BALLOONS BUILT TO STEER.

HISTORY OF THE PROGRESS OF AERIAL NAVIGATION.

From Montgolfier to Renard and Maxim—The Development of the Navigation of the Air is Wholly Within the Last Forty Years—Capt. Renard's Success—Maxim's Present Experiments in Old England.

From the year 1783, when the brothers Montgolfier constructed the first balloon, which was formed of paper and inflated with hot air, very little was actually done in regard to steering or directing balloons until 1851, notwithstanding that numerous attempts had been made and many foolish theories proposed. However, in this year it may be said that a really first-class engineer took up the subject of aeronautics. I refer to Henri Giffard, who was said to be an engineer and mechanic without rival, and the inventor of that marvellous instrument the injector, by which a stream of water without pressure is driven into a boiler against a pressure with no other force than the steam from the boiler acting directly upon the cold water without the interposition of any pistons or moving parts whatsoever.

HIRAM MAXIM.

After a great deal of trouble and many disappointments, Giffard launched his first *aerostat dirigeable à vapeur* on the 24th day of September, 1852. This aerostat was an elongated balloon, pointed at both ends, and entirely covered—excepting the points and the lower part—by a net. Cords hanging from the net on each side of the balloon were attached to a wooden beam 65.6 feet long, placed at a considerable distance below the balloon; 19.6 feet below the beam was suspended a platform, on which was placed a small steam engine and boiler, with the necessary coal and water. The balloon itself was 39 feet in diameter at the middle and 144 feet long, and contained 88,281 cubic feet of gas. A triangular rudder was attached to the balloon, and connected with cords, so as to be easily manipulated from the platform. The fire was enclosed in such a manner that it could not ignite the gas. The draught was induced by the escaping force of the exhaust steam, after the manner of a locomotive. The fuel employed was coke of a good quality. The engine shaft extended rearward, and was provided with a screw propeller having three blades. The diameter of the screw was 11 feet, and the force of the engine was found sufficient to give the screw 110 turns per minute. The engine was three horse power, or equal to the work that could be done by thirty men. The weight of the boiler was 220 pounds and of the engine 128 pounds, making in all 348 pounds, or 110 pounds for one horse power, or about 12 pounds for the power of one man. In order to have produced the same amount of energy by hand it would have been necessary to employ thirty men, which would have represented a weight of 3,960 pounds; that is to say, nearly twelve times the weight of the boiler and engine. On each side of the platform the fuel and water were stored, and it was believed that this could not be considered as adding any weight to the machine, because ballast would have to be provided in any event, and instead of throwing the ballast overboard, as is usual in ordinary balloons, the ballast was consumed by the engine. Had the machine been supplied with pure hydrogen, it would have had a lifting force of 6,160 pounds, which would have permitted the employment of a much more powerful motor, but at that time large quantities of hydrogen gas were not easily obtained; consequently, common illuminating gas had to be employed, which diminished the lifting power 2,200 pounds, giving a lifting force of 3,960 pounds.

When the machine was fully equipped it was found that the total weight, everything considered, was 3,432 pounds, leaving 528 pounds for water and fuel, and consequently for ballast. When the first ascension was made it was found that the elongated balloon kept its shape perfectly, that its axis remained horizontal, that there was no oscillation or vibration of the platform or car, and when the steam engine was put into action it gave to the balloon a speed of 4½ to 6⅔ miles per hour. The velocity of the wind being greater than this, the balloon could only navigate through a certain number of degrees to the leeward of the point of departure, the width of the arc depending upon the velocity of the wind. It was also found that the rudder operated perfectly, and that the head of the balloon could be turned in any direction, and if navigated in a dead calm it was as manageable as a boat.

After making his first balloon, Giffard made other inventions from which he realized large sums of money, and this enabled him to conduct further experiments not only with "dirigeable" balloons, but also with captive balloons. From experiments which he had tried, he believed that it was only necessary to make the aerostat large enough, to inflate it with pure hydrogen gas, and to provide it with a powerful motor, in order to obtain velocities much greater than he had obtained in his first experiments. He prepared a complete specification of a gigantic balloon which formed the subject of a patent. The text of this patent was published in the *Génie industriel de MM. Armengaud frères*, and at the time was considered a monument of skill and ingenuity in aeronautics. This proposed balloon was very much elongated, being much longer and relatively less in diameter than had ever been attempted before, and in order to preserve its shape and to enable it to resist end pressure it was provided with a stiff backbone, extending its entire length. It was about 1,968 feet long, 98 feet in diameter, and its cubic contents 7,769,647 feet. It was proposed to inflate this balloon with pure hydrogen gas. Such a balloon could carry a motor weighing no less than 66,000 pounds and still leave an excess of ascensional force sufficiently great to carry a number of passengers, besides fuel and water.

In the meantime Giffard had been making great improvements in high-speed engines, and he proved mathematically that such a balloon might attain a velocity of forty-four miles per hour, and consequently be quite independent of all ordinary winds. The drawings, the specifications, the material, and the money were all ready, but the great Giffard was seized with blindness, and thus incapacitated for this great undertaking.

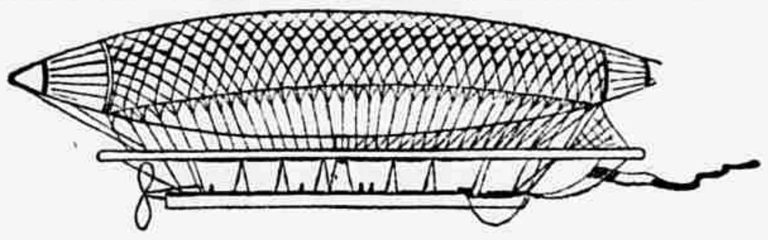
In 1870, after the first defeat of the French, and while Paris was in a state of siege, when the only means that the inhabitants had of communicating with the outside world was by balloons or by carrier pigeons, Dupuy de Lôme, who had already gained a great reputation in the construction of ironclads, became a member of the Committee of Defence, and interested himself in aeronautics. He presented to the Academy of Science a project for a "dirigeable" balloon, and the National Defence opened a credit of 40,000 francs for its construction. But on account of great difficulties, and the complete disorganization of labor, this balloon was ready only a few days before the capitulation, and, in fact, was not actually tried until two years later. This balloon was 118 feet long, 48 feet diameter, and contained 120,076 cubic feet of pure hydrogen gas, and it was in the form of a very thick cigar. As it was necessary to keep the balloon completely inflated in order that it should have sufficient stiffness to maintain its form while being propelled, it was furnished with an interior bag or balloonette, which enabled air to be pumped in or discharged without allowing the air to mix with or to deteriorate the gas. The car was suspended about 46 feet below the balloon, and was provided with a propelling screw 29.5 feet in diameter, which was driven by eight men. A triangular rudder was attached to both the balloon and the cords of suspension. The first experiments took place on Feb. 2, 1872, in the Fort of Vincennes, under the direction of M. Dupuy de Lôme, accompanied by M. Zédé, M. Yon, and eight men to operate the screw. The balloon ascended rapidly, and as soon as the screws operated it responded to the action of the rudder at once.

The speed was found to be 6.2 miles per hour, and it descended without accident about 6 miles from the point of departure.

In 1881 the brothers Tissandier commenced experiments with a "dirigeable" balloon, which was made of a similar shape to those previously experimented with by Giffard and Dupuy de Lôme. This balloon was 91 feet long, 30 feet in diameter, and had a volume of 56,503 cubic feet. The car was formed of bamboos secured together by cords and copper wires. The balloon was completely enclosed in a net, and the car was suspended a sufficient distance below the machine to give the necessary stability. It was driven by a dynamo-electric motor specially constructed for the purpose by the Siemens Brothers. It developed 1.25 horse power, and weighed 99 pounds. The propelling screw was 9 feet in diameter, had two blades, and made 180 turns a minute. The current of electricity for operating the motor was derived from a bichromate battery of twenty-four elements, the solutions being made very strong and the surface of the zinc very large. The weights were as follows: Balloon, 374 pounds; cords of suspension, 154 pounds; shafts, 74 pounds; car, 220 pounds; motor, screw, and battery, with liquid for operating two and a half hours, 616 pounds; apparatus for stopping, 110 pounds; all this, with the aeronauts and their instruments and 849 pounds of ballast, brought the total weight up to 2,728 pounds.

The first experiment took place Oct. 8, 1883. The balloon rapidly mounted to a height of 1,640 feet, and when the battery was fully turned on, the balloon commenced at once to move through the air at the rate of 6.7 miles per hour, and the rudder was found to operate perfectly. A second trial was made on the 26th of September, 1884, on a comparatively calm day when the wind was only blowing at the rate of 6.7 miles per hour; the speed of the balloon through the air was found to be 8.9 miles per hour. A great number of evolutions were performed over Paris. The balloon remained in the air two hours and finally descended without accident in a field fifteen miles from the point of departure.

The present "dirigeable" balloon of the French army, of which so much has been said, is the result of a long series of experiments conducted at Chalais-Meudon in behalf of the French Government by Capt. Renard, Capt. de la Haye, and Capt. Krebs. Experiments were commenced as early as 1879, but very little progress was made until after the brothers Tissandier had shown their apparatus. Taking advantage of all the experiments that had preceded them the French officers constructed a fish-shaped balloon, the greatest diameter being near the forward end. The principal dimensions of the balloon were: Length, 165 feet; diameter, 27.5 feet; volume, 63,830 cubic feet. The motive power was a specially constructed dynamo-electric machine which developed 8.5 horse power on the shaft of the machine. It was driven by a battery which developed 12 electrical horse power. The weight of the battery was 42.5 pounds per horse power per hour. The screw was of great diameter, made 46 turns per minute, and gave a propelling pull to the machine of 132 pounds. The principal weights were: balloon and balloonette 811 pounds, net 279 pounds, car complete 994 pounds, rudder 101 pounds, screw 90 pounds, electric machine 215 pounds, framework and gearing 103 pounds, motor shaft 67 pounds, battery and appliances 958 pounds, aeronauts 308 pounds, ballast 470 pounds, total about 4,400 pounds. The relation of the weights to the lifting power was so adjusted that the balloon had very little ascensional force and when liberated on the 9th of August, 1884, it was found to rise very slowly in the air. When it had attained a small elevation above the earth, the screw was put in motion and the balloon at once commenced to travel through the air at a velocity of 12.26 miles per hour, and readily responded to the least movement of the rudder. The officers in their report on this trial to the Government say:



"LA FRANCE" OF 1884.

"The direction was at first toward Châtillon and Verrières, but in order not to become entangled with the tops of the trees the direction was changed, and the balloon headed toward Versailles. Above Villacoublay, finding that we were about two and a half miles from Chalais, and being wholly satisfied with the behavior of our balloon, we decided to return and to attempt to descend at Chalais, notwithstanding that there was only a very small clear space there. The balloon made a half turn to the right at a very small angle of the rudder (about 11°). The diameter of the arc of the circle described was about 984 feet. The dome of the Invalides, by which we had located ourselves, showed Chalais to be a little to the left of the direction in which we were headed. Following our route until Chalais was directly to our left, the balloon was then turned to the left with much more ease than it changed its direction before, and very soon it was hovering 984 feet above its point of departure. The tendency of the balloon to descend at this moment was caused principally by opening the valve. During this time it was necessary to make the balloon move forward and back several times in order to bring it exactly over the spot where we desired to land. At 262 feet above the ground a cord let down from the balloon was seized by some men, and the aerostat was landed in the field from whence it had started."

On the 25th of August, 1885, Capt. Renard, in conjunction with his brother, made other experiments with a "dirigeable" balloon. The ascension took place at about 4 o'clock in a light breeze, but nevertheless the balloon, under the action of its screw, resisted the strong aerial current, and accomplished with great success a number of manœuvres in different directions without always returning to its point of departure. The landing took place near Petit-Bicêtre.

On the 22d of September, 1885, other experiments were tried, which gave satisfactory results. The aerostat advanced toward the fortifications of Paris, in the vicinity of Point-du-Jour, and returned with great facility to the point of departure. These experiments took place under favorable circumstances, because the balloon was kept in a sheltered enclosure and ready inflated, and ascensions were only attempted at favorable moments; nevertheless, the French themselves say: "Elles n'en constituent pas moins un des plus grands résultats de la science moderne."

If ordinary balloons, completely without any means of directing them, proved of such great service to the French during the siege of Paris, how much more useful would they have found the latest "dirigeable" balloons, which would have enabled them not only to leave Paris, but to return again, and thus to keep in communication with the outside world.

Experimenters who attempt the navigation of the air are divided into two classes; namely, those who seek to accomplish it by the use of balloons—that is to say, apparatus lighter than the air; and those who seek to accomplish it by machines heavier than the air, which it is proposed to sustain in the air by dynamic energy, after the manner of birds. So far no machines have succeeded, except those which are sustained by gas, and, considered as a whole, are lighter than the air. For many years the leading scientists of the world have admitted that the navigation of the air by machines heavier than the air would become possible whenever a motor sufficiently powerful in proportion to its weight should be discovered. It has long been known that birds and all other animals which sustain themselves in the air by muscular effort are capable of developing an enormous amount of power in proportion to their weight, but just how much power has not until lately been definitely determined. As it may be presumed that artificial machines could not be made which would operate more economically than natural machines or birds, it is self-evident that some motive power should be discovered which would develop at least as much power in proportion to its weight as a bird is able to develop. Heavy birds with relatively small wings, such as, for instance, the goose, carry about 150 pounds to the horse power, while birds such as the albatross and the vulture, in which the wing surface is very large in proportion to the weight, carry probably in the neighborhood of 250 pounds per horse power. All who have witnessed the flight of these latter birds have remarked the apparent ease with which they fly; in fact, they appear to exert any muscular energy at all.

Two complete sets of experiments have been independently conducted recently, with a view of ascertaining how much power is required to perform artificial flight. One set of experiments was tried in the United States by the eminent astronomer and mathematician, Prof. Langley; the other experiments were conducted by myself at Bexley, in the county of Kent. Both series of experiments were conducted with the aeroplane, because it was believed that this system was the one which would require the least amount of power. We were both provided with very perfect apparatus, with many instruments of precision, which enabled us to ascertain accurately just how much power was required to drive a plane through the air at various angles, how much the plane would lift, the kind of screw best adapted for propulsion, the efficiency of the screw, and the power required to operate it. Prof. Langley's experiments were tried on a rotating arm thirty feet long. In my apparatus the arm was made slightly longer, so as to make the circumference of the circle round which it travelled exactly 200 feet. Prof. Langley's experiments were conducted for the most part with small planes, which carried loads of only two or three pounds, while my experiments were conducted with large planes, carrying weights of from 20 to 100 pounds. In Prof. Langley's experiments the load carried was at the rate of 250 pounds to the horse power of energy expended, while in my experiments, where the load was heavier and the area of the plane less in proportion, the load carried was at the rate of 133 pounds to the horse power. However, when I carried a light load at a very high speed on a relatively large plane, I sometimes approached very closely to Prof. Langley's figures. My experiments were tried with a view of obtaining the necessary data for building a practical machine; consequently I approximated as near as possible to what a practical machine should be. I quote the following from Prof. Langley's admirable work on "Aerodynamics:"

> I may state that these researches have led to the result that mechanical sustentation of heavy bodies in the air, combined with very great speeds, is not only possible, but within the reach of mechanical means we actually possess, and that while these researches are, as I have said, not meant to demonstrate the art of guiding such heavy bodies in flight, they do show that we now have the power to sustain and propel them.

After discussing the power as relates to speed, he says:

> One horse power thus employed will transport a larger weight at twenty miles an hour than at ten, a still larger at forty miles than at twenty, and so on, with an increasing economy of power with each higher speed, up to some remote limit not yet attained in experiment, but probably represented by higher speeds than have as yet been reached in any other mode of transport—a statement which demands and will receive the amplest confirmation later in these pages.

It has long been known that birds obtained the greater part of their support by moving forward with sufficient velocity so as to be constantly resting on new air, the inertia of which has not been disturbed, and that it was quite impossible to account for a bird sustaining itself in the air if we computed the lifting power of its wings in accordance with Newton's law. Prof. Langley, in referring to this subject, says:

> We may remark that they incidentally show that the effect of the air friction is wholly insensible in such experiments as these; but the principal deduction from them is that the sustaining pressure of the air on a plane 1 foot square, moving at a small angle of inclination to a horizontal path is many times greater than would result from the formula implicitly given by Newton. Thus, for an angle 5° this theoretical pressure would be $\sin^2 5° \cos 5° = 0.0076$ of the pressure on a normal plane moving with the same velocity, while, according to these experiments, it is in reality 0.15 of that pressure, or twenty times as great as the theoretical amount.

In discussing the question as to whether it is possible to perform artificial flight or not, Prof. Langley prefers to appear very conservative in his opinions. He, however, says:

> I may state the fact, surely of extreme interest in its bearing on the possibility of mechanical flight, that while an engine developing one horse power can, as has been shown, transport over 200 pounds at the rate of 20 metres per second (45 miles an hour), such an engine (i. e., engine and boiler) can be actually built to weigh less than one-tenth of this amount.
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> The most important general inference from these experiments, as a whole, is that, as far as the mere power to sustain heavy bodies in the air by mechanical flight goes, such mechanical flight is possible with engines we now possess, since effective steam engines have lately been built weighing less than ten pounds to one horse power, and the experiments show that if we multiply the small planes which have been actually used, or assume a larger plane to have approximately the properties of similar small ones, one horse power rightly applied can sustain over 200 pounds in the air at a horizontal velocity of over twenty metres per second (about forty-five miles an hour), and still more at still higher velocities.
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> I am not prepared to say that the relations of power, area, weight, and speed, here experimentally established for planes of small area, will hold for indefinitely large ones; but from all the circumstances of experiment, I can entertain no doubt that they do so hold far enough to afford assurance that we can transport (with fuel for a considerable journey, and at speeds high enough to make us independent of ordinary winds) weights many times greater than that of a man.
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> The most important, and, it is believed, novel truth, already announced, immediately follows from what has been shown, that whereas in land or marine transport increased speed is maintained only by a disproportionate expenditure of power, within the limits of experiment in such aerial horizontal transport, the higher speeds are more economical of power than the lower ones.
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> I wish, however, to put on record my belief that the time has come for these questions to engage the serious attention, not only of engineers, but of all interested in the possibly near practical solution of a problem one of the most important in its consequences of any which has ever presented itself in mechanics; for this solution, it is here shown, cannot longer be considered beyond our capacity to reach.

In my experiments I found that a well-made screw operated well and was fairly economical, and that the skin friction was so small as to be negligible. I found that whatever push my screw communicated to the aeroplane the plane would lift in a vertical direction from ten to fifteen times as much as the horizontal push that it received from the screw, which depended upon the angle at which the plane was set, and the speed at which the apparatus was travelling through the air. Having ascertained by actual experiment how much power was required to perform artificial flight at speeds varying from twenty to ninety miles an hour, I commenced experiments with a view of producing a suitable motor. I carefully considered the merits of all forms of motors, including hot-air engines, steam engines, petroleum engines, and electrical motors operated by storage batteries. At that time it seemed to me that the steam engine would be the most suitable, as I believed it could be made lighter than any of the others in proportion to the power developed, and also its action was simple and reliable. My experiments have extended over a long time, having been much delayed by my long absence from England. I constructed two sets of compound engines of tempered steel, all the parts being made very light and strong, and a steam generator of peculiar construction, the greater part of the heating surface consisting of small and thin copper tubes. For a fuel I employed naphtha. My steam engines weigh collectively 600 pounds; the steam generator, including the casing, the smokestack, and the burner, 1,000 pounds; the pumping machinery, 100 pounds, and the gas-generating apparatus about 100 pounds. I find that the condenser operates well while travelling at a high velocity through the air, that its weight need not exceed one pound to the horse power, and that the weight of the water and steam in the complete circulation through the boiler, the engine, and the condenser need not be more than one pound to the horse power, which is at the rate of 8 pounds per horse power. The bursting pressure of the tubes forming my boiler while under steam is not less than 1,700 pounds to the square inch and the pressure at which I operate them is 300 pounds to the square inch. The engines have developed in useful effect on the machine itself a force of not less than 300 horse power, which, of course, means an indicated horse power considerably higher. Having developed a motor of sufficient power and lightness, I am now experimenting with large aeroplanes placed at various angles, and instead of being run in a circle, as in my former experiments, they are driven straight through the air by running the machine on a railway track. The question to be decided now is whether large planes will prove as economical as small ones.

The reason why all experimenters with aeroplanes have thus far failed, has been because the motors employed were vastly too heavy in proportion to their weight. I believe now I have shown that it is possible to produce a really powerful and reliable motor which is well within the limits, that if I do not succeed some one else will, and at no remote date. In regard to steering, I do not anticipate that this will be a very difficult matter, certainly not more so than to steer a locomotive torpedo completely submerged in the water.

I do not pretend to say that I have reached finality in producing a light and powerful motor; perhaps, in choosing the kind of motor to experiment with, I selected the steam engine, not because it was best adapted to the purpose, but because it was the motor which at that time I understood the best and considered the safest. Since I commenced my experiments, petroleum engines, operating on the principle of the "Otto Cycle," have been reduced to a high degree of efficiency if not of lightness, and the French engineers have reduced the weight of the electrical motor and storage battery in about the same degree that I have reduced the steam engine.

Moreover, experiments have taken place in America, England, and Switzerland with naphtha engines,* and the results obtained have been rather startling. The eminent engineers, Messrs. Yarrow, have conducted some very careful and accurate experiments, and have proved that the same amount of heat will develop twice as much energy in a naphtha engine as in a steam engine, and this, notwithstanding the fact that engineers and mathematicians proved that it could not be done. It is a good steam boiler that will evaporate ten pounds of water with one pound of coal. In some experiments which I conducted in the United States I found that one pound of light naphtha (gasoline) would evaporate nearly 200 pounds of gasoline. The density of the vapor was, however, much greater than the density of steam at the same pressure. I am of the opinion that, with a generator and engine especially constructed for lightness, a naphtha motor could be constructed which would develop 100 actual horse power and not weigh over 500 pounds, including the condenser, and still have a factor of safety quite as large as we find in locomotive practice. This being the case, I think the scientists who have so long been crying "Give us a motor and we will very soon give you a flying machine" ought to be satisfied.†

In constructing a flying machine which is intended to be navigated by living engineers precautions must be taken to insure their safety. A very large aeroplane has to be provided to prevent a too rapid fall in case of a stoppage of the machinery, and this, of course, adds to the weight and to the power required to drive it. But should a flying machine be considered as only an aerial torpedo for carrying high explosives and dropping them at a point twenty or thirty miles distant, then the bulky aeroplane could be replaced by a large number of long, narrow blades, or wings, placed one above the other (superposed), which would lift much more for their weight and the power required to drive them, and would enable the machine to fly much faster. A machine of this kind could be controlled as relates to height above the earth after the manner of a common water torpedo, while its direction could be controlled with a great degree of nicety by a magnetic needle operating upon automatic steering gear‡ constructed in such a manner that it could be instantly set to steer automatically to any desired point of the compass, and to let go its bomb and to fall itself with the remainder of its naphtha after the screw had made a predetermined number of turns.

Experiments in any field of research are always extremely expensive, even if all the data is at hand. How much more expensive must they be when conducted on a large scale in a field where all the data has to be obtained by long and laborious experiments, in which a great many machines and expensive apparatus have to be invented and constructed simply to obtain the necessary data! Such experiments are too expensive to be conducted for any considerable time by private individuals. The French experiments were conducted by French officers at the expense of the Government; they extended over a period of fifteen years, and have all been conducted for the purpose of rendering the balloon manageable. At the date the experi-

MAXIM'S AEROPLANE.

ments were commenced no motor had ever been made which was powerful enough in proportion to its weight to raise itself in the air. These experiments have cost some millions of francs, and as far as actual results are concerned they have placed the French far ahead of all other nations in this field of science, and have probably brought the balloon to about as high a degree of perfection as it will ever reach.§ If we in England wish to excel the French in aerial navigation, I think we should turn our attention to the aeroplane, which alone is capable of being driven through the air at a speed which makes it independent of the wind, and which if driven at such a speed will lift and carry a load quite equal to that of the so-called "dirigeable" balloon. Complete success may be a long and expensive task, and all the points necessary to success may not be the work of any one man, but I do believe that a staff of engineers and scientists could be found among the Anglo-Saxon race, without going outside of England, who, if provided with unlimited means, could produce a machine that would actually fly without a gas bag, and in much less time than it took the French engineers to evolve their present "dirigeable" balloon, and thus render it quite as unsafe to attempt the invasion of England through the air as it now is by water.

Two eminent engineers are now experimenting in France with a view of navigating the air with machines heavier than the air (flying machines). The ingenious scientist, engineer, and electrician, M. Trouvé, has already made a small flying model, somewhat in the shape of a bird, which has actually flown a short distance, the motive power being produced from gas explosions taking place inside of flattened volute springs such as are used in steam gauges. The well known and energetic M. Ader is experimenting on a true aeroplane driven by a steam engine. He is said to have spent over 600,000 francs, but has only met with partial success, on account of the great weight of his motor. The German army is experimenting with "dirigeable" balloons, and I have been informed by a Russian officer that the Czar has spent over 1,000,000 roubles out of his private purse on the aeroplane system; but it is asserted that his motors never weigh less than 200 pounds to the horse power; consequently actual flight is impossible.

When the question is solved, as it is sure to be in the immediate future, the whole system of modern warfare will be changed. Big ships armed with big guns will not be able to protect themselves, much less the country they belong to, from attack, and nations will not be so ready to go to war when each is armed in such a manner as to make it quite as dangerous and disagreeable to the rulers themselves as to the common soldier. If a warlike Continental nation should be the first to achieve complete success it would probably make its power felt and rearrange things to suit its own ideas; but when all the great nations find out how to fly successfully then there will be no more war between them, and the great armaments which have existed so long will, happily, become a thing of the past. A congress of nations will become a sine qua non, and let us hope that we, the Anglo-Saxons, on account of our immense numbers, our vast possessions, and our enormous wealth, will be permitted to occupy a front seat.

HIRAM S. MAXIM.

* Engines made on the plan of the steam engine, which use a light spirit of petroleum in their generator instead of water.

† "The maximum weight admissible for the motor has long been stated to be 40 pounds per horse power."—*Scientific American.*

‡ An automatic steering gear controlled by the action of a magnetic needle has already been invented for steering ships, and is quite practicable.

§ It is true that a higher speed might be looked for with the more powerful motor which is now attainable.

TELEGRAPH LINES IN THE TROPICS.

How they are Interfered with by Monkeys, Spiders, Plants, and Other Things.

The business of telegraphing has its difficulties and is prolific of exasperations in this town and country, with dead wires and live wires, crosses and tangles, cyclones and blizzards, and auroras and "bugs." Telegraphic communication anywhere is subject to interruption from a hundred and one causes, and few people who kick about the service are aware of the difficulties to be overcome in maintaining a perfect electrical circuit. But in the tropics the maintenance of a telegraph line in good working order is a constant uphill fight against all manner of interrupting enemies that linemen and operators in this latitude never dream of.

In Brazil the wires get tangled up with the cable-like web of an immense spider, which, dripping with dew or rain, makes cross connections, short circuits, and grounds almost daily. Ants often destroy the poles in a few weeks. Monkeys swing on the wires and break them, and in the forests creepers and rope-like withes overgrow the poles and wires every few weeks. All this is more or less true of all Central and South America. In Cuba there is an orchid that incrusts the wire and causes leakage. In the West Indian Islands the John Crows, or turkey buzzards, make life miserable for the telegraph and telephone people. These big, heavy birds, the only scavengers, are around in great numbers. They roost on the wires or fly up against them, and invariably break them short off. In one large town the telephone lines that ran by the public market had to be put underground because the buzzards congregated there in great numbers, rested on the wires, and broke them almost nightly. On the pampas of Argentina the herds of practically wild cattle rub and butt against the poles, and frequently break them down.

For some years it was altogether impossible to maintain a line of telegraph through Persia for more than a few days at a time; the natives regularly destroyed it as a device of the evil one. Finally the Shah issued an edict making the loss of an ear the penalty for a first offence of destroying the telegraph line; the loss of a hand for the second, and death, by being buried to the neck in the sand beside the telegraph line, the penalty for a third offence. One-eared men were common in Persia for several years, for the Shah was determined to introduce civilizing influences.

WAS IT THE MT. WASHINGTON LIGHT?

If So, It Was Visible at Sea More than 800 Miles Distant.

From the Philadelphia Press.

A possible explanation of the curious lights seen in the sky at sea by Capt. Findlay of the steamship Missouri has been offered. The publication about a month ago of the curious phenomena created much interest. What the Captain saw was this:

"On the evening of the 15th, between 9 and 10 o'clock, the ship was in latitude 45° 57', longitude 52° 52', when there appeared a bright patch in the sky at about 15° altitude, appearing and disappearing at intervals of about thirty seconds, and bearing east half south from the ship. In character it resembled closely the northern lights, and later in the evening the same phenomenon appeared in the west-southwest. On the 17th, in latitude 40° 39', longitude 68° 56', the phenomenon was again seen in the northwest at an altitude of about 30°, and remained visible from 10:50 until 11:15 P. M."

Lewis H. Rogers of Boston gives the following interesting explanation of the lights:

"There is a large search light on Mount Washington, which was started up on the night of Aug. 13. The nights of Aug. 15 and 17 were clear, and the light was running and being flashed around the heavens between 8 and 11:30 o'clock. There is an attachment on the apparatus by which the beam of light is shut off and on at will, thus enabling the operator to make long and short flashes of light, by which method the Morse or any other understood alphabet is produced. On the night of Aug. 17, we had the light pointed about 45° over Portland for some little time. The words 'Congratulations,' 'Mount Washington,' 'Good night' were flashed and read by an operator on the top of a building in Portland, Me. He was not in line of vision with the light, and the beam was far over his head. This beam of light would continue eastward almost indefinitely until it struck some cloud or mist in the heavens. Thus the light, or the reflection of the light, might have at different times appeared to the east, south, or north of an observer on the ocean.

"To my mind, therefore, it is an almost assured fact that the light seen by Capt. Findlay of the steamship Missouri emanated from the search light projector, thirty inches in diameter, located on the top of the tower on the summit of Mount Washington."

AN OLD STORY NEWLY TOLD.

FROM THE POINT OF VIEW OF AN OFFICER OF THE MERRIMAC.

A Confederate Account of the Engagement that Was the Signal for Remodelling the Navies of the World—The Merrimac Won—The Fate of the Rebel Ram.

From the Appeal-Avalanche.

I was one of the Lieutenants of the Merrimac during her career under the Confederate flag, and the evidence I submit concerning her is only such as would be admissible in a court of law. It is from my own knowledge.

When the Federal authorities abandoned Norfolk, after Virginia had passed the ordinance of secession, they set fire to the Government property at the Navy Yard there, including the vessels that were lying in ordinary. The most noted of these was the sloop-of-war Portsmouth of 22 guns, the fastest sailing vessel in the navy; the ship of the line Pennsylvania of 120 guns and the steam frigate Merrimac of 40 guns. The old frigate United States, famous for her victory under Decatur over the British ship Macedonian in the war of 1812, was also among these vessels in ordinary, but for some reason or other she was spared by the Federals. Later she escaped the efforts of the Confederates to sink her in the ship channel leading to Norfolk. Her live-oak bottom was found to be harder than iron, and the attempt to scuttle her was abandoned. Was she emblematic of the country after which she was named?

The Merrimac was burned only to the water's edge, the lower part of her hull and her splendid machinery remaining intact.

Lieut. John Brooke was the leading spirit in the Naval Ordnance Bureau at Richmond. He was one of those men of genius whose conceptions are apparently so simple—like setting the egg on end—that they fail to attract the notice they merit. To Brooke the world is indebted for the solution of the problem of sounding the depths of the ocean, the preliminary steps toward laying ocean cables, and from him came the conception of the Merrimac's sloping sides, an arrangement that alone enabled her to pass almost unscathed through the terrific fire of the enemy's fleet.

HOW SHE WAS MADE READY.

On the razeed hull of the Merrimac the sloping shield was erected—its lower edges coincident with the sides of the hull. At either end the hull extended beyond the shield to the distance of ten or twelve feet, and was decked with iron. When the ship had her battery and crew on board this deck was just awash in the rippling waters of the Roads. Over the after end, which we named the "fan tail," the rudder chains were led, absolutely exposed to the enemy's fire. At the forward end a great cast-iron prow was bolted into the old cutwater just below the water line. The shield was of heart pine, covered with plates of rolled iron two inches thick. These iron plates extended down to the line of junction of the shield with the hull, and this line, when the ship went into action, was between two and three feet below the water line. Under that depth the Merrimac was vulnerable, like any wooden vessel. The gun deck was about five feet above the water line. One 11-inch Dahlgren gun pointed out at each end of the shield, and we carried eight 9-inch Dahlgren guns on the side.

Next perhaps to Commander Dahlgren, whose coadjutor he had been in conducting experiments, Lieut. Catesby Jones enjoyed the highest reputation in the old navy as an ordnance officer. He was selected as the executive officer of the Merrimac, and the equipment of her battery and the organization of her crew were left entirely to him. He was permitted, too, to take the navy list and officer the vessel at his discretion. There were only a few seamen among our crew. To make up the complement we had to take green country men, most of whom were volunteers from Georgia regiments stationed near Norfolk. These men had never been afloat, except, perhaps, in ferry boats and dugouts, until they found themselves going into a naval battle. Before the Merrimac was ready to receive her crew, the men, as fast as we got them in hand, were drilled at the guns of the old United States. We did not have much more than a week's time to drill the whole crew, and they were not exercised more than once or twice at the Merrimac's own guns before they were made to win a brilliant victory against fearful odds, so far as numbers were concerned, over seamen that had been trained from boyhood.

About the time that the Merrimac was approaching completion there was published in the Norfolk papers, with the reluctant consent of Commodore Forrest, the commandant of the Navy Yard, a letter pronouncing the unfinished ironclad an absurd failure, and laying the blame on the authorities of the yard. This letter lulled the Federal vessels into fancied security.

During the twenty years preceding the war, Capt. Franklin Buchanan of Maryland was regarded in naval circles very much as Col. Robert E. Lee was in the army. If there ever was a man endowed with the spirit of the gamecock it was he. Of all the men I ever knew I thought him the best constituted for brilliant and audacious exploits like that of Hampton Roads, and later in Mobile Bay, when in the Tennessee, of eight guns, he attacked all Farragut's fleet, many of them iron-clads, and bearing in the aggregate 300 guns. Capt. Buchanan was ordered to take command of the Merrimac, and he did so a few days before she went into action.

A MOMENTOUS TRIAL TRIP.

At about 9 A. M. on Saturday, the 8th day of March, 1862, the Merrimac cast off her moorings from the Navy Yard wharf and started on her "trial trip" to Hampton Roads. Handkerchiefs waved and cheers went up from the thousands of people that thronged the wharves in Norfolk and Portsmouth as we steamed past them. The Cumberland and Congress frigates had for some months been lying off Newport News, blockading the mouth of James River. The Cumberland, formerly a 50-gun frigate, had been razeed and lengthened, and now carried fewer guns, but heavier metal than formerly. Among her guns were two 11-inch Dahlgrens, mounted on pivot at bow and stern respectively. Experiments made by Catesby Jones with a section of the Merrimac's shield, set up on shore, showed that it could not resist a protracted fire from an 11-inch gun. It is to this fact that the Cumberland was indebted for being sunk before any serious attentions were paid to her consort.

The Congress was a 50-gun frigate of the old style. On each broadside she mounted four 64-pounder guns of the Paixhan pattern, and 21 32-pounders. I had served as midshipman in both vessels. The Cumberland had been altered beyond recognition, but with the Congress, in which I had more recently served, I was familiar from keel to royal truck. Little had I thought, when she was my floating home for two years, that the time would ever come when I should raise a hand for her destruction, but such was the destiny in store for me.

Officers and men are taking things as quietly as if we really were on an ordinary trial trip, and we might delude ourselves into the belief that such was the case were it not for the fact that we are drawing ominously near the Federal vessels. How natural the old Congress looks, as she lies there with her boats at the swinging booms and her washed clothes triced up on the lines! Many a poor fellow who scrubbed his shirt or his trousers on the white deck this morning will never more need clothing of any sort after this day's work shall be over. Fort Monroe and the Rip-Raps come plainly into view, and lying between them we see the steam frigates Minnesota and Colorado, of forty guns each, and the sail frigate St. Lawrence of fifty guns.

For some time the enemy are in doubt as to our point of attack, but in due season we head directly for Newport News, and then all becomes life and animation on board the two frigates there. Their washed clothes are piped down, their booms are swung to the sides, their boats run to the davits. Then the well-known call to quarters by drum and fife is heard, and scarcely is it over ere their guns are cast loose and they are ready for battle. Our drum and fife answer with the identical notes, and officers and men quietly fall into their stations, cast loose our guns, and wait for orders.

About that time Capt. Buchanan descended to the gun deck, made a brief and stirring appeal to the crew, which they answered with cheers, and then took his station near the wheel. The latter was under the forward end of the shield, and just forward and above it was a hollow cone of cast iron, with "peep-holes" in its sides, securely bolted over an opening in the top of the shield. The Captain and the pilot stood on a horseblock high enough above the deck to bring the heads of the two within the cone and their eyes level with the "peep holes." The two heads inside that cast-iron helmet controlled all the movements of the vessel.

I commanded the 9-inch broadside guns next abaft the engine room hatch, and I was ordered to serve one of them with hot shot. The latter were heated in the ship's furnaces and hoisted up the hatchway in iron buckets. Well-soaked wads prevented any possibility of the ignition of the powder by the hot shot. We were manning the starboard battery, and from where I was stationed the view was restricted to the limits of the gun ports. For a time nothing was visible there but sky and water, and now and then the distant shores.

THE BATTLE BEGUN.

Suddenly the picture of a great ship thirty yards distant, and with twenty-five guns bearing on us, came into view. It was but for a moment. Twenty-five lock-strings are pulled simultaneously, and twenty-five solid shot and shells strike the sloping sides of the Merrimac and glance high into the air, many of the shells exploding in their upward flight. In reply to this broadside from the Congress, one red-hot shot and seven nine-inch shells are hurled into her crashing sides from the guns of the Merrimac, and we steam on without pausing to note the result.

There were a few moments of the thunder of battle, and of the dead and wounded borne below through the lurid smoke, and then there was a jar as if the vessel had suddenly run aground. There was cheering forward, and soon after Flag Lieutenant Minor passed aft along the deck, waving his cap and crying out, "We've sunk the Cumberland!"

She had been struck about amidships by the prow of the Merrimac, and, in sinking, tore it from the bows of her assailant and carried it down with her. Just before the Cumberland made the final plunge the spunky fellows in charge of her bow pivot gun gave us a parting shot, and the next moment were swimming for their lives. She went down with colors flying, possibly because there was no time to haul them down.

We were told after the fight that the officers of the Congress had expected to sink us at the first broadside and consequently they lost heart when they saw their projectiles glance aloft from the sloping side of the ram. But they regained hope when they saw the Merrimac, after having sunk the Cumberland, seeking to escape up the James River.

The movement was merely preparatory to turning in the narrow channel. When the Congress saw her terrible foe coming down upon her for a final encounter, she slipped her cables and tried to escape under sail. She ran aground in the effort; whereupon we took position under her stern, and a few raking shots brought down her flag. Parker ran alongside the Congress to take off the prisoners, but, after having secured about a dozen or more, he was driven away by the fire of the sharpshooters on the beach. Lieut. Minor was also sent in a ship's cutter bearing a white flag, with orders to take charge of the prize, but he had not gone far when he was fired upon not only from the shore but also from the gun deck ports of the Congress, notwithstanding that the white flag was flying from her peak. Minor and one of his men were wounded, and one man killed.

After the surrender of the Congress Buchanan had taken his station on top of the shield, and, seeing what was happening to Minor, he called out in a ringing voice down the hatchway: "Destroy that d——d ship! She's firing at our flag of truce!"

Slowly and deliberately we obeyed the orders—raking the doomed vessel with shell and hot shot, while some of his officers ran up and down the poop deck vehemently waving their white handkerchiefs toward us. Dearly enough they paid for their treachery, which, indeed, I cannot believe ever had the sanction of the officers of the vessel. The slaughter from our raking fire must have been terrific. When finally we ceased firing the frigate had been set on fire in several places. About this time Capt. Buchanan was borne below, shot through the leg by a sharpshooter on shore.

Catesby Jones succeeded to the command, and, pausing at my guns soon after, I remarked to him: "This has surely been a good day's work." "So far as it goes," he answered, "but the worst is yet to come, the Minnesota, the Colorado, and the St. Lawrence are coming up to give us battle."

But these vessels, mounting as they did 130 heavy guns, had no stomach for the fight after they beheld the fate of the Cumberland and Congress. They contented themselves with firing on us at long range, as with the approach of night we steamed over to Seawell's Point, where we sent our dead and wounded on shore, and anchored until morning under the Confederate batteries. Our casualties had been slight, not more than three killed and, perhaps, six wounded.

As soon as the ball opened off Newport News three Confederate gunboats, hitherto blockaded in the James River, gallantly ran past the Federal land batteries and took part in the turmoil. They were the Patrick Henry, I think, of four guns, Capt. Tucker; the Jamestown, similarly armed, Capt. Barney, and the Teazer, a tug, mounting one gun, Capt. Webb. The first two named were walking-beam steamers that had formerly plied between Richmond and New York.

There was a reunion that night on board the Merrimac of the Captains and other officers of the wooden vessels, at which congratulations were exchanged and notes compared. Webb, as well as Parker, had made an effort to bag a few prisoners from the Congress, and with a similar result. I noticed that his clothes were riddled with bullets.

At about an hour before midnight there was a sudden lighting up of the horizon in the direction of Newport News, followed by a sound as of thunder. That was the last of the Congress frigate. The fire had reached her magazine.

THE DUEL WITH THE MONITOR.

When at dawn the next day we looked out over the smooth waters of the Roads we saw that the Colorado and the St. Lawrence had returned to Fortress Monroe, and, half way between Seawell's Point and where the upper spars of the Cumberland marked the site of yesterday's conflict, the Minnesota was apparently hard and fast aground, and near her was the queerest looking craft we had ever seen. "A cheese box floating on a plank" is the comparison that subsequently was applied to her by a newspaper correspondent. It was the Monitor.

We steamed out toward the Minnesota; the Monitor came gallantly forward to meet us, and then and there began the first battle ever fought between ironclads. It continued for several hours; neither vessel, so far as we could ascertain at that time, inflicting by her fire any very serious damage on the other.

Round and round us the Monitor circled, often not more than a biscuit's throw from us. She was evidently trying to make a breach in our shield, for many of her 11-inch shells struck us about the same spot, and that was on the starboard side, just abaft the smokestack. All the time that the Monitor was performing this waltz about us she was receiving an unceasing hail of shot and shell from our battery, for the guns of the Merrimac, no matter how she was heading, could be trained to all the points of the compass.

Once during the fight we ran aground, and then we felt that the situation was very critical. All the wooden vessels were looking on at a respectful distance, and of course, none of our own ventured to respond to the useless signals we made to come down and pull us off. At length we had the good fortune to get afloat again by our own exertions, the bombardment in the mean time having been kept up unceasingly by both vessels. Our shield was resisting the pounding of the Monitor's 11-inch shells far better than we had hoped, and we could see our projectiles break into fragments when they struck her turret.

Disgusted with such a result I finally ordered my division to cease firing for a time and save their ammunition. Catesby Jones, passing just then, I called his attention to my idle guns, and told him my reason for taking a rest. "Ah, well," he said, "we are getting ready now to try what ramming will do for her."

What it really did do was to silence the Monitor forever in the presence of the Merrimac. Unfortunately, just before we struck her, we stopped our engines under the belief that the momentum of our ship would prove sufficient for the work. If we had kept on at full speed we would have run the Monitor under.

As it was she got such a shaking up that she ignominiously fled and sought safety in shoal water, whither we could not follow her. So ended the first battle between the ironclads.

It was no ordinary thrashing that the Monitor acknowledged when she fled to a place of safety, for that flight meant the abandonment of the helpless Minnesota to her fate. She had fought well, but from that day she was a hacked cock whenever she caught a glimpse of the Merrimac.

There was nothing left for us to do but to ricochet our shells down upon the Minnesota. As a sister ship to the Merrimac, she drew the same water that we did, hence the fact that she was aground was a sufficient warning to our pilots not to go nearer to her than we then were.

Firing at ricochet is like skitting a pebble over the surface of a mill pond. Under favorable circumstances a smooth-bore gun could be made to carry much further by that method than by direct firing. Little reliance, however, can be placed in its accuracy. In the present instance at least two-thirds of our shells skipped entirely over the Minnesota. Nevertheless we kept up the fire for a full hour, while the Monitor looked calmly on from a safe distance. Under the circumstances it might have required several days utterly to destroy so immense a target as the Minnesota.

WHY THE MERRIMAC QUIT.

Capt. Jones finally held an informal council of war by conferring with his division officers at their respective stations. This is in effect what he said to me: "The enemy's ironclad has escaped out of our reach. So far as I can judge, we have done the Minnesota all the injury we are likely to do her at this distance. Our men are considerably exhausted from the two days' fighting. The ship is leaking from her encounter with the Cumberland and her recent ramming of the enemy's ironclad. I think of returning to Norfolk for repairs. What is your opinion of it?"

I agreed with him fully, as did every other Lieutenant on board, except John Taylor Wood, a grandson of Gen. Zachary Taylor's, and with a full share of old "Rough and Ready's" hard sense and indomitable pluck. Wood was for going down by Fortress Monroe in search of the enemy's vessels there; and this very suggestion of his shows that there was no longer any question of the Monitor, or even of the Minnesota. There was no longer any question before us except as to a choice between Norfolk and Fortress Monroe.

Before and since the war Admiral Buchanan has frequently told me that it had been his intention to continue fighting as long as the Merrimac floated and an enemy was in sight. A trip to Fortress Monroe would doubtless have caused the Colorado and the St. Lawrence to fly for safety to the open sea, but the chances would have been against the Merrimac ever returning from such a raid. There were guns on the Rip Raps a single projectile from which would have ended her career.

There is no record, Federal as well as Confederate, evidence of the defeat of the Monitor. Capt. Van Brunt of the Minnesota says essentially in his official report that the Monitor, silenced and driven into shoal water, had left him to his fate, and he was preparing to fire and abandon his ships, when, to his great joy, the Merrimac returned to Norfolk. In view of that fact, it must be admitted that we made a mistake in leaving just when we did, but we had no means of ascertaining the true state of affairs on board the Minnesota.

The damage received by the Merrimac in her two days' fight had been trifling. The muzzle of one of her guns had been shot away; some of the iron plates had been started, and the woodwork under them sprung by the shells of the Monitor, and her smokestack had been cut off clean with the top of the shield. As if by a miracle her exposed rudder chains were unscathed, and only the fragments of a shell had entered one of her open gunports.

The wooden tenders of the Merrimac had done all that such frail craft could do. These people were much more exposed than those on board the ironclad, and they are entitled to their full share of the glory achieved, as they would have been to the prize money had our Government proved solvent. But, while they doubtless lengthened the list of the enemy's killed and wounded, I cannot agree with my old friend, Capt. Parker, that their presence affected the fortunes of the day. Indeed they ought never to have been permitted to go into the fight at all, inasmuch as it was a useless exposure of valuable lives. If the importance of the part performed in a battle is to be weighed by the danger incurred, then, as a rule, the drummer boy contributes more to a victory than the General-in-Chief.

The following is a recapitulation of what the Merrimac did single-handed: She sunk the Cumberland with her prow; forced the Congress to surrender by taking up a raking position under her stern, and afterward set her on fire with shells and hot shot; knocked the Monitor out of the ring, and inflicted on the Minnesota all the damage that vessel received. Never before or since have ten guns accomplished so much—destroying, silencing, or dispersing twenty times their own number.

NEITHER CHALLENGE ACCEPTED.

Only once after the battles of the 8th and 9th did we have any expectation of meeting the enemy in anything like a fair fight. After Commodore Taylor had taken command we were lying one day at Norfolk, when we heard a furious bombardment going on down the bay. Steaming hurriedly out we came in view of a Federal fleet of perhaps ten heavy vessels, mounting in the aggregate 300 guns. With the Monitor at their head they were manœuvring, and amusing themselves by throwing their broadsides into the Confederate works at Seawell's Point. We were told that President Lincoln was at Old Point that day, and the manœuvring was for his entertainment.

When they saw us coming, this fleet with the Monitor leading, fled precipitately like a flock of geese, and huddled for safety under the guns of the fortress. We went down and tauntingly, but vainly, offered them battle. Some of our gunboats even ran in and made prizes of two transport brigs within a half mile of them and they bore the insult with meek silence.

The extravagant hopes entertained of the Merrimac by our own people, and the panic with which she was regarded by the enemy, were due to the exaggerated ideas of her power. I have shown how vulnerable she was in more points than one. She was, besides, utterly incapable of going to sea. Her proper classification was that of a floating harbor battery, as much part of the fortifications of the waters she was built to defend, and as incapable of escaping from them as the earthworks on Craney Island and Seawell's Point.

When Norfolk was evacuated by our land forces one of two things remained to be done with the Merrimac: either to destroy her ourselves or to surrender in a few weeks at furthest. We chose the former course.

When compared in magnitude with the pitched battles fought by our armies, or the great sea fights of Nelson's time, the engagements in Hampton Roads were mere skirmishes. But in their indirect results they were of incalculable importance. They revolutionized the whole system of naval warfare, and were the signal for remodelling the navies of the world.

WHITECHAPEL METRE.

The Way the Wicked Chicago Club Sings to Its Casual Victims.

A new song, the product, the vocal flower, of the wicked Whitechapel Club of Chicago, has come to town. It arrived by the way of Fire Island, where it was rehearsed in the press cottage under the direction of a New York reporter, who learned it in Chicago during the National Convention.

He learned it as other visitors to the Whitechapel Club have learned it. He told a story there. He thought the story would be new to the Whitechapelers, but when he finished the President of the club rose from his seat at the head of a coffin lid, which serves as a drinking table there, and, using a human shinbone as a baton, led the members in this stanza:

In the days of old Rameses—Are you on?
They told the same thing! They told the same thing!
In the days of old Rameses
That story had paresis.
Are you on? Are you on? Are you on?

There are several stanzas of the song, but one usually serves to remind a story teller that he has been a little too subsequent with his story, and not quite previous enough in his order to fill the glasses. Most of the stanzas deal with historical characters. The second runs thus:

In the days of Ananias—Are you on?
He told the same thing! He told the same thing!
In the days of Ananias
That story used to try us
Are you on? Are you on? Are you on?

There are other stanzas indicating a richer chestnut flavor in the story upon which the song is used as a comment. This stanza makes the story teller wish he hadn't:

Adam told that yarn to Eve—Are you on?
He told the same thing! He told the same thing!
He told that yarn to Eve,
And the serpent made them leave.
Are you on? Are you on? Are you on?

If a guest of the Whitechapelers is so unfortunate as to tell a story known to belong to Marshall P. Wilder's repertory the gas is turned low, a member goes to the organ and plays a dirge-like accompaniment, while the members sing, *con espressione:*

When the Lord made the earth—ah, dear me!
The stars in heaven sang the same thing!
When the Lord made the earth
Marshall Wilder he gave birth
To that story. Are you on? Are you on?

It will be observed that there is a breezy, Chicago-like independence in the matter of rhyme and metre in these verses, but that does not make so much difference when you know the tune and have learned to phrase the words so that the feet all fit. There is a way to do it, but it is one of those things that cannot be explained by mere written instructions. With the aid of music and the engaging guidance of a shin-bone baton almost any one can be taught to effect a sort of junction between the words and the tune. It is hard, to be sure, but not so hard as it is to tell a story in the Whitechapel Club and have a stanza sung at you.

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