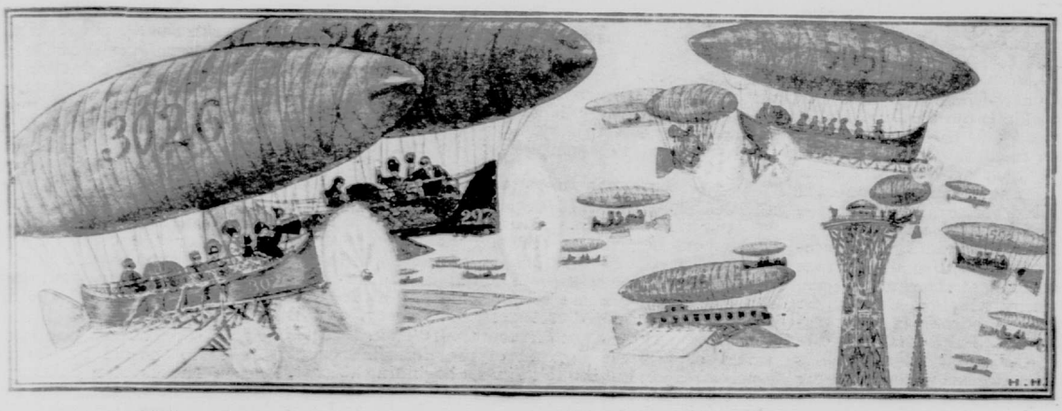

AËRIAL TRAFFIC

Its Regulation and Limitations

By EDWIN M. HOOD

THE promise of to-day is the fulfilment of to-morrow, and perhaps the time is now at hand when thoughtful minds should begin to forecast the means to be adopted to regulate in some measure the future passage through the air of the flying machine. This can scarcely with propriety be called aërial navigation, but rather aërodromics, to use the word coined by the late lamented Professor Langley. For undoubtedly what is now in the public mind regarded as an interesting, because largely spectacular and dangerous experiment, is in the near future destined to become a solid, practical reality, and, within certain degrees of precision, aërodromes are to leave the earth's surface at stipulated hours to make well-defined flights.

It is not within the scope of the present article to review the history of the development of aërial flight from the days of the Montgolfiers' balloon, down through the countless efforts of daring inventors to control the direction of the great gas-bags, first by hand, and then by power-driven devices, culminating in Santos Dumont's brilliant achievements. Nor is it even possible to detail the more scientific experiments of Langley, who, first of all, overturned Newton's formulæ and demonstrated mathematically the practicability of supporting in air mechanically a body heavier than the liquid in which it floats; or of the Australian Hargreaves; or of Hiram Maxim; or of that martyr to science, Lilienthal.

Flying Machines, Not Balloons

SUMMARIZING these various achievements and many others, and having in mind the recently concluded contract of the French Government with two enterprising Americans for the construction of an aërodrome similar to that upon which they had already made successful flights of about twenty-five miles in length, it is perhaps safe to predict that the outcome is to be a flying machine; not a balloon, but one capable of sustaining flight, dependent alone upon the power of its motors.

That such a machine can be constructed admits of mathematical demonstration; but there is no occasion now to worry the non-technical reader with questions of horse-power and motor weights and necessary aëroplane surface. Nor is it needful to weigh the respective merits of aëroplanes of large extent, relying upon small propellers to float them upon air currents, and of the aëroplane and screw combined in one. It is sufficient to note that the trend of thought is toward the latter school.

This would point to the development of two kinds of machine, comparable in a degree to the bicycle and quadricycle; the first consisting of a light carriage for one person, containing a suitable motor, and sustained by two screw propellers revolving in opposite directions on the same shaft, and capable of deflection from the vertical to any desirable angle toward the horizon; and the second to an elongated car of much greater capacity sustained by a series of similar propellers.

Machines of either type should be able to rise vertically in the air to any desired height, and then, by a deflection toward the horizon of the propeller shafts, dart off at great speed on a plane with the earth's surface; the flight being a resultant between the lifting power of the screws and the horizontal inclination. Reversing the process, the machine should also be able, when nearing its destination, by the simple device of erecting the propeller shafts, to stop the horizontal motion, and, reducing the speed of revolution of the propellers, to sink gradually and safely upon the earth.

Changes in the World's Customs

ASSUMING the practicability of the aërodrome as thus briefly outlined, and pausing only for a few flights of fancy into the realms of enjoyment of this soaring through space, the same mind is confronted with the necessity of imposing regulations upon this aërial traffic. Many and complex are the problems involved. Perhaps in a few instances, to the daring aëronaut flying on the winds over hundreds of miles of desert and lake and farm and city and hamlet, but never to the countless millions of earth-dwellers, has the thought occurred of the powerful influence that will surely be exerted upon the world by the flying machine. Changes will be wrought in the fundamental principles of society; privacy will be unknown; political boundaries will become mere shadowy delimitations. But the first and foremost consideration will be the increasing risk to human life and property, and from a realization of that fact will follow a general demand for the regulation of aërial traffic.

The safety of human life and property being the first consideration, it will follow that aërodromes must conform to legal regulations in many respects. Of course, the strength and stability of the machine must be established beyond question; this certainly as to public carriers, and probably also as to individual machines. As the owners of automobiles strenuously resisted the application of laws regulating their speed and prescribing the numbering and lighting systems, and limiting the emission of noxious vapors and smoke, so will the future aëronaut protest against local laws that limit his freedom; but also without success.

So it will happen that, at least in populous centers, the aërodromes will be required to start from and alight at certain prescribed points, probably on the outskirts of the cities. It cannot be contemplated with equanimity that a score of persons below should be put in jeopardy of their lives through the possible carelessness of an aëronaut above them in the management of his machine. Apart from the danger to life below of a falling machine would be the dropping of oil and refuse.

Must Not Fly Over Cities

SO the machines must not fly over the cities and towns; that must be prohibited by law. And even in the agricultural country the farm-house and yard would appear to have a claim to protection, and the farmer's vote will probably be as potential in the future as now with the lawmakers. His protection would involve stringent prohibition against the discharge from above of any objectionable matter. Possibly it might be found difficult for the aëronaut entirely to avoid this; certainly it would be in the infancy of the science of aërial flight, with crude and experimental machines.

This fact naturally suggests the feasibility and desirability of prescribing aërial routes of traffic connecting the great centers of population, corresponding with the ocean lanes which are followed by the steamships of the world with inestimable benefit to the mariner. At first suggested by the economy of taking advantage of seasonable currents and winds and of Great Circle navigation and avoidance of icebergs, the establishment of these lanes was found to have largely eliminated that dread of the sailor—a collision at sea. So the aëronaut of the future, though naturally chafing under the restrictions upon his freedom of movement, may in the end—though the primary purpose of the law establishing aërial lanes of flight will be the protection of the people below—be glad to reduce the chance of a frightful collision in mid-air by following the rules of the road.

The mere thought of a collision in mid-air is enough to shake the stoutest spirit; but how much more dreadful to the imagination the terrible crash of the two great but fragile machines, laden with human freight, in the shadows of night and speeding in opposite directions at the rate of a hundred miles an hour. Destruction to every living being in such crafts would appear to be inevitable.

It may be reasonably expected that in its initial phases the science of aërodromics will follow in general lines the rules of navigation upon the high seas. Air-ships will be fitted with simple horns or whistles; sounding one blast to pass to starboard, or two to port. Likewise at night, if there are aëronauts so venturesome as to try the upper darkness, the aërodromes must carry the familiar red and green lights on left and right. Other signals common to water navigation will be adopted to give notice of the intention of the aërial captain to pass to one side or another of a slower craft ahead, as well as to signal his approach to his home station, just as the returning river excursion boat calls out its dock-hands to catch its mooring lines.

Signals Needed at Night

BUT these old and serviceable devices of the water navigator must, after all, soon fail to meet the needs of the aëronaut. To travel at the speed of, say, twenty miles an hour upon an absolutely horizontal plane, in a stout craft capable of withstanding a considerable impact, is one thing; to dart along in undulating flight, in company with the wild duck, at the rate of one hundred miles an hour, now in clear air and the next moment swallowed up in a fleecy cloud, swerving rapidly to right or left to avoid adverse air currents, is another. Signals sufficient for the comparatively slow water craft might reasonably be expected soon to fail to meet the demands of aërial flight, if safety of human life is to be regarded, and, regardless of individual desire, the law is sure to interpose at this point.

Scientific development watches human needs at every turn, and the aëronaut will soon have at hand the instruments to guide him with precision in his wildest flights. The simple system of sound blasts and of colored lights will give way to the subtler but more accurate devices of the electrical engineer. Even now, student minds are giving their virgin energies to the solution of the problem of electrical detection of approaching substances. Only a small stretch of imagination is necessary to adapt the existing system of wireless telegraphy to the prospective needs of the captain of the aërodrome. The present obstacle is found in the fact that none of the wireless systems now in use is operated without what is known to electricians as a ground; that is, one of the terminals must be connected with Mother Earth. The problem to be solved by the aero-