CORRESPONDENCE.

**** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which they have read in FLIGHT, would much facilitate ready reference by quoting the number of each such letter.

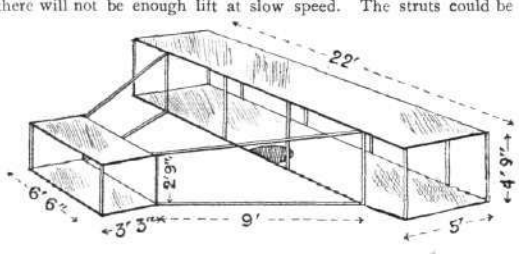
NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

MAN-CARRYING GLIDER.

[1003] I intend building a glider of the Voisin type, of the dimensions shown below. I would be much obliged if you could give me some points about construction. I weigh about 8 st. 12 lbs. Would the glider need curved planes? The operator places his chest and stomach on the seat, and his legs hang free, for starting and steering. What thickness of wood would be necessary? Would three-quarters of an inch square do? And what would be the best wood for the purpose, and what would the cost be for the right thickness? I thought willow or American white pine. Would it be possible to start a glide on such a machine by springing into the air with it from a fence or wall, or would the tail catch? I would like to know, if it is not too much trouble to you, the necessary thickness of the main longitudinal spars of the planes, the spars that join the front and tail planes, and the uprights between the planes.

Cambridge. J. L. ELMSLIE.

[The spars should be about 1 in. by 1½ in., otherwise they will tend to warp too much. The ribs should be cambered, otherwise there will not be enough lift at slow speed. The struts could be



about 1 in. by ¾ in. oval section. Any straight-grained wood, well selected, would be suitable; the selection is more important than the kind of wood.

Gliding should be practised down a hill of about 1 in 5 slope. —ED.]

MAGNALIUM TUBING.

[1004] Can any reader kindly explain a method of bending magnalium tubing?

Dulwich. B. TRASK.

IS THE HELICOPTER POSSIBLE?

[1005] In Mr. Reynolds' letter, No. 940, appearing in your issue of the 10th ult., he states "that there is no actual example" of a helicopter type of machine having flown or even risen from the ground by its own power.

It is evident that he is not conversant with the very careful experiments carried out by M. Cornu in France. M. Cornu in 1907 constructed a helicopter consisting of two 20 ft. diameter screws, one behind the other, the blades of which were adjustable to any angle; provision was made for the horizontal progress of the machine by means of two inclined planes, so placed that a small portion of the downward current of air produced by the screws was changed in direction so as to obtain a horizontal thrust. The power of the Antoinette engine at the speed at which it ran (about 900 revolutions per minute) was estimated by the maker at not more than 14-b.h.p.

The machine rose from the ground carrying two men and travelled forward at a speed of 10 ft. per second, the weight lifted being about 704 lbs. The flight was of very short duration, under a minute, somewhat less than the first aeroplane flight of the Wright Brothers.

There is no doubt that M. Cornu's machine was very unstable. The most interesting point in the experiment from a scientific point of view is, if we calculate the possible lift from the screws with the power applied (assuming the machine to be stationary), we could not expect a greater lift than about 450 lbs. This goes to prove that the forward motion tended to augment the lifting power; after all, that is what we should expect, because by the forward motion each screw is enabled to act upon and set in motion air over a greater area in a second of time. If we substitute this value for the area acted upon in place of the disc area of the two screws, we at once see there is no reason why the screws should not lift the above weight.

Experiments at the Koutchino Institute have since proved that the lifting power of a screw was increased nearly three times when subject to a considerable horizontal blast. The reason is obvious in either of the above cases. With the forward motion of the machine, or the horizontal blast of air, the screws are unable to force the air downwards with the same velocity as when stationary; this causes a greater resistance, resulting in a greater lift.

We are therefore forced to the conclusion that to obtain great lifting power from a helicopter the forward speed must be considerable.

M. Cornu, I believe, experimented further with this object, but his results seem to prove that the question of stability altogether outweighs the question of lift, principally for the reason that with a forward motion the reaction from one blade is not counterbalanced by the reaction from the blade opposite (one blade is acting against a horizontal air current and the other is travelling with the current during a period of each revolution).

From the above I am forced to agree with Mr. Reynolds that the helicopter is not a practical machine, although my reasons for doing so, it will be noticed, are very different to his.

Gray's Inn Square. J. R. PORTER, A.M.Inst.C.E.

[1006] In reference to the remarks of your correspondent, Mr. William A. Weaver (letter 978, in your issue of December 24th), concerning my letter under the above title (940, in your issue of December 10th), your correspondent does not seem to realise that, whether for a flying machine, a bridge, or any other mechanical structure, the same mechanical laws and limitations govern all, and that any structure or machine in which the load is concentrated will and must be heavier to sustain the load than one in which the load is more distributed or less concentrated, and that the larger the machine or structure is, and therefore the greater the total weight or load borne, the lighter per unit of weight will be the machine to bear the load; and therefore it follows that if, as stated in my letter, supposing the machine to be of such a size that the weight to be lifted amounts to 3 tons for each propeller, it is impossible to obtain a structure strong enough to bear the load and at the same time be light enough to fly or be air-borne; it will be still more impossible to do it with a smaller machine as then the unit weight in respect to unit strength will be increased, and the smaller machine will be found relatively heavier than the larger, and Mr. Weaver's suggested combination of supporting planes and propelling screws with lifting screws as well, will be heavier than either, for the more the total power required is divided up the heavier will the machinery and necessary supporting structure be to transmit that power. The same remarks apply to flapping wings or reciprocating paddles; these must be very strong, as they bear the whole weight of the structure at the hinge to which they are articulated, and the weight of the machinery per horse-power (that is the useful horse-power exerted by the wings or paddles) is very heavy indeed, as owing to their reciprocating action the inertia stresses, due to their reversals in direction are very heavy, and absorb so large a proportion of the engine-power that so large an engine has to be provided that its weight becomes prohibitive. Mr. Weaver talks about suspending the structure from the screws in a helicopter, instead of resting it on the top of the axles. This will be an actually heavier form of construction than the one I mentioned; the friction will be greatly enhanced, and therefore the necessary horse-power (and weight) of the engine will also be greatly increased, while the concentrated weights on the structure still remain as I have said in my former letter. If Mr. Weaver cares to write to me, I shall be pleased to hear how far he has got. But, all said and done, a certain weight has to be lifted in a certain way. This requires a certain horse-power (and, therefore, weight) to be exerted at a certain place or places; this requires a certain structural strength, which can easily be calculated and its weight known, when the question, to fly or not to fly, can at once be answered, without any waste of time or money in experiment. No structural conception that does not agree with the laws of mechanics can ever be brought to a successful issue.

Maidenhead. CHARLES J. REYNOLDS.