

row was slightly overlapping the previous one, it represented the aspect of fish-scales made of square pieces. Every separate wood spring resembled, in action, a quarter-elliptic spring of the car.

The part of the bottom covered with springs was exactly the same as at two previous experiments. An altogether new hull was made, as it required specially-made ribs, at special intervals, to fix the springs.

As it was the first hull built on this principle, it was slightly over-strengthened, and consequently over-weighted. As I received an offer to go to England, I hurried up construction, and when it was ready, I had very little time to test it. Notwithstanding that only six "take-offs" were made, the idea of the device seemed to be a right one.

All sharp knocks of the short waves were absorbed perfectly. Longitudinal rocking stopped, and here was no difference in performance, in comparison with the rigid construction, regarding the time for lifting the tail.

An especially interesting effect of the absorbers, was taking water at good speed, and "taxi-ing" on the redan. Usually I avoided fast taxi-ing, due to the undesirable overstraining of all parts of the boat, but with shock absorbers, it seemed to be quite an easy matter.

I had no chance to try it in rough weather, and therefore I consider this device to be in an experimental stage, and for this purpose it is now in the hands of Mr. Mitchell, of the Supermarine Aviation Co.

I hope, however, that I shall be excused for bringing it to your notice, because my only intention was to share my experience with those who are working for the development of Aeronautics, and who look at every experience, however small, as a benefit to our common endeavour.

DISCUSSION.

DR. THURSTON: I think these experiments are most interesting, and feel that the lecturer is on the right lines. It is very well known that in landing a flying boat the pressure that develops is quite localised. I have made many experiments in landing on the river on account of the localised area. If, therefore, you can devise some means of absorbing this pressure at points where it is developed, you could get an easier-running boat than if you relied on the flexibility of the whole hull. The Linton-Hope hull is a wonderful construction and has a remarkable strength, but although it is flexible at all parts you do not want it to be so in the parts where pressure is developed. Therefore it seems to me that this idea of the Lieutenant's of having a part separate from the main hull specially devised for the purpose of absorbing the main portion of the pressure, is very valuable.

We want, of course, more research work to find out the extent of the pressure developed in landing on various types of waves, and exactly where it comes on the hull.

CAPT. SAYERS: I am very interested in this method, and it is rather unfortunate that further experiments have not been made with it.

It seems to me that the arranging of a series of overlapping springs on a long length of the hull must involve a lot of weight. I think that the pressures probably come more close to the step itself.

It is possible by using the Linton-Hope type of spring to give a good deal of flexibility to the hull, and in an experiment recently published there are figures indicating that the maximum pressures developed on the hull were something of the order of one-half of its loading. Unfortunately the Linton-Hope hull, though very flexible, is least so at the step, where it is most wanted. The step is always more rigid than the rest of the structure.

If you can avoid putting in a second bottom it is an advantage, and it seems to me that the particular type of spring of which we have heard to-night has a very good effect if used in the proper way. I certainly think that a series of ash springs would lead to a great excess of weight.

MR. MANNING: I should like to say that we have all listened with considerable interest to Lieut. Olechnovitch's account of his experiments, which are in a direction that I think very practicable as so far conducted. There are one or two points, however, that I should like to mention.

His first hull of the flexible type had apparently a number of different steps. One would like to know how the hull behaved, and if there was much resistance with it. In this country we use only one kind of step.

I agree with Capt. Sayers regarding the weight of the springs.

Another point that I think would be difficult is the attachment of the front end springs. I think it would not be easy to get a satisfactory attachment with one cam to carry it out.

Capt. Sayers referred generally to the degree of flexibility of the Linton-Hope hull. It is impossible when you have to combine a rigid hull with a flexible structure, to get a hull entirely flexible; I think, however, that a good deal of flexibility remains.

Concerning Mr. Evans's remark, I do not think anyone has yet tried to make a metal hull flexible, and I do not think it can be done.

LIEUT. OLECHNOVITCH'S REPLY TO THE DISCUSSION.

With regard to the Linton-Hope hull, I had no knowledge of this when I started my experiments, but I certainly think it is more or less the last word in construction. I commenced in 1916, at which time we had no ideas

on flying boats, and they were very rigid and heavy. In my opinion, if we made the whole hull flexible it would not be a good thing, because the efficiency of the whole hull would be very great and would prevent it from absorbing the shocks of the small waves. It would do for the larger waves but not for the small ones.

With regard to Capt. Sayers's remarks that the whole length of the hull should not have the over-lapping springs, I quite agree, but have not had time to experiment fully. I think, however, that it is probably only necessary to make the step flexible.

Concerning steel construction, I talked with Mr. Short about his flying boats, and he says that his large flying boats are so heavy that they require practically no floats, because their weight and rigidity make the pressure on the water so noticeable that it gives way considerably. With light boats, on the other hand, the water is very rigid. I have seen a man fall into the water and have all his bones broken in the same way as if he had fallen on the ground.

Replying to the Chairman's questions, I did not make any experiments with different steps, but I think they are more flexible than a single step, as many of the steps are not flexible. Probably two steps might be some advantage, but I did not make any experiments in this direction.

With regard to the fixing of the springs, as far as I experimented I did not find any loosening in the fixture. It depends on the thickness of the springs; if they are not very thick they do not require much fixing.

A hearty vote of thanks to Lieut. Olechnovitch for his interesting paper was proposed by the Chairman and passed with acclamation, and the meeting closed.
