Correspondence.

THE INVENTOR OF THE STEAMBOAT.

To the Editor of the SCIENTIFIC AMERICAN:

I am indebted to a friend for the information contained in a recent issue of your journal relative to the Hudson-Fulton celebration in New York, in which under Fig. 1 you give a sketch of Jonathan Hulls's steam tug or boat, which you describe as being "proposed, but never built." With this statement I beg to differ, as it is quite contrary to actual facts.

You admit that the "complete description" is "of a practical steamboat," therefore I contend that the planning of a practical steamboat constitutes inventorship, if nothing "practical" existed previously. This seems only fair argument; but I go further. I am in the position to prove that the boat was actually built, from an official document, viz., Jonathan Hulls's treatise, published in 1737, as in this it is stated:

"Whereas our Trusty & well Beloved Jonathan Hulls hath by his petition humbly represented unto Our most dearly beloved Consort the Queen, Guardian of the Kingdom &c. That he hath with much Labour and Study, and at Great Expense *Invented* and FORMED a Machine for carrying ships & Vessels out of or into any Harbour against wind & tide, &c." And "the Petitioner hath made oath that he is the Sole inventor," etc., and he concludes his treatise by stating:

"There is nothing in it but what is necessary to be understood by those that desire to know the Nature of that Machine which I now offer to the World; and I hope that, through the blessing of God, it may prove serviceable to my Country."

Now to prove practical results. I find in "The History of Progress in Great Britain," published in 1859, the following:

"Thus we arrive at the time when in 1736 Jonathan Hulls' steam boat took a Sailing Ship in tow, and amid the wonder, doubts and jeers of the spectators made a great splash, a loud noise and a black smoke, yet managed to haul the cumbrous hulk along, and gave promise that the child, which had distinguished itself by such an unheard of feat, would one day become a giant of great strength."

What further or more convincing proof that the boat was actually built and proved practically successful can be required?

I would here mention that I have made a careful study of the claim of the many claimants from 1543 to 1807, a very lengthy period, and I challenge anyone to produce proof that will controvert Jonathan Hulls's right to the honor of being the inventor of the steamboat in 1736.

My proofs consist of, among many others:

1. Jonathan Hulls's specification No. 556 (1736) old Law Series.

2. Jonathan Hulls's treatise, written by himself (1737). Both still in existence at the British Museum and Patent Office Library.

3. "History of Progress in Great Britain," published in 1859. Etc.

If you wish to pursue the subject further, I shall be pleased to submit many convincing proofs that the steamboat existed on this side, as also in America, long before the "Clermont," which undoubtedly was not an invention of Robert Fulton's but merely the outcome of the inventive genius of one of Jonathan Hulls's methods of steamboat propulsion.

I would be pleased to have a copy of your Hudson-Fulton issue if you have a spare one, as I find some difficulty in procuring one here, and in return I will assist you in reaching the actual indisputable facts as to who was the "inventor" of the steamboat.

J. HOOPER HULLS.

Manor Park, Essex, England.

LEDUC'S FIGURES.

To the Editor of the SCIENTIFIC AMERICAN:

In the number dated August 14th, 1909, you give a description of M. St. Leduc's experiments for obtaining plant-like forms.

I believe I was the first, some thirty years ago, when I showed these forms to my friend Sir William Crookes, and explained to him how such experiments can be conducted. Any of your readers having at his disposal some solution of silicate of potash or of soda and some metallic salts crystallized, sulphate of iron, of copper, of nickel, etc., can reproduce the experiments.

By filling a glass two-thirds with a solution of one of these silicates, then adding distilled water to the very top, and throwing some small pieces of the metallic salt (which will fall to the bottom of the glass) into the solution, he will see, in a short time, plants growing in different forms, sizes, and colors, according to the salt employed. The copper one will give a blue, the iron a dark green, the nickel a light green, and a beautiful plant will be obtained with chloride of cobalt.

By varying the density of the silicate solution, different effects in form, size, and color will be obtained. If the solution containing the plants is kept well sheltered from the air by a good covering of the glass, these plants will keep any length of time.

Paris, France. GEORGES FOURNIER.

WHY DO WATCH SPRINGS BREAK?

To the Editor of the SCIENTIFIC AMERICAN:

The mainspring of a watch does not unwind at a uniform rate, but intermittently. It is subjected to a sudden jerk at every tick—four times per second for my Elgin watch. This makes 345,600 times per day, and over 126 million times per year. This operating condition is analogous to others discussed in Kent's "Mechanical Pocket-Book" under the heads of "Relation of the Elastic Limit of Endurance under Repeated Stresses" and "Resistance of Metals to Repeated Shocks."

Among other things, it says: "Another long-known result of experience is the fact that rupture may be caused by a succession of shocks or impacts none of which alone would be sufficient to cause it. Iron axles, the piston-rods of steam hammers, and other pieces of metal subject to continuously repeated shocks, invariably break after a certain length of service. They have 'a life' which is limited." Wöhler found in testing iron by repeated stresses (not impacts) that in one case 400,000 applications of a stress of 500 centners to the square inch caused rupture, while a similar bar remained sound after 48,000,000 applications of a stress of 300 centners to the square inch. (One centner = 110.2 pounds.)

The mainspring of a watch is not only under a considerable tensile stress but also under a bending stress when suddenly released, then immediately stopped by the escapement mechanism. It is then probable that its molecular cohesive power deteriorates in a manner similar to those quoted. HENRY GETAZ.

Pittsfield, Mass.

A MAGIC SQUARE.

To the Editor of the SCIENTIFIC AMERICAN:

The appended magic square is remarkable as containing the odd numbers in regular progression within the inscribed square.

26	20	14	1	44	38	32
34	28	15	9	3	46	40
42	29	23	17	11	5	48
43	37	31	25	19	13	7
2	45	39	33	27	21	8
10	4	47	41	35	22	16
18	12	6	49	36	30	24

So far as I know it has not been published before. WILLIAM P. DOYLE.

Los Angeles, Cal.

THE BREAKING OF MAIN SPRINGS IN STORMS.

To the Editor of the SCIENTIFIC AMERICAN:

Respecting the breaking of main springs now discussed in the SCIENTIFIC AMERICAN, it may be interesting to note what an old French watchmaker has to say regarding the rupture of springs in storms. The following is a translation:

"The influence of storms on the breaking of springs is certain; many watchmakers have observed it; even ordinary rains may produce this effect. I have noticed it personally in quite a regular manner in the months of April and September, which are generally rainy months; thirty per cent of the springs which I change in the course of the year are destroyed in these months by the influence of the rain. This barometric influence acts much more on new springs than on those that have been working for a considerable time, and these months are a critical period for testing their elasticity. I have often been obliged, after a short time, to replace a spring that had thus been changed. In one case I was obliged to renew the spring three times in the same day, though the springs had been carefully fitted."

Many of the watchmakers can cite cases of springs broken, not in a couple of pieces, but in ten or a dozen fragments, as if they had been divided by a saw. Thus we come into the domain of electricity, and watchmakers may be supposed to notice the effect without determining the cause.

The quality of steel employed in the manufacture of springs and the care devoted to their tempering and annealing must be among the causes, and it is for the makers of springs to give us information.

Close observation has led me to believe that the contact of benzine or extreme oiling of the springs in stormy weather may not be completely foreign to their tendency to break.

Thus, when I change a spring during the critical period, I avoid passing it even rapidly into benzine. I clean it by rubbing with a piece of peg-wood and a rag slightly wet with fresh olive oil. I do not wipe it, and put it in without oiling, as customary in ordinary weather. I endeavor to substitute a slight lubrication for the oiling.

This appears to me to be advantageous, but I must acknowledge that it is not an infallible panacea. It is to be hoped that other members of the profession will give the results of their experience.

Brooklyn, N. Y. CHARLES A. BRASSLER.

AN OPTICAL PHENOMENON.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of September 4th, 1909, page 156, heading, "A New Speed Indicator for Marine Engines," a device is necessary to enable engineer to correctly and intelligently interpret signals from the pilot or captain. The camera device, as described in a recent issue, used on submarines when partly or wholly submerged, would, it seems, put the engineer in a position which would enable him to interpret the signals by a visual comprehension of the location.

The cost of installing one of the cameras on the upper deck, so arranged as to give a clear front and rear view of the ship's situation, with a reflection in the engine room, should be inconsiderable.

We must concede that there are times when the camera might be obscured by fog or smoke, etc. At that time, if serviceable, its utility might be greatest; but that is a time when attention is tense, and is but a small proportion to the number of times when it would be effectively serviceable. The obscurity of the reflection, *ipso facto*, would be notice to the engineer to proceed cautiously, and in case of doubt to ring for a repetition of signals.

This letter is suggested by an experience I once had. I was sojourning in the country, in the lean-to room of a log house. The protection from the elements was a thin weather boarding. As the fleecy flakes beat through the cracks and nail holes and with the cutting wind discomforted me, I thought of a device whereby, if I could not entirely obstruct, I could at least reduce the force of the wind. The next morning I bought and tacked some white drilling on the uprights about four inches from the weather boarding. I was engaged in a perilous occupation and had been warned not to light my lamp without first lowering the shade, in order that some unscrupulous "owl meeting" participant might not make me the target of a 0.45 caliber Colt. I neglected to reraise the shade, and reentering my room, my attention was arrested by a spot of green on the drilling. Close investigation revealed in perfect miniature a reproduction in part of the landscape outside, but reversed. A small nail hole was the medium. Though I have never experimented, I conclude the effect might be reproduced by tubes, mirrors, lenses, etc., so as to effectively show the surroundings of the ship in the engine room, the engineer thus being partly in possession of the same information as the pilot or captain. This suggestion is given for what it may be worth to you.

Houston, Tex. G. O'C. MACMANUS.

[This suggestion and the experience from which it originates are very interesting. The phenomenon described is that of the camera obscura, and can be as well produced with a "pinhole" camera as with a lens, hence the result from the hole in the roof. A similar effect may be observed if a sheet of paper be held a few feet away on the dark side of a door which is opposite the window of a room, a picture of the window, and the scene outside if the light is good, appearing inverted on the paper. There are only two objections to the use of such apparatus in a ship's engine room; one is that the engineer is unaccustomed to observing the effect upon the ship of the speed he is getting out of his engines, and the other is that he has enough to do in regulating his engines to give the speed desired by the pilot without also having to gage and decide upon the necessary speed. Also such a camera could hardly be arranged to look forward and aft simultaneously without complicated piping, with a mirror at each bend to avoid the ship's gear, and we should say it would not be desirable to remove the navigating responsibility from the bridge to the engine room. In the case of the submarine it is different; the navigator cannot be above deck when submerged, so uses the periscope, but he is still responsible for gaging the desired speed and instructing the engineer.—ED.]

The Current Supplement.

The current SUPPLEMENT, No. 1765, opens with an elaborately illustrated and exhaustive article on the recent Paris aeronautic exhibition. Mr. F. W. Harbord's article on iron and steel and their relation to other industries, is concluded. An extract is published of an interesting report on the advantages of treating the water in swimming baths with electrolytic fluid. The mechanicians and especially the watchmakers of three or four centuries ago invented many ingenious mechanisms which have been forgotten. Some of these are described in the current SUPPLEMENT. The dome just erected over the four great arches of the Cathedral of St. John the Divine is an engineering feat of note, and is described and illustrated.