

# The Mastery of the Air.

A Record of the Achievements of Science in the Realm of Aerial Navigation.



## PART I.

ACCORDING to one of the most successful aeronauts of our time, the air has been waiting since the advent of man on the earth to transport airships of his contrivance through boundless space, with the speed and grace of a bird, "in the open firmament of Heaven." This is one of the Brothers Wright, of Dayton, Ohio, who claims that he has discovered the secret of constructing the proper kind of airship. The more famous Santos Dumont makes the same claim. In a contrivance of his own he actually did fly through the air in the open firmament of heaven a distance of 235 yards, in the presence of a large number of spectators, at the rate of some ten yards per second, or 20.5 miles per hour. In a burst of triumph this aeronaut declared, immediately after his remarkable performance, that he saw his way to building a machine which would fly a hundred miles with as much ease as his present combination of box kites accomplished the few yards of flight which constitute the accepted present record. Dumont has made up his mind that the method of harnessing the air has been discovered and is now waiting only to be developed. He is not alone.

A large number of believers are offering prizes for the encouragement of that development. The *Daily Mail* offers a prize of £10,000 for the first successful flight from London to Manchester, 183 miles; there is the Archdeacon prize of £2000 for flights of distances over half a mile; the Paris prize of £10,000—the offer of the *Matin* newspaper increased by public subscription to the larger figure—for a flight from London to Paris; the prizes of the Adams Motor Manufacturing Company and the *Autocar* journal respectively, of £2000 and £500 to the winner of the *Daily Mail* prize if the machine or the motor-petrol are made in Britain. In addition, there are the Salomon and Howard de Walden prizes for flying machines of the heavier-than-air type; the *Daily Graphic's* prize of £1000 for a flight of more than a mile with one or more human passengers; and the two Challenge Cups known as the Gordon-Bennett International, and the Hedges-Butler. These make a substantial aggregate of encouragement. They are not the first offer, however, nor the largest yet made, for there was an offer of \$200,000—£40,000—during the St. Louis Exposition, of which \$100,000 was for the best airship—safe, manageable, and fast. The faith of these believers of the recent past and the present is expressed by the *Figaro* newspaper in perfluviant terms: "What a triumph! A month ago Santos flew ten yards. A fortnight ago he flew seventy. Yesterday he flew still further and enthusiasm knew no bounds. The air is truly conquered. Santos has flown. Everybody will fly." With all these believers the only questions are: how soon shall we fly, and shall it be with machines that are heavier than air or with those that are lighter?

## THE ANTIQUITY OF THE PROBLEM.

From the earliest ages man has dreamt of the conquest of the air by boldest flight. In the dawn of history, before the setting of fable Daedalus was believed to have accomplished the feat. Shut up in the Island of Crete, where he had constructed for King Minos the famous Labyrinth, this cunning workman fashioned for himself and his son Icarus each a pair of wings, with which they started to fly over the Ægean to a country of safety. The father arrived, but the son, being ambitious, neglected the paternal advice not to approach too near the sun, which would assuredly melt the wax with which his wings were fastened to his body, soared aloft, and met the fate against which he had been warned. Succeeding ages have forgotten the part of the story referring to the successful flight of the sire, preferring to perpetuate the

second as a warning against the ambition which leads men to attempt great enterprises without considering adequately the strength they possess or the means they should provide for carrying them out. Throughout the ages that have succeeded Icarus has furnished the point for every tale of vaulting ambition that overleaped itself. Practical people explained the story of the flying, which they saw to be unthinkable, by substitution, they pointed to the fact that in the days of Daedalus the art of sailing over the water was as unknown as that of flying through the air, they declared that the great inventor invented the sail, applied it to the nearest canoe and got away in safety, losing his son in the voyage by some accident, which in the first sailing voyage on record was not by any means difficult to imagine. Daedalus was the great builder and architect of his time; the creator he was of the two arts, the inheritor of the fame of all the artists who had preceded him, but for lack of records had been forgotten. He was credited with the making of everything wonderful known in his day. All statues of the gods of special excellence were called by his name—Daedala—nothing was regarded as impossible to him. In time the myth of the wings was resolved into the fact of the sail; and the name of Icarus remained alone of the story for the encouragement of inventors to keep on the right track.

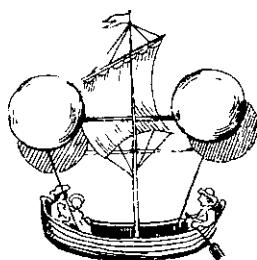
They needed some encouragement of the practical kind. Antiquity and the Middle Ages are full of their endeavours to solve the problem of the air. From Archytas of Tarentum to the great Leonardo da Vinci some of the greatest intellects of mankind were devoted to the solution of this fascinating problem of flying through the air. The first named, who was eminent as geometrician and astronomer, was famous also throughout antiquity for the flying pigeon which he constructed, which probably was

number of persons who thought and hoped with him were learned enough in comparative anatomy to know that the superior muscular power of birds in proportion to their weight makes easy to them the problem of flight, which to man is impossible with his inferior muscular apportionment. Some of the inventors of that time, moreover, and indeed of other periods of history, were not always remarkable for proper study of means to ends. Like the artists who illustrated their ideas, they were more concerned with the magnificence of results than with the methods of producing them. There is, for instance, the project of Lara the Portuguese, (in 1670), whose proposal to build a flying-machine made him a conspicuous figure in the annals of his time. He designed a boat to be supported by four copper balls. Some gas lighter than air was to be put into these, which, thus charged, would infallibly raise the whole fabric aloft to any altitude. The diameter of these cups was to be 25 feet. But the metal employed in their construction was to be only one two-hundredth part of an inch thick. Had this genius proceeded from theoretical proposal to actual practice, his project would have had short shift, for the balls, long before the exhaustion of air in them, would have collapsed with unsatisfactory completeness. So it was with most of the inventors who were ready with the lightest hearts to undertake aerial voyages on the provocation of their ill-furnished brains. They have their place in history, however, which consists of a name merely, but little more. About Lara there is the additional distinction that he was the first to conceive the notion of getting some gas lighter than air to do the raising and sustaining required for flight through the air. His machine was wrong but his idea was right. Though the first balloon did not rise for a century after his death he was the first to evoke the idea of the balloon.

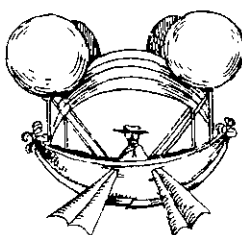
The attempts of man to master the air as birds do in their flight, is divided into two parts: the part which relates to machines that are lighter than air, and that which relates to those that are heavier. At the head of the former the name of Francis Lara is entitled to an honoured place.

LIGHTER THAN AIR.—THE BALLOON PERIOD.

In the year 1783, the brothers Montgolfier gave the world a new turn by their success in elevating a balloon in the air. Paper-makers at Annonay were in a position to experiment with the idea propounded by Guzman and others that if an envelope could be found for enclosing a given quantity of a gas lighter than air the envelope would rise up in the air, and the problem of flying would be solved. They turned their attention to the subject, and after various experiments managed to make a bag of paper and linen of considerable strength, and impervious to air. This they contrived to get filled with air heated over a straw fire, and the heated air, being lighter, carried the envelope high up into the atmosphere, to the great wonder of a large crowd of spectators. As the air cooled, the envelope descended gradually, finding its way back to earth without shock or trouble. The brothers soon constructed a balloon of 105 feet in diameter, and the name of Montgolfier became for ever famous in connection with the art of sailing ships through the air. Their balloon is number 1 of our next plate. It carried no passenger or crew loomed large, rose mysteriously, floated about majestically, and returned to earth comfortably. Speculation and experiment followed in its track with eager enterprise. The first balloon was accepted as evidence of the fact that the work of ascension and suspension had at last become possible. One half of the problem of flying was therefore solved. The solution of the other half, the propelling and direction, would be only a matter of time. Let it be understood however that though the Montgolfiers had solved the problem of the application, the idea was not theirs. It was Guzman, of Lisbon, who had suggested that heated air might be of use



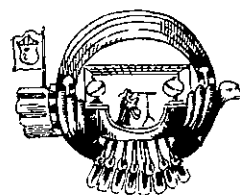
LARA'S QUADRUPLE COPPER BALLOON 1670.



LARA'S 1678



A MAN FLYING (FROM FAUSTUS VERONTIUS) 1695.



BARTHOLOMEW LAUREAT'S IDEA 1709.

some kind of kite flown with a string. Which reminds us that the amusement of flying kites was not unknown to the ancients. In addition, there were many who said they had seen men fly with wings of their own construction through the air. But in the absence of information there can be no discussion of their testimony, and the only possibility is that something of the principle of the parachute must have been suspected by those who had watched the leaps of the flying squirrel, which have in our day been measured up to forty feet. But they could not have made much progress, for so late as the seventeenth century there is the instance of an exhibitor who, descending from a great height in a machine much like a parachute of our time, broke his leg by falling into a barge moored on the Seine. As he did not seem to have any conception of the area of parachute required to sustain his weight it is right to conclude that all his predecessors in the flying art were no better off for scientific equipment. By the time of this adventurer the only persons who were supposed to ride through the air were the witches, who were popularly thought to use broom sticks. But this scarcely belongs to the subject of airships.

Leonardo da Vinci, painter, poet philosopher and man of science, was conspicuous among his contemporaries for the zeal with which he devoted himself to the art of flying. Drawings are extant of a contrivance which kept him employed for many years, a contrivance by which a man exerting the muscles of his legs might keep a pair of great wings in motion. It was the dream of this great man's life that one day his invention would enable men to fly like the birds through space at his will. But neither he nor the large