

MR. MAXIM'S FLYING MACHINE.

BY PROF. C. V. RILEY.

Upon my return recently from the meeting of the British Association, at Oxford, I gladly availed myself of a kind invitation to visit Mr. Hiram S. Maxim, at Baldwyn's Park, Bexley, Kent, where for the past four years he has been experimenting with and perfecting what is usually called the Maxim flying machine, but were more correctly termed a soaring machine. Accounts of the experiments have been published from time to time, but the most complete and authoritative is contained in a paper recently read by Mr. Maxim himself at the above-stated meeting in Oxford. I send you a manuscript copy of this, which he has furnished at my request,* and a photograph showing the machine as it appeared immediately after the famous experiment of July 31 last.

This paper renders it quite unnecessary that I should give any descriptive details; but no one who has not inspected the various parts of this huge soaring mechanism can fully appreciate the marvelous ingenuity and the truly scientific method brought to bear in elaborating the various details, which provoke admiration the more one studies them. The engine, the boiler, the numerous automatic devices for feeding and regulating the fire, the screws, the aeroplanes, the re-

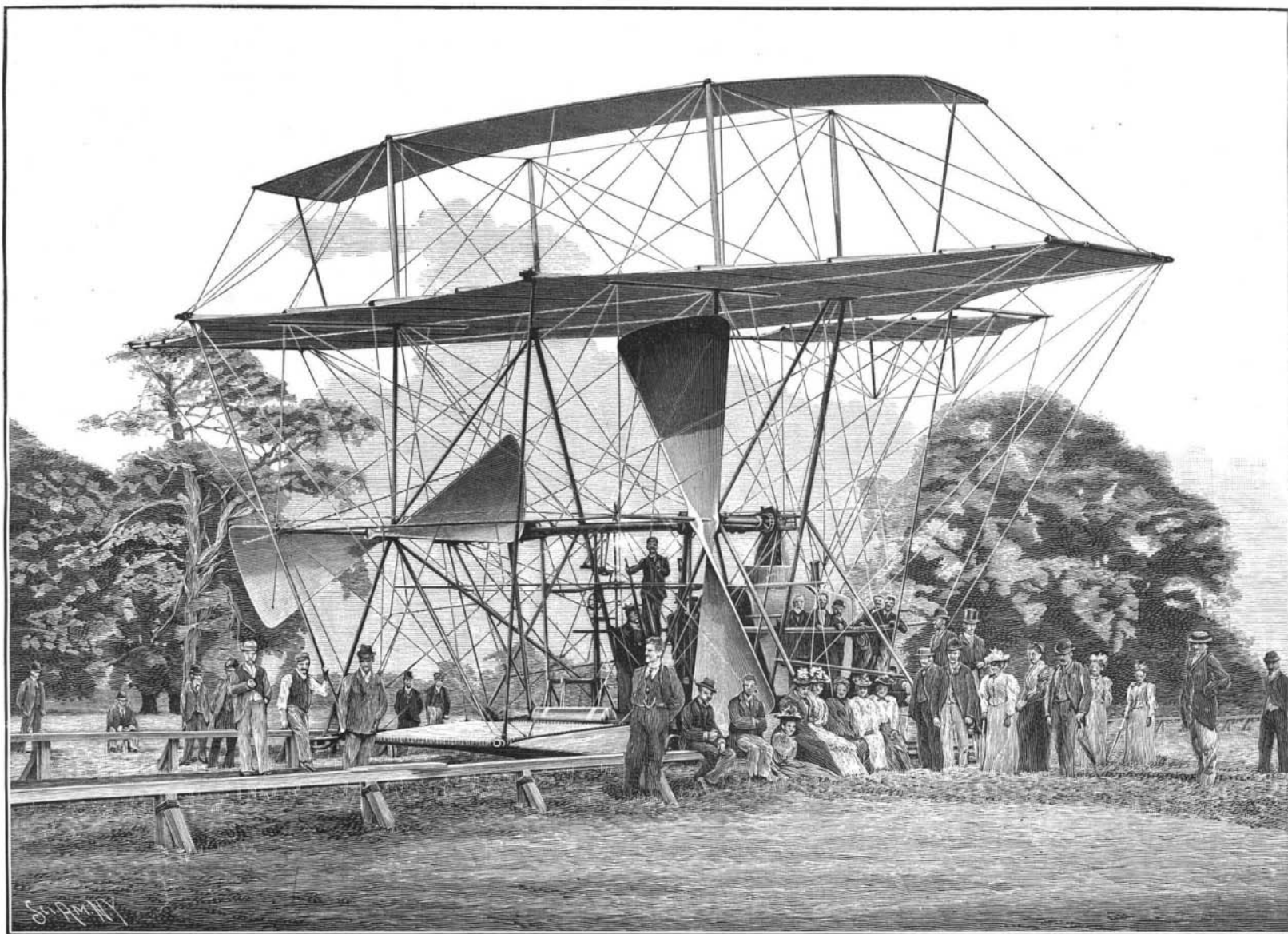
chine broke away, first by bending and breaking the rear axle and then by the forward retaining wheel on the underside of the left retaining guide breaking away. Being thus lifted away from the guides at three points, the momentum broke the heavy retaining timbers to the right, some of which became entangled in the framework (the engine being already stopped), and the machine embedded its wheels in the ground.

The lateral brasure made by the left forward wheel in breaking from the retaining wooden guide gives one a graphic idea of the power exerted, while the fact that the machine fell outside the guide to the right, without in any way affecting the iron traction rails within, is the best evidence that the machine was lifted from the ground just as described by Mr. Maxim. Hence, notwithstanding the accident, the machine was made to soar above the ground, and this was the first time in the history of the world that this feat was accomplished in the same way. The meaning of this accomplishment can best be appreciated by remembering that the machine, with water, fuel, and three men, weighed nearly 8,000 lb.; that the screws were 17 feet 10 inches long and 5 feet 2 inches wide, and that the area covered by the aeroplanes was some 4,000 square feet.

Mr. Maxim has thus demonstrated his ability to

making mechanical toys sustain themselves against the ceiling by rapid screw rotation on a vertical axis; and I cannot help feeling that had Mr. Maxim devoted as much energy, ingenuity and means to the application of power to horizontal screws, depending on these for his lifting power, and using aeroplanes as auxiliaries only, he might be to-day much nearer the end which he seeks. I venture this opinion after pretty careful study of the flight of various orders of insects and of birds, and after following pretty closely the mechanical experiments of the last thirty years.

Mr. Maxim, by his wonderfully ingenious boiler and motor, has solved the chief difficulty as to power, and ascertained many other important facts as to form of propeller, etc. Let him now perfect an adjustable and reversible screw, to be applied at first on the horizontal plane for lifting and then gradually to be brought to an oblique angle for propelling forward, and the next great problem is solved. Lateral dirigibility is easily controlled by cuneiform rudders fore and aft; while soaring power could be gained when once in the air by long aeroplanes of relatively narrow dimensions in the line of direction, to be held vertically in ascent and brought to the horizontal position during forward movement. Safe descent under such conditions will be far more thoroughly within control, and



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cording devices, in fact, everything about the mechanism has been beautifully done and represents great originality and inventive power.

The two dynagraphs are good illustrations in point. One of them indicated the lift off the hind axletree, the platform of the machine being so attached to the axletrees as to constitute a sort of weighing machine, and any change of weight resting on the axletrees being shown on the cylinder, which turns once round in 1,700 feet. The other not only recorded the lift on the forward axletree, but made a diagram which recorded the speed with which the machine was passing through the air.

It must not be forgotten that the mechanism in all its parts had been repeatedly tested at various steam pressures, and that the casualty of July 31 was really due to its almost unanticipated lifting power under high pressure. Most of the test trips had been made with a lifting effort of not more than 3,000 pounds, a steam pressure of not more than 200 pounds to the square inch, and a maximum rate of speed of 35 miles an hour, as it was difficult to stop the machine at a greater rate. But on the last test made Mr. Maxim raised the steam pressure to 320 pounds to the square inch, and the velocity and lift were beyond the holding power of the retaining guides, and the ma-

soar by mechanical means on a scale which will permit a greater lifting power than that necessary to carry the men and machinery, and there can be very little doubt that he will ultimately succeed in soaring through the air, and thus add, as he designs to, one of the most unique and most formidable engines of destruction in modern warfare.

But my visit only confirmed a belief which I have long held, viz., that the practical solution of aerial transit by mechanism is not to be found in imitating the soaring of birds, or other animals, but rather in imitating the fish and by use of adjustable screws, the inclined aeroplane to be used only as a means of reducing power when momentum is once attained. This would involve the use of a float in the form of bags of hydrogen gas to assist the vertical screw thrust as lifting power.

Mr. Maxim for lateral dirigibility depends on the slackening or stoppage on one or the other of his propellers, and as the lifting power depends on the angle of incline of his aeroplanes, there can be no use in reverse screw power. Hence the difficulty when once in the air of easy and safe descent. The management of the machine, in air, and the proper control and security of such vast canvas surface, with the now well known variability in the wind gusts, must always be risky, if not absolutely unsafe.

I have been deeply interested from a boy in the subject of aeronautics, and years ago amused myself in

I am of opinion that it is along these lines that ultimate success will be attained.

The whole skeleton of Mr. Maxim's machine is made of cylindrical hollow steel tubing, manufactured in France. In future he proposes to use oval-shaped tubes, so as to offer less resistance to the air. Mr. Maxim has found that aluminum is useless and unworkable for his purposes.

There is a current belief that, deterred by the late accident, Mr. Maxim intends abandoning further experiment. All interested will be glad to learn that this is not so. I found the men under the intelligent superintendence of Mr. Roberts all busy repairing the breakages, and Mr. Maxim occupied, as far as his engagements with the Maxim-Nordenfelt Co. will permit, in devising improvements and means of overcoming past difficulties.

Margate, August 24, 1894.

Connecting Metal to Earthenware.

The portion of the earthenware with which connection is to be made being unglazed, or the glaze having been removed, it is coated with plumbago, and placed in an electrolytic bath, whereby a firm metallic coating is obtained. The lead pipe is then soldered to this coating by a plumber's "wiped" joint. By this means are avoided the imperfect joints made with India rubber sleeves, washers or putty.

* Mr. Maxim's paper is given in full in our SUPPLEMENT of this week, No. 979, and in SUPPLEMENT No. 976 will be found some twenty figures of details.