to have made nearly double the speed (38 miles per hour).

In the experiment just described, Santos Dumont's machine lifted only about 10 pounds to the horse-power, while the Wright brothers' aeroplane, it is claimed, lifted 60, and Maxim found that it is possible to lift 133, although, in reality, with his huge machine weighing 8,000 pounds, provided with two 18-foot propellers and steam engines developing 461 horse-power, he only succeeded in lifting 20 pounds per horse-power at speeds of about 40 miles an hour. When the fact is noted that the new aeroplane has a total surface of 645 square feet (the superposed planes being 39.37 feet long by 8.2 feet wide) as against about 480 square feet of sustaining surface carried by the Wright machine (the planes in this machine are said to have been 40 feet long by 6 feet wide), if we concede the correctness of the Wrights' results, we must immediately conclude that the Dumont machine is exceedingly inefficient. The only essential features wherein it differs from the Wright flier are the use of a small, high-speed propeller (necessitated by the mounting of it on the engine shaft) and the setting of the planes at a dihedral angle. Therefore, it would appear that both these arrangements are quite inefficient.

THE INTERNATIONAL WIRELESS CONFERENCE.

BY A. FREDERICK COLLINS.

Delegates representing the governments of nearly thirty countries, convening for the purpose of drawing up regulations for the control of wireless telegraphy in times of peace and war, have been in secret session in Berlin.

This is the second international wireless telegraph congress that has convened at the suggestion of Germany. The first, it will be remembered, was held in Berlin in 1903, when it was resolved that "coast stations should be obliged to receive and forward all telegrams from vessels at sea by whatever system they might be dispatched." In order to facilitate communication between vessels and coast stations, technical explanations of the working of the apparatus are to be published.

Telegrams referring to wrecks and attempts to render assistance to vessels at sea are to be forwarded before all others. The rates for telegrams forwarded into the interior from a coast station will be those of the ordinary telegraph service plus a special charge for the use of the wireless apparatus, and will be paid for on receipt. Telegrams sent to a vessel will be paid for on board the vessel at the rates usually charged by the nation under whose flag the vessel sails. Stations are to be arranged so as to interfere with one another as little as possible, and arrangements will be made to insure correspondence in a number of technical details. Provision is made for other states besides those which sent representatives to the preliminary conference so that they may be parties to any arrangements which may finally be made for the regulation of wireless telegraphy. The most important of these resolutions is the one referring to the duty of coaling stations to receive all messages without distinction relatively to the system used. This resolution was incorporated in a protocol which was signed by the representatives of Germany, Austria-Hungary, Russia, France, Spain, and the United States. The representatives of England and Italy did not sign, for the chief reason that the navies of these countries have long-term contracts to use the Marconi apparatus exclusively, which is also true of Lloyds.

To those who so persistently clamor for the "open door" policy in wireless telegraphy, i. e., the interchange of messages between ship and shore stations equipped with whatever system, it is pointed out that Marconi secured letters patent on the fundamental principles underlying wireless telegraphy as it is practised to-day, in 1896, and further that at the very outset of the successful application of electric waves to the transmission of intelligence without wires by him, Dr. Slaby, of Charlottenburg, Germany, went to England and through the influence of the emperor witnessed the experiments.

A little later Dr. Slaby devised a system of wireless telegraphy, collaborating with Count Arco, and this and Prof. Braun's system, also a German production, were finally merged into what is now known as the Telefunken system. In every country from this time on inventors assiduously attacked the problem, presumably from the viewpoint of effecting selectivity, and the result has been an abundance of systems differing from one another and from the original in detail but not in principle.

As a matter of fact there have been only two marked improvements made in the design of wireless telegraph apparatus since it came into existence, and these are the resonance circuits devised by Lodge, and the liquid barretter invented by Fessenden. All others are merely modifications and some of them are infringements. This being true, it follows that if there is any merit in protecting inventions by letters patent, and if such protection is valid, then certainly Marconi is entitled to the fruits of his genius and his industry, which should give him a monopoly for a period, at least in this country, of seventeen years, ten of which have already expired.

It is urged that the ether is free to anyone who may care to use it. But this is beside the question. That it is free is self-evident. The interchange of messages, which is put forth so strenuously by some of the representatives, is of lesser importance. The vital point that is menacing the safety of the public is the evasion of the laws, and none are more difficult to uphold than those relating to patents.

Fortunately neither the breaking of laws nor the making of regulations can compel an inventor or his assigns to handle a competitor's products, and it is not clear how any rule can be framed that can justly compel the Marconi company to receive and re-transmit messages sent by other companies unless they choose to do so, unless indeed the wireless companies now in the field are to be considered as common carriers by their respective countries.

Last spring the daily papers reported an incident which they stated "as emphasizing the danger of giving one company a monopoly of the wireless telegraphy business, and of permitting those operating any one system to refuse to interchange intelligence with shore stations or ships equipped with another system." A recent cablegram says that the British delegates individually favor the "open door" policy if the regulations are not too rigid. Until the priority of wireless telegraph inventions can be sifted through the courts it would be well to have the opposing interests abide by a regulation that should provide merely for a compulsory interchange of messages where there is danger involving the lives of passengers on the high seas, but it need go no further.

The matter of tuning naval and mercantile marine vessels to different frequencies and the location of shore stations to avoid interference, in so far as possible, are necessary, but these are secondary questions over which no time will be lost in the present conference. No effort will be spared to induce the British and Italian representatives to agree on an unlimited interchange of messages between ship and shore stations no matter what the system installed may be, for this is the primary object of the promoters of the congress.

AERONAUTICAL NOTES.

On the 22d ultimo there was inaugurated at Pittsfield, Mass., the first balloon chase held in America. Two balloons, the "Orient" and the "Centaur," carrying two and three men respectively, ascended at 10:20 A. M. and sailed northward at a slow speed. The "Centaur" landed 30 miles away in the outskirts of Bennington, Vt., at 1:11 P. M., while the "Orient" kept in the air till 4:30 P. M. and finally landed at Jamaica, Vt., some 57 miles from the starting point. The winning balloon was piloted by Leo Stevens and carried Capt. Homer W. Hedge, president of the Aero Club of America, as passenger. Charles T. Walsh, the pilot of the "Centaur," was accompanied by Major Samuel Reber and Capt. Charles F. Chandler of the Signal Corps of the U. S. A. The "Orient" beat the "Centaur" not only in distance traversed, but also in altitude reached as well, for this aerostat ascended to a height of 8,000 feet, as against the 6,888 reached by its opponent. Contrary to what is usual in the upper air, the aeronauts found the strata unusually hot, the thermometer on the "Centaur" at one time registering 74 deg. and that on the "Orient" 106 deg. A northeast wind was blowing near the surface of the earth, and the weather was damp and chilly. After the balloons had ascended some distance a gentle air current from the southwest was encountered. This caused the balloons to change their direction and travel northward. The three automobiles which pursued them had an exciting chase. C. F. Bishop in his 45-horse-power Panhard, suffered a breakage of a driving chain and was passed by Floyd Knight in a 35-horse-power Berkshire car. The latter reached the spot where the "Centaur" landed nearly two hours after that aerostat came down. The second car to arrive at the landing place of the "Centaur" was a 16-horse-power Pope-Hartford machine, which reached the spot but 12 minutes behind the Berkshire, having consumed 4 hours and 53 minutes in chasing the balloon, the flight of which lasted but 2 hours and 50 minutes. Mr. Bishop's Panhard was 5 hours and 20 minutes in completing the pursuit. Great difficulty was found in following the balloons, as they were continually disappearing among the hills or in the clouds. The men in the "Orient" witnessed the descent of the "Centaur" at Woodford, some three miles east of Bennington, and dropped a note as they passed over the latter place, telling where the larger balloon had landed. It was this information that made it possible for the pursuers to locate the aerostat, after they had all but given up the search upon arriving at Bennington at 2:30. The army officers who went up in the "Centaur" obtained considerable valuable data which they expect to turn in to the chiefs of their departments, with the hope that the War Department may experiment with balloons and airships for its own use, as is done by the war departments of most of the foreign powers.

Besides the successful experiment of Santos Dumont with his aeroplane on the 22d ultimo, we have to record some further experiments made by M. Vuia at Issy-les-Moulineaux, France, on the 7th of October. M. Vuia's machine, which was illustrated and described in our issue of March 24, consists of two large wings having a spread of 215¼ square feet. These wings, which can be folded up, are held rigid when in use by steel ribbons. They are slightly concave, and have a purely geometrical shape. They are mounted upon a framework, which is carried on pneumatic-tired wire wheels, forming a quadricycle. The apparatus is propelled by a special carbonic-acid gas motor, which is nothing more nor less than an ordinary Serpollet engine, and is run on the heated vapor from the liquid carbonic acid. The heating of the gas keeps it from congealing, due to its own expansion, and also increases its pressure by superheating it. By combining the heating of the gas with the admission of the same to the cylinders, the experimenter has a double means of varying the pressure on the pistons, and hence the power of the motor. The cylinder contains 22 pounds of liquid carbonic acid, which is sufficient to run the motor at its full capacity (25 horse-power) for five minutes. The propeller, which has a diameter of 7.21 feet and a pitch of 7.71 feet, is mounted directly on the end of the shaft, and gives a thrust of 130 kilogrammes (286 pounds) when the engine is making 900 R. P. M., and the apparatus is held stationary. To develop this speed the engine requires a pressure of 143 pounds to the square inch. The total weight of the apparatus and operator is about 550 pounds. On the date mentioned, M. Vuia, in the presence of the officials of the Aero Club of France and a considerable crowd of onlookers, succeeded in getting his machine to rise in the air by bounds of about two-fifths of a second duration.

Experiments have also been carried on recently in France by M. Cornu with a helicopter, which consists essentially of two propellers on a vertical axis. These raise the apparatus and advance it by blowing the air which they displace against suitably disposed aeroplanes. The model tested was fitted with a 2-horse-power Buchet motor, which revolved propellers of 2.25 meters (7.38 feet) diameter. The weight of the entire apparatus was 13.75 kilogrammes (30¼ pounds). In the first trial the apparatus rose vertically with great facility; while in the second trial, after the planes had been inclined to produce forward motion by the effect of the reaction of the air upon them, the apparatus, which was attached to a central axis, was made to describe, in the free air around this axis, a circular orbit 75 feet in diameter.

THE CURRENT SUPPLEMENT.

The current SUPPLEMENT, No. 1609, opens with an article by our English correspondent on a huge dredging plant for service in India. The dredger in question has a bow of triple form constituting two wells, in which rotary cutters are mounted for excavating hard material. Underneath and to the rear of these cutters are suction pipes. Excellent illustrations accompany the article. An admirable discussion of dustless roads for motor traffic is published. Mr. Walter J. May writes on the making of foundry patterns. The third and last installment of the digest of the regulations and instructions concerning the denaturation of alcohol appears. Dr. Otto Roehm discusses the modern manufacture of illuminating gas. In view of the recent important announcement that tungsten incandescent lamps are to be manufactured in this country on an extensive scale, the exhaustive article on the tungsten lamp which appears in the current SUPPLEMENT will be read with interest. Messrs. Herbert J. Webber and Walter Swingle contribute an article on new citrus creations of the Department of Agriculture. The new fruit which they have succeeded in evolving is called the "citrange," and possesses some of the properties of the orange and some of the lemon.

MANUFACTURE OF IRON IN CHINA.

Iron in China is made by mixing four parts of the ore, one part of decomposed coal dust, and one part of small coal. The mixture is placed in crucibles each about 18 inches deep and 6½ inches in diameter. The crucibles are heated in a furnace having walls about 3 feet high and a floor 4 feet by 6½ feet, which is covered with clay and spread with a layer of coarse coal to a height of 7 inches or 8 inches above the clay. The furnace holds about sixty of these crucibles. The space between them is filled with small coal, and on top is placed a 3-inch layer of small coal, followed by a layer of cinders and ashes of the same depth. About sixteen hours of strong heat suffices to convert the mixture into a mass of carbon iron, says the Iron Age. This is made into wrought iron by reheating over a wood fire and by hammering it when red hot.