Correspondence.

Another Letter on Repairing Broken Shafts.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the article in the SCIENTIFIC AMERICAN of March 23 entitled "A Quick Method of Repairing Broken Shafts," the writer would suggest that a tapered stud be used instead of a straight one. This would give more nearly the full strength of the shaft, and would make a joint such as is used on drilling tools for oil wells. These joints are known to be very strong, and to stand hard usage. If then after this joint is tightly made up, holes are drilled around it, and steel pins driven in, keying it together, it is doubtful if it would ever show weakness. Although the writer has never had experience in work of this kind, he offers this suggestion for what it may be worth. A. B. CARLL.

Boothwyn, Pa.

A Curious Accidental Welding of Steel Shafting.

To the Editor of the SCIENTIFIC AMERICAN:

A very curious accident occurred recently in a large cotton mill near Moscow. From a steam engine of nearly 1,500 horse-power, 350 horse-power is transmitted by ropes to one of the stories of the mill. The driven shaft makes 320 revolutions per minute.

The main shafting in the rope drive is arranged according to the accompanying sketch, the power from the flywheel being transmitted by ten ropes to the rope pulley on the first shaft, then by a pair of bevel wheels to the second shaft, and then by a Wüllfel's friction clutch to the third shaft, and from the rope pulley on this shaft to the rope pulley on the line shaft in the mill.

By some mistake of the fitter, the second shaft was put too close to the third shaft, so that it touched the latter, and all the pressure from the bevel wheel was transmitted directly to the end of the third shaft.

One Saturday morning the first bearing on the third shaft, *a*, became warm. The engineer, wishing to cool it, loosened the clutch and thus stopped the third shaft. Thus all the pressure from the rotating second shaft became applied to the end of the third shaft. Both shafts have the same diameter, 170 millimeters (6¾ inches).

As the pressure from the bevel wheel on the shaft was considerable, and the shaft was making 320 revolutions, in a few moments the touching ends of the two shafts between the two halves of the clutch were heated, not only to a red heat, but to the welding point as well, so that the liquid iron spurted to the walls. The engineer became very much frightened and signaled to stop the engine, and thus both shafts became completely welded together.

After the shafts were cooled, the engine was started again, but both shafts revolved together, notwithstanding that the friction clutch was open. The bearings did not become heated, thanks to the fact that both shafts were welded in exact alignment, so the mill was run till night, and all the usual machinery working from this shaft and taking 350 horse-power.

Next Sunday the shafts were lifted by their free ends, together with the bevel wheel, the clutch and the pulley, and though they weighed some tons, the welded joint did not separate. So it was decided to leave them in the welded state till the new shafting is ready.

Since that time, for more than a month, the shaft has been working satisfactorily with opened clutch, transmitting all the power without difficulty.

P. N. BOCKAROFF, M.E.

Mockba, Russia.

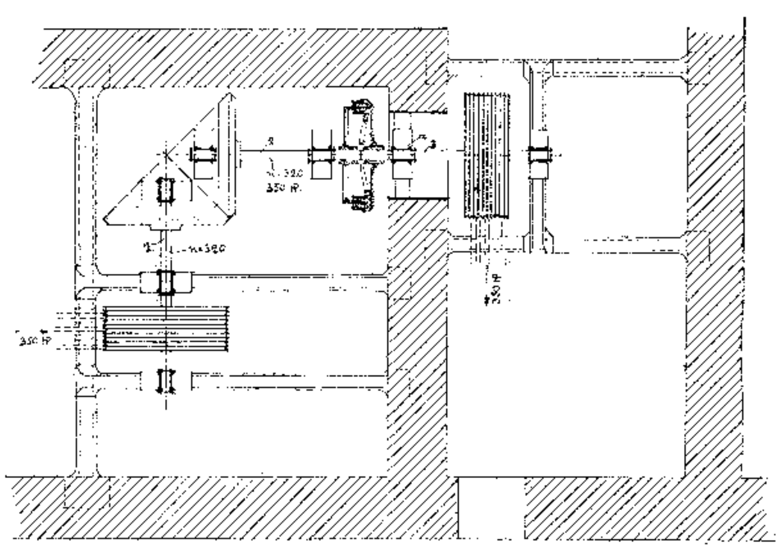
The Salvage of Ships.

To the Editor of the SCIENTIFIC AMERICAN:

It may be considered presumptuous in a layman to make suggestions in the matter of naval construction, but I cannot recall that I have seen any such method described in any scientific or other publication as the one I am submitting in this communication. The branch of construction to which I propose to refer does not cover either the actual designing, model, or machinery of ships, but relates solely to the salvage of the vessel in the case of accident by collision or running aground. In modern construction, I understand that ships are built with numerous watertight compartments, any two of which may be filled without resulting in serious danger to the vessel. This system is certainly a good one, and has been proved so in many instances, while in others it has not had the effect of saving the vessel from total loss. The scheme of construction I would advocate is merely an extension or improvement on the present system, and I claim would have the effect of saving many vessels that, under existing circumstances, would be totally lost.

As a solution, to some extent, of the problem of rendering vessels safe from damage or total loss through collision or grounding, I would suggest, in the first place, that the main deck or first deck above the load waterline of every passenger steamship, battleship, and cruiser should be built airtight and of sufficient strength to sustain a pressure of air below that deck that would keep the vessel afloat, even if the bottom were perforated alongside the keel in every compartment. That would mean, of course, that the deck would have to be so built that every opening could be hermetically sealed, so to speak, and in the shortest possible time. Each compartment should be separate and independent of the other. Each of the compartments should have an airlock, on the same principle as those used in the construction of the North and East River tunnels in New York city. A gang of locomotive air-brake pumps should be installed above the safety deck, operated by gasoline motors, so that they would be wholly independent of the ship's power—of sufficient capacity to fill any one or all the compartments with air within a short space of time. By these means, easy and safe access could be obtained to any compartment, and repairs made to the damaged part of the vessel. Further, each one of the compartments should be supplied with an electric light system and a telephone system, controlled and operated from a central point. A vessel equipped in this manner would be practically unsinkable, unless broken in two or the plates strained in every part of the ship so that the air pressure could not be maintained; and even in the former case, if each half of the vessel had its full complement of air pumps and other appliances, the two halves could be kept afloat independently, but, of course, the propelling power would be available only in one portion. The additional expense entailed by this mode of construction would be comparatively small.

Take the case of the Allan steamship "Bavarian," recently floated in the St. Lawrence River by means of pneumatic pressure. The cost of the vessel was over $1,000,000. She was sold by the underwriters, I understand, for about $30,000. That amount, I estimate, would fully cover the cost of installing the appliances I have suggested herein; but assuming it would be $100,000, it would be well worth expending to insure the safety of a vessel of that class. No vessel, large or small, that traverses the ocean is immune from danger by striking derelicts, icebergs, collision with other vessels, or running aground in foggy weather or in heavy snowstorms, when lights are obscured and the reckoning cannot be ascertained, in approaching a dangerous coast.



A CURIOUS ACCIDENTAL WELDING OF STEEL SHAFTING.

Provision should also be made for the installation of check valves, relief valves, and air gages both inside and outside of each compartment, in order that persons working under air pressure could regulate the supply of air as circumstances might require.

It would appear to me that sliding doors should be used, instead of swinging doors, in all partitions below the airtight deck, and that these doors should be kept closed except when not actually in use, and that horizontal sliding doors should be used to close apertures or hatches in the safety deck. A system of indicators might be installed in the central telephone and electric light switchboard room which would show, at all times, the position of the vertical and horizontal doors in each compartment; that is, whether they are open or closed.

I have not gone into any calculations with regard to the air pressure that would require to be developed, but I would estimate, roughly, that it would be very much below thirty pounds to the square inch.

I venture to prophesy that not one vessel in a hundred equipped in this way would become a total loss in case of accident, without taking into consideration what is of greater importance, the saving of human life. J. E. W. CURRIER.

Ottawa, Canada.

The Orbit of the Sun and the Solar System.

To the Editor of the SCIENTIFIC AMERICAN:

In the issue of your valued periodical for April 20, 1907, a letter from a correspondent is printed under the title "The Orbit of the Sun and the Solar System." It would seem to be well to examine the statements of this letter, to see what basis there may be for them in the work of astronomers. The larger portion is a quotation from an article "in a local publication." Of course, there is no objection to "newspaper science" when it is true.

The writer quoted is certain that we are traveling toward the star Arcturus, and with a speed of about 5,000,000 miles a year. He states that we shall be near enough to that giant star to experience its awful heat in about 25,000 years, and in about 75,000 years more we shall be near Polaris, at the other end of the solar orbit, where are "thrilling regions of thick-ribbed ice." These transitions are to be repeated, we presume, forever. This is all interesting, if true, but the most careful researches of astronomers do not give one scintilla of evidence in its favor.

Now, as to the speed of the sun in its path, astronomers are agreed that this is about 12 miles a second. At this velocity, which is a slow one as velocities go in the heavens, we go 1,036,800 miles a day, as any one can determine by multiplication, instead of 5,000,000 miles a year, as the writer states, and nearly 400,000,000 miles a year. Yet the stars are so remote that the sun will require 68,000 years to cross the space separating it from the nearest star at this enormous rate of motion. Again, astronomers are agreed that the sun is moving toward Vega, and not Arcturus, and that it will require the sun 558,000 years to pass by Vega. But we shall never pass by Vega, although we are moving toward it, nor would we pass Arcturus, if we were at present moving toward that star, since these stars are themselves moving, and will not be where they are now when the sun gets where they are now. They will be far away from the places they now occupy. Let us see how long it would require the sun to travel to the place where Arcturus now is. The parallax accepted for that star gives its distance such that light requires 160 years to come to us from him, and that we should go to him will require nearly 2,500,000 years at the rate of 12 miles a second. In the light of such figures a period of 75,000 years becomes a mere point of time, a watch in the night.

The determination of the point in the sky toward which the sun is moving is a matter of much interest to astronomers, but it is one on which no more than a beginning of investigation has been made. Herschel, more than a hundred years ago, studied the proper motion of the stars, and located this point in the constellation Hercules. Many others of the highest repute, including Struve and our own Newcomb, have followed Herschel, and have reached a slightly different result, although they do not remove the point very far from Hercules. It is now located near Vega in the constellation Lyra, or by Campbell at a spot 10 deg. south of this star. The opposite point is near Sirius, and not near Polaris. Any one who is interested in this investigation will find a statement upon it given in Moulton's "Astronomy," the latest and best textbook for students beginning the subject. WILLIAM C. PECKHAM.

Adelphi College, Brooklyn.

The Current Supplement.

The exhaustive paper by Prof. Alexander Graham Bell on "Aerial Locomotion," which has been running in the SCIENTIFIC AMERICAN SUPPLEMENT, is concluded in the current issue, No. 1640. In this installment Prof. Bell compares Hargrave box kites with tetrahedral kites. Mr. S. E. Worrell writes on "Recent Improvements in Machinery for Drying Different Products." An abstract is published of the paper read before the Royal Institution by Prof. H. A. Miers on the "Birth and Affinities of Crystals." "Artificial Fertilizers: Their Nature and Function," is the title of a splendid discussion of an ever-timely subject by A. D. Hall, director of the famous Rothamsted experimental station. Dr. George A. Soper writes on "The Sanitary Engineering Problems of Water Supply and Sewage Disposal in New York city." Since the invention of wireless telegraphy many attempts have been made to transmit to a distance mechanical effects, as well as telegraphic messages, without the use of conducting wires, and thus to operate mechanical devices wherever situated. Dr. Alfred Gradenwitz gives a review of various systems which have been proposed to accomplish this end. "Artificial Fireproof Stone" is the title of an article giving much practical information. Victor Quittner discusses modern methods of photometry. In 1879 Prof. George H. Darwin propounded the view that the moon formerly formed a part of the earth. Accepting this theory, Prof. William H. Pickering has sought to ascertain the place of origin of the moon on the earth.