lock is slid behind the bolt of the electrical apparatus and held there securely by it until the current is turned on, when the electrical bolt recedes into the lock and releases the mechanical bolt. At the same instant a mechanical device, situate in the lock, in the form of a powerful spring push, and which, by the way, is up to the highest state of tension when the door is locked, is released, and acting upon a small brass plate fastened to the door, serves to throw it a distance of three feet. The door is thrown open with its bolt shot and immovable and cannot be closed again except by means of the key, as the electric bolt is immovable save when influenced by the current. This forms an advantage in preventing viciously inclined patients from securing themselves in their rooms or inveigling attendants therein and imprisoning them, as might happen in case a spring latch were used, as was suggested to me at one time.

The device has the appearance of an ordinary lock, and nothing in connection with the system is objectionable as tending to suggest disagreeable associations, as the wires are all concealed under the mouldings of the door frames and carried through the floor to the ceiling below in the basement, and along it to a locked cabinet containing the cells. At present the ten doors are operated by means of eight cells, the ordinary Bell battery with sal ammoniac solution being used. A test of the apparatus is practically made every morning, as the patients are released in this way, and in case of any imperfect working the defect can be immediately traced and corrected, so as to insure its efficiency in any event. The push buttons are located in the attendants' rooms and are operated at that point, but in order to make assurance doubly sure the wires are to be carried to the superintendent's office and are to be controlled from that point also. It is intended also to have a separate button to operate the exit and fire escape doors, which will be used solely in case of emergency. This arrangement will provide a perfectly free exit from the building as well as from the sleeping rooms.

I have recently introduced a fire drill among the patients, so that at a given signal they hasten to the hall and form in a double column, when they are counted by the attendants and marched to the fire escape. It may seem an incredible statement, but the great majority of our patients respond promptly to this drill. I would say that in carrying this out I have relied greatly on the force of habit, which obtains as prominently among the insane as among the sane, and is quite effective in this instance. I am digressing, but I merely wished to call attention to the value of a drill of this kind in connection with the means of release provided by the electric system of door openers and the advantages resulting from their combined operation.

The subject of the safety of inmates of institutions of this kind is one that is deserving of serious reflection on the part of all interested in the care and treatment of this unfortunate class, and the apprehension of the patient for his or her release in case of fire or panic is certainly worthy of our consideration. If any means can be devised which will tend to promote a feeling of security in minds diseased and morbidly apprehensive, I am of the opinion that nothing of practical value in this direction ought to be disregarded or overlooked.—*American Journal of Insanity.*

Another Chance for Inventors.

According to the *Virginia City* (Nev.) *Enterprise*, the fortune that awaits the inventor of a successful dry-placer machine, or any method by which the gold in the loose dirt on the hills and mountains of Nevada can be separated, will make the present wealthy men of the world have, by comparison, dismal anticipations of the poorhouse. The experiment has often been tried, and as often the result has been only partially successful, often sufficiently encouraging to induce continued effort, but never so far has a profitable working test been made. Frequent failue, however, does not discourage those who have a conception of the possibilities, and detail after detail of discovery and improvement will be made until dry working is achieved.

Owing to the specific gravity of gold, which enables us to collect it by the use of water, wind will probably be the chief agent of separation. The numerous contrivances for that purpose now in existence depend more or less upon the principle by which grain is separated from chaff, and the experimenters have usually directed their attention to modifications of the form and structure of the familiar winnowing machine.

The several methods of utilizing the air have at times been combined with amalgamating plates and with a moderate use of water, which is made to do continuous service. The failure in the sense of profitable working has usually been due to the relatively small quantity of metal saved; that is, the returns have not justified the outlay. There is no question as to the feasibility of making the weight of particles of gold operate in collecting themselves in a distinct mass. It is and always has been only the ratio between value received and value expended that must be overcome by the successful dry separator. Heretofore the wind has been supplied by artificial means, and its application has necessarily been limited. Some time the natural motion of the air will be applied on a large scale, and in such a manner that by a repeated fanning the dry earth may be blown away from the heavier metal. Great air concentrators will be devised that can be operated at an expense merely nominal, and the problem will be practically solved. When this is accomplished, the *Enterprise* adds, the wind, which, like the poor, we have always with us, will blow wealth and prosperity for Nevada.

PHOTOGRAPHIC NOTES.

A New Developer has been very successful in my hands. This new developer, which combines the delicacy which may be obtained by the use of pyro with a beautiful transparent steel gray tone, gives most uniform negatives of excellent printing qualities. The formula which I used is the following:

No. 1.—Water	1,000 c. c.	
	Sulphite of soda	250 grammes.
No. 2.—Water	1,000 c. c.	
	Carbonate of soda	250 grammes.
No. 3.—Water	1,000 c. c.	
	Carbonate of potash	250 grammes.

Now are mixed in a bottle:

No. 4.—Sulphite solution 1	200 c. c.
Pyrogallic acid	10 grammes.
Hydrochlorate of hydroxylamine	2 "

And in another bottle:

No. 5.—Soda solution 2	100 c. c.
Potash solution 3	100 "

To develop a plate of 13 by 18 centimeters I mix:

Water	100 c. c.
Pyro solution 4	10 "
Solution 5	20 to 60 drops.

If I have to develop instantaneous pictures, I add at the very beginning 40 drops of solution 5 to the bath, but in the case of time exposures I begin with 20 drops, and, if the picture comes out slowly, I gradually add 5 drops at a time, as often as required with instantaneous exposures. This developer gives plenty of detail, and at the same time soft and brilliant negatives, if the alkalic solution, No. 5, is correctly employed, and neither too much nor too little of it is used.—*H. E. Gunther, in Photo. News.*

A Brilliant Actinic Artificial Light.—A writer in the *Chemiker Zeitung* has recently given the following formula for a penetrating light, which, it is stated, is visible in clear air for a distance of a hundred kilometers, or about 60 miles: Magnesium powder 20 parts, barium nitrate 30 parts, flowers of sulphur 4 parts, beef tallow 7 parts. The tallow is added in a melted state, and the mixture is sifted. This mass, filled in strong zinc cases ten centimeters high and seven in diameter, burns for twenty seconds with a light of 20,000 candle power. Making a rough estimate, this might weigh about a pound, and as it would be one-third magnesium, its cost is quickly seen. Of course such an immensely powerful light would be needlessly great for portraiture.—*British Journal of Photography.*

Depth Daylight will Penetrate Water.—In the month of March sunlight affects a sensitive dry plate sunk to a depth of 400 meters in the Mediterranean Sea. In September the distance is less by 20 meters.

Developer for Collodion Emulsion Plates.—

Hydroquinone	165	grains.
Bromide of potassium	23	"
Citric acid	40	"
Sulphite of soda (crystals)	1½	"
Water	20	oz.

Alkaline Solution.

Carbonate of soda	2 oz.
Carbonate of potash	2 "
Water	20 "

When the exposure is correct, use equal parts of each for the developer. If over-exposure is suspected, use half the quantity of the alkaline solution.—*Fred. W. Muncey, in the British Journal of Photography.*

A HISTORY of sugar was written in 1799 by Dr. Mosely. It states that sugar when first introduced into every country was used only medicinally. Pliny, the naturalist, leaves no room for doubt on this point. Even in Arabia, in the time of Avicenna (A.D. 980–1038), though sugar was an article of commerce from the East, there is no record of its being used for dietetic or culinary purposes for several centuries afterward. It was chiefly used to make nauseating medicines pleasant to take.