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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE "WASH" OF AN AEROPLANE.

Those of our readers who have sat in a racing shell, or stood at the wheel of a racing yacht, will remember how troublesome is the "wake" of a competitor, whether it takes the form of the wash of his sculls, or of the disturbance of the air as it sweeps from the leach of the mainsail of a weatherly yacht that is eating out to windward some distance ahead. In the case of two racing yachts that are thrashing it out on the same tack in a struggle to windward, there is a certain relative position of the two, in which the disturbance of the air, caused by its passage over the sails of the leading yacht, will prove exceedingly troublesome to the second boat, especially if she be but a few lengths astern and sailing close to the wake of the other. When this occurs, there is nothing for it but to put about on the other tack, and so get clear of the interference.

With the rapid development of mechanical flight, the remarkable extent of which was shown so clearly in the recent brilliant performances at Rheims, it has become evident that the "wash," or interference, which is inconvenient to a sailing yacht, may become positively disastrous to that yacht of the air, the aeroplane. It was not until the Rheims contests that an opportunity was presented to determine the effect of one aeroplane upon another, when, in meeting or overtaking, they passed in rather close proximity. It is quite possible that the question of interference had never occurred to the aviators at Rheims, but it is certainly a surprising fact that the existence of such interference, and its evidently serious character as shown when several machines were in the air at once, should not have excited more attention, both at the time and in subsequent expert discussions of the Rheims contests.

When such a large body as an aeroplane, spreading several hundred square feet of surface, and weighing from a quarter to half a ton, is driven at fifty miles an hour by propellers that are revolving at from 1,000 to 1,200 revolutions per minute, it is certain to leave in its wake a complicated series of aerial cross currents, whirlpools, and vortices. Now, judging from the description of eyewitnesses of the Rheims races, the behavior of the aeroplanes, when they swept into rather close proximity to one another, indicates that these artificially-created wind storms were present, and that they seriously affected the equilibrium of any aeroplane that came within their influence. The "wash" from propellers, driven, as in the case of Bleriot's monoplane, by an 80-horse-power engine, and the air waves set up by the passage of his planes must be very serious indeed; certainly the air will not regain its equilibrium until long after the machine has swept by.

Two notable instances of this interference occurred when several aeroplanes were in the air together. During one race, when Farman was rapidly overhauling opponents who were flying at the same level, he encountered the "wash" of the machines and his own aeroplane was thrown into rather violent oscillation. Before he could pass, it was necessary to make a wide detour to the right or left, or swing up to a higher level into undisturbed air. On another occasion when Latham, flying high, overtook a competitor who was traveling at a lower level it was noticed that his own aeroplane made a sudden dive, as though drawn downward by the suction of the machine below him.

We attach no little importance to a question which must become increasingly serious as the number of flying machines is multiplied, and the favorite lines of travel become populous with these mechanical birds of the air. "Leeway," as the sailors call it, will become even more necessary to the air yacht than it is now to the sailing yacht. Woe to the aviator who, flying low with scant clearance between himself and the ground, is overtaken by some aeronautical scorcher, who sweeps up from behind, and with the characteristic snort of triumph whirls onward, giving him his aerial dust. Happy for him if he recover his rudely-disturbed equilibrium at the expense of a broken wing and not of a broken neck. Perhaps after all we have been a little too "previous" in felicitating ourselves upon the unlimited room that will be afforded for flight through the air; evidently the clearance demanded by our sixty-mile-an-hour aeroplane must be measured by something far wider than the stretch from tip to tip of the planes, or the length from head to tail.

THE RETURN OF HALLEY'S COMET.

The announcement by Prof. Max Wolf that he has discovered Halley's comet will be received with interest and with surprise by every astronomer throughout the world—with interest, because not a little credit redounds to the Heidelberg astronomer, when it is considered how much this honor has been coveted; and with surprise, because the historic comet has made its appearance nearly four months before it was expected.

Halley's comet is unique because it was the first celestial body of its kind which was mathematically subjugated to the law of gravitation, and because its history is to a large extent the history of astronomy. In 1682 a comet was observed by Newton, Halley, and others. On examining the circumstances of its motion, Edmund Halley, who was Newton's intimate friend, and who did perhaps more than any other astronomer of his day to popularize the idea of gravitation, computed its orbit on the supposition that it was parabolic. Comparing his results with the observations of previous comets, for which purpose it was necessary to calculate their orbits from the necessarily imperfect measurements of earlier times, he found that in 1531 and 1607 comets had appeared which followed so nearly the same path that he ventured to assert its identity with them, and to predict its return within a period of about 75 years. Knowing that he would not live to witness the event, because of his advanced age, he left a plea for recognition which reads: "Wherefore, if it should return according to our predictions about the year 1758, impartial posterity will not refuse to acknowledge that this was first discovered by an Englishman."

In the year 1758 the French astronomer Clairaut took up the task of computing the perturbations which the comet would probably have experienced since its last appearance, because of the influence of the two great planets, Jupiter and Saturn. An extremely laborious calculation showed that the comet would have been retarded about 100 days by Saturn and about 518 days by Jupiter; and accordingly he announced to the Academy of Sciences near the end of the year 1758, that the comet might be expected to pass its perihelion about April 13th of the following year, and that owing to various defects in this calculation, there might be an error of a month either way. The comet was actually discovered by an amateur, George Palitzsch, on Christmas day, 1758, thereby justifying Halley's brilliant conjecture, adding a new member to the solar system, and raising the hope (to be later amply fulfilled) that in other cases also the motions of comets might be reduced to rule. Thus at one fell stroke the dreadful divinity that once hedged a comet, the badge of pestilence, of war, and of death, was swept aside for all time.

Since Clairaut's day Halley's comet has been made the subject of much mathematical inquiry. The French astronomer Pontécoulant carried the calculation of the perturbations back to 1531, and recently Messrs. Cowell and Crommelin of Greenwich have traced the comet back beyond the Christian era. The result of these computations has been to prove that Halley's comet undoubtedly appeared in 1066, and was promptly regarded by William the Conqueror as an omen of victory for his English invasion, and that it is the same which is depicted on the Bayeux tapestry. In 1378 and 1456 it appeared again. Constantinople was besieged by the Turks in 1456, and the comet was regarded by the Mohammedans as a favorable sign because of the crescent-shaped tail. Christendom was so alarmed at the simultaneous apparition of the Turk and the comet that a Papal Bull was promulgated against both. In a measure, therefore, the history of Halley's comet is the history of civilization.

The problem of predicting the return of such a body as Halley's comet is one of considerable difficulty. If the sun and comet alone existed in space, the path of the comet could be determined easily. There are also planets to be considered, and these have a marked perturbing effect.

So variable are the features of the comet, that in all the recorded instances of its return the descriptions never quite tally. In 1066 it created universal dread throughout Europe. In 1145, according to the Chinese, it had a tail 10 degrees long. In 1222 it is spoken of as a fine star of the first magnitude with a large tail. In 1456 it occupied a space nearly 70 degrees in length, and spread terror throughout Europe during the month in which it was visible. On the other hand, in 1531 and 1607 it does not appear to have been so conspicuous, for its tail was only 7 degrees long. In 1682 the comet attracted little attention except among astronomers, the tail being 12 to 16 degrees long. This apparent waning of the comet led to the fear that in 1758, the year of its first predicted return, it might be so faint as not to be visible at all. In truth, the tail was not visible until after perihelion, and was then inconspicuous because at its brightest it was seen against bright twilight. In 1835 the comet was visible to the naked eye during the whole of October, and its tail varied from 20 to 30 degrees in length. So marked have been the fluctuations, that there is some question whether the comet will be as magnificent in 1910 as it was in 1546, or whether it will be as insignificant as it was in 1607.

Halley's comet never reappears with clock-like regularity. The change in period from one revolution to the next in some cases has amounted to more than two years. The longest revolution so far recorded was that from 1222 to 1301—79 years and 2 months. The shortest round is the one now being accomplished in a little less than 75 years and 5.5 months. This extreme range of over four years in the orbital period renders necessary the most careful and laborious calculation of the effect of the attraction of all the planets upon the comet. It is indeed marvelous that mathematicians have come so near to predicting the exact date of perihelion at previous appearances. The best calculation hitherto made was that of Pontécoulant, who was only two days out of the way, an achievement which is not likely to be outdone by mathematicians of our time. In 1864 Pontécoulant published the results of his calculation of the present return, and placed it early in May, 1910, a result with which the observations of Cowell and Crommelin agree. Their reservation that possibly the comet may be at perihelion a few weeks sooner is amply justified by Wolf's early discovery. At present the comet is about 250,000,000 miles away from the earth. At the beginning of November its distance should be not more than 165,000,000 miles.

It is certain that if May 10, 1910, is the date of perihelion the comet will be disappointingly near the sun, so that the solar glare will rob it of its principal glories.

THE SELDEN PATENT CASE.

The decision which has been handed down in the United States Circuit Court upholding the Selden patent will be received with mingled surprise and disappointment. We are probably safe in stating that few patent lawyers ever believed in the validity of the patent. If the defendants carry out their intention of appealing, it is not impossible that the decision will be reversed.

The Selden patent was granted on November 5th, 1895, to George B. Selden. Originally filed on May 8th, 1879, its final allowance was postponed until the birth of the automobile industry by delaying the filing of amendments. The chief claim in issue was "the combination with a road locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more cylinders, with suitable fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device, and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described." In other words, George Selden claimed all of the essential features of a modern automobile. Every one of the features embodied in this claim was individually old. If they were patentable in combination as a road carriage, was a new result produced? We doubt it. The internal-combustion motor was known before Selden's day. So were power shafts connected with and arranged to run faster than the shafts or wheels which they propelled. So were intermediate clutches or disconnecting devices between shafts running at different speeds.

Thus far, the patent has consumed nine years of litigation, almost half a million dollars, and 60,000 folios of testimony to provide material upon which to base a disappointing decision. The Selden patent expires on November 5th, 1912. It may be doubted whether its validity will be finally settled before it expires, if an appeal is taken.

That the patent was ever respected by the automobile industry is due largely to the fact that it was cheaper to pay the slight royalty demanded by its owners than to contest its validity.