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Scientific American.

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Some twenty thousand of the subscribers to the SCIEN-TIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT will find printed on the wrappers which envelope this week's papers the information that their subscriptions are about to expire, coupled with a request that the same may be renewed for the coming year. But three numbers of either journal, including the present issue, remain to complete the volume; and as it is our fixed rule not to send papers after the term subscribed for is ended, those desiring the weekly visits of our papers to continue without interruption; will therefore serve themselves by remitting as soon as possible. At the same time they will, in so doing, greatly favor the publishers, as the latter are thus enabled to form proper estimates as to the magnitude of the edition which it will be necessary to print at the commencement of the year. The rates of subscription to either journal or to both combined remain as heretofore.

The SCIENTIFIC AMERICAN SUPPLEMENT, we would here take occasion to state, was started, as its prospectus intimated, partly as an experiment, and without definite intention on the part of the publishers regarding its continuance after the present Centennial year. The success which it has en countered has, however, been so genuine, and the circulation which it has achieved so greatly beyond our anticipations, that it has been decided to continue its publication. As to the preparation and plans which we have in hand for rendering both SCIENTIFIC AMERICAN and SUPPLEMENT indis pensable to workers in every branch of art, of industry, and of Science, the reader will find them fully detailed in our announcements on the advertising pages of this issue.

Those who have taken the papers through newsdealers are recommended to continue to do so, and those in the habit of procuring their papers weekly from the stands will find them there as of old; and those who neither subscribe for nor buy the Scientific American norits Supplement may peruse them both on file in any working men's reading room iu the country, or in the library of any institution of learning in the world.

A handsome subscription list will be sent as usual on application by those desiring to form clubs.

PROSPECTS OF AERONAUTICS.

Though failure more or less signal and complete has been the fate of every attempt thus far made to navigate the air by mechanical devices, the problem has by no means been given up as hopeless. Better still, sufficient progress has been made of late toward a right understanding of the conditions and requirements of flight to justify the belief that the obstacles to be overcome are purely mechanical, and sure, sooner or later, to be successfully surmounted. The long sustained flight of birds sufficiently demonstrates the possibility of propelling heavy objects at great speed through the air by a purely mechanical apparatus: while the small amount of food which birds require for the generation of the energy expended in flight proves that only a moderate amount of force, rightly applied, is required for that sort of work.

The problems to be solved before aerial navigation takes its place among human achievements are consequently weight. these two the invention of an apparatus to accomplish the If the results obtained by the fan blast and inclined work of the bird's wings and tail, and an engine capable of plane are to be depended on, an engine used for propulsion developing great power with comparatively little weight of ought to succeed even better than those employed direct in machinery and fuel. For the purpose of navigation, the lifting. flying ship must be, however, like the bird, heavy in com-ENGLISH DEALINGS WITH FOOD ADULTERATIONS. parison with air, that it may not be at the mercy of every If there is any one subject on which the British public is gust of wind; and it must be strong enough to withstand the pressure of strong gales or, what is equivalent, the resistance due to rapid motion. Hence it is evident that, what and drink. No country, we believe, has such stringent leever it may be the successful air ship will not be and will formalities for their enforcement are made so few and simnot contain a gas bag. For the practical navigation of the air, the balloon is and will ever be a delusion and a snare and the general recognition of this truth by intelligent vain denunciations, but summon the offending grocer or workers in this field is one of the most encouraging features butterman forthwith before the nearest magistrate to anwer for the fraud. f modern seronsutics An excellent instance, showing how persistently warfare It is quite possible that aerial rafts, supported by balloons, may sometimes be useful in regions favored with winds against spurious materials is waged, is found in attacks now being made in England on artificial butter. It is a well which blow steadily in a fixed direction for months at a time; but in ordinary climates, they cannot but be as useless known fact that, until recently, attempts to produce even a for commercial purposes as log rafts in a sea everywhere as moderately palatable artificial butter have failed; and although the product has been made of fair savor while fresh, vexed by conflicting currents as Hell Gate was in its worst a day or two's keeping has turned it into mere tallow. In A self-propelling vessel supported by a balloon davs. would be little, if any, better. No balloon light enough to England, however, the fraud has not ended at this. Conscienceless individuals have sold as butter, it is said, horri sustain such a vessel could begin to withstand the pressure ble concoctions of old lubricating tallow, and even old tallow it would meet in stemming or crossing the current of a moderate wind, or in being driven through still air at the rate candles minus the wicks, which an official analyst describes of twenty or thirty miles an hour : and unless it can do this as "supplied to the poor in the last stages of rottenness." and much more, it is out of the question for practical navi-One factory was detected making this delectable product at the rate of two tuns a day. This and many other like cases nation. being well known, it is but natural that the British public After many experiments and no small amount of costly investigation, the Aeronautical Society of Great Britain, so should cordially detest "grease butter." The London Grolong presided over by the Duke of Argyll, has pronounced cer has lately printed long reports of trials of sellers of the decisively against the balloon as incapable of being made adulterated material: and to show how rigidly the penaluseful for the purpose of locomotion, except in the way of ties against the adulterations are enforced, we note that a retailer who purchased grease butter, innocently supposing it waftage; and in a recent report, the secretary of the society declares that the sole improvement of which the balloon is to be genuine cream butter, and who sold it to a customer as

capable is the invention of some means to secure its ascent and descent without the expenditure of gas or ballast.

Suppose we have, for example, a balloon so weighted that it would float on the discharge of 35 lbs. of ballast, or on receiving an additional thousand cubic feet of gas. It is plain that, if some mechanical means (say a screw acting vertically) were added, capable of exerting a lifting force of 35 lbs. more than its own weight-a light two horse power would drive it-the voyager would be able to rise without discharging ballast, or sink without discharging gas; and so be able to avoid obstacles while drifting over the surface, or to rise above adverse currents to such as might be more favorable.

But for the purposes of real aerial navigation, such drifting is wholly inadequate. The work to be accomplished is not the floating of a relatively light body in more or less favorable air currents, but the propulsion of a heavy body with a force sufficient to overcome all aerial resistance, and with velocity enough to make the inevitable driftage relatively unimportant.

This has not yet been achieved, though the efforts toward it have shown some very encouraging results. Certain experiments made at the expense of the Aeronautical Society, to determine the exact lifting pressure of air currents against a plane inclined at different angles, obtained results which are especially promising. The plane used was a steel plate a foot square, and the substitute for wind or the resistance, occasioned by the passage of a body at high speed through the air, was the Llast of a powerful fan blower. Placed at right angles to this blast, the pressure on the plate was 31 lbs., indicating a wind velocity of about twenty-five miles an hour. Inclined at an angle of 15°, the plate received a direct pressure of only one third of a pound, while the lifting pressure amounted to 11 lbs. In other words, a plane of 1 square foot, held at an angle of 15° against a current of air having the velocity of twenty-five miles an hour, will carry four times as much weight as it meets resistance. A less angle than 15° could not be tried, owing to some obstruction to the action of the apparatus. The experiments showed, however, that the ratio of the lift to the thrust greatly increased as the inclination of the plane diminished, and also that the lifting power of the current, per square foot of plane, increased with the extension of the sustaining surface, probably on the same principle that makes a large sail on a ship so much more efficient than an equal area of small sails.

The chief thing that remains to be done for the success ful solution of the problem of flight is therefore this: To drive a sufficiently broad-bottomed car, say from forty to sixty miles an hour, by means of apparatus acting on the air. With this velocity the resistance of the air would support the car, at the cost of a relatively small part of the driving force. A number of experiments have been made in this direction, perhaps the nearest to success being one in which a small engine drove a plane, carrying, with its weight, a load of 214 lbs. around a circular course (planked) at the rate of twelve miles an hour, by means of two wheels working in air and having a driving surface of 60 square feet. A speed three times as great would have been required to lift the apparatus from the ground.

Other experiments have shown that, by direct acting vertical screws, a constant force of three horse power will support 100 lbs.; and inasmuch as a one horse power engine has been made weighing no more than 13 lbs., the possibility of an engine's lifting itself in that way is clear. In another experiment made to ascertain what lifting power could be got from planes moving in horizontal orbits, an engine weighing 186 lbs. was prove capable, under very unfavorable conditions, of lifting itself with 40 lbs. additional

extremely sensitive, it is the quality and purity of its food gislative enactments against adulterations; and the legal ple that the aggrieved consumers now waste no time in

- VII. NATURAL HISTORY, ETC.—Impregnation of the Boa Constrictor. —The Cat as a Substitute for the Carrier Pigeon.—Testimony for Evo-Intion.—The Antiquity of Man, an interesting paper by ALFRED RUSSE WALLACE.—The Ash Showers of Iceland.—The Planet Venus.
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