The Volga River.

The number of vessels on the Volga is only a little less than 20,000. The chief products sent up the Volga are oil from Caspian Sea, fish from Astrakhan, salt from Tsaritsin, wheat, tallow, and hides from Samara and Saratov. The cargo of vessels that reach Nijni-Novgorod is estimated at 5,000,000 tons. From this point begins the distribution of these products in the middle Russia; 1,500,000 tons reach Ribinsk, and proceed to St. Petersburg by canal systems.

Down the Volga the cargo consists of 1,000,000 tons of miscellaneous goods and an unestimated amount of timber.

The Volga River is the largest in Europe. The thankful Russian people call it the Mother Volga. The Volga begins in a marshy locality, about 150 miles N. W. of Moscow, in the Tver Government as a small stream a few feet wide, which continually grows, receiving on both sides streams and rivers, some of which, like the Oka and the Kama, rank among the largest rivers of Europe.

The length of the Volga is about 2,500 miles, its width at the middle part about 1, and in lower part about 2½ miles. It enters the Caspian Sea; by means of three canal systems it is connected with Neva, St. Petersburg, and the Baltic Sea; by another canal system it is connected with North-Dvina, Archangel, and the White Sea, and now it is proposed to connect it with the Don River at Tsaritsin, and therefore with the Black Sea.

This immense water route, however, is not without defects. Every year it becomes shallower and shallower. Below Nijni-Novgorod the Volga is navigable for the large vessels, but above that place it is accessible only for smaller vessels, and during the dry summer of 1883 it was not navigable at all between Tver and Ribinsk. In May, when navigation begins, the Volga presents a magnificent sight, swelling at some places to 20 miles in width, but the water falls rapidly, and in the middle of June shallows or sand banks are formed which obstruct navigation. If a scow runs on such a bank, its cargo must be carried over with great expense. At the sand banks near the mouth of the Kama River, this overloading amounts to 500 to 1,500 tons every summer, and there is about a score more of such banks between that place and Ribinsk. Improvements obtained by the grated dams of Engineer Jankowsky and by dredging these banks are very inconsiderable, and it appears that the only radical measure is in enforcing the law which prohibits the wholesale destruction of forests.

Another great defect is the total absence of artificially improved harbors. Very often vessels caught by an early ice in October, and compelled to seek safety in the natural harbors, are moored to the ice through the winter, and in most instances are destroyed in the spring when the ice begins to move.

Above Ribinsk the Volga is not navigable at all, and vessels proceed further north by canal systems, of which the Marunskaia system admits vessels of larger size, and carries two-thirds of whole canal traffic. This system is a part of the great water route, and to give an idea of the system itself and the difficulties which await the vessels there, we tabulate below the different parts of which the Marunskaia system is composed:

a. 222 miles of open canals, on which scows towed by horses make about 20 miles per day at the cost of 24 cents per mile.

b. 170 miles down the rivers Sweer and Neva, on which scows make 33 miles per day, at the cost of 48 cents per mile.

c. 47 miles of canals with locks, the scows being towed by man-power at the rate of five miles per day and $1.20 per mile.

d. 249 miles up the river Sheksna, by horse and steam power, at the rate of 26½ miles per day and 90 cents per mile.

e. And finally, 14½ miles of rapids on the river Sheksna, taking at least seven days and costing $14 per mile.

The slowness of navigation is due in great part to obstructions and stoppages arising from the limited capacity of the system. Plans are under consideration now for a series of improvements to increase the capacity.

But in spite of all the difficulties, the navigation on the Volga grows every year, together with growth of commerce and production of that region. The latest and most powerful impulse in this growth has been given by the rapidly developing production of the Baku oil-region, which furnishes not only the cargo, but also cheap and excellent fuel for the Volga steamers.

REDUCED postage and other causes have increased the correspondence of the world. Less than fifty years ago the average of letters received by each person per annum was only 3 in the United Kingdom, and it is now 37 letters and 4 postal cards. The latest reliable ascertained comparison (for 1882, when the average was 35 in Great Britain) gives the average per head in the United States at 21; Germany, 17; France, 16; Italy, 7; and Spain, 5.

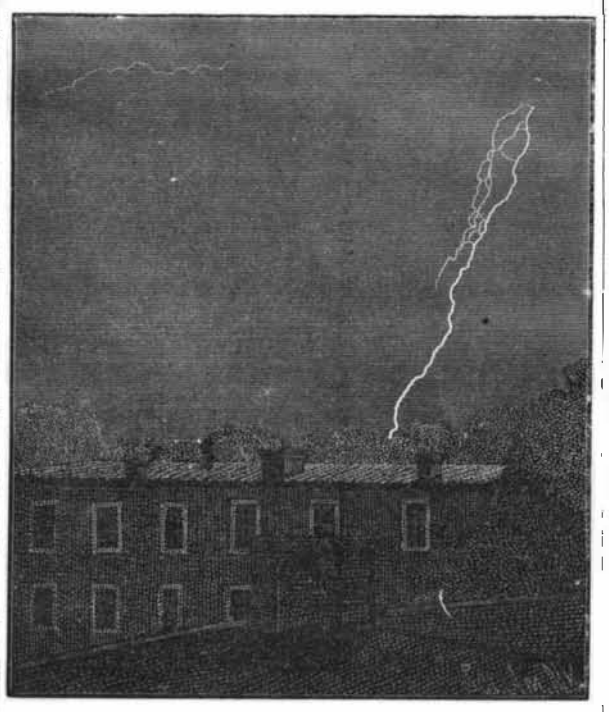
Correspondence.

LIGHTNING PHOTOGRAPHY.

To the Editor of the Scientific American:

I inclose a photograph of a streak of real "Jersey lightning," which I was fortunate to secure at 10:30 P.M., on Saturday, Aug. 1 last, after a great many "exposures."

The writer was led to try the experiment of photographing lightning, on account of a theory which he held, that lightning traveled in a wavy line, and not in a zigzag path, as drawn and painted by almost all our artists and painters. The result of these experiments would tend to show that the above theory was correct,



although the streak in this case certainly looked to the eye as if it was a thick zigzag streak tearing its way through the sky; but I think this zigzag effect was produced by the small streaks which branch out all the way down the main stem.

Additional interest is given to the photograph on account of a horizontal streak which occurred at the same time, which is shown, very faintly, near the top of the photograph.

W. N. JENNINGS, Photographer.

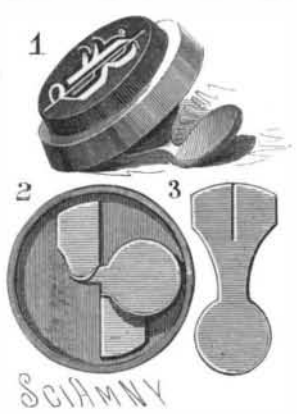
Philadelphia, August 10, 1885.

Torpedo Boats at Sea.

The records of the English torpedo boats at the recent function in Bantry is thus summarized by a London service journal: "The eight torpedo boats attached to the Hecla were terribly detached on the passage home. Only one remained near the parent ship, one made for Appledore, and has been sent for by the Seahorse, five put into Dartmouth, and one remained by the squadron. The misery suffered by the crews of these boats in a sea-way is great indeed, sleep being almost if not quite impossible; and we look forward with interest to the report upon the fitness of these little vessels for the work upon which they have been employed. Machinery repairs have been frequent, the strain upon the engines being very great, and no fewer than eight first-class and six second-class boats have been considerably damaged by their short cruise.

IMPROVED BUTTON OR STUD.

This button or stud has a twisted shank with attached plate, whereby the plate or bottom may be easily inserted into a button hole in a garment, and the button shank and plate together may be formed of a single piece of sheet metal bent into form, to be soldered or otherwise secured to the bottom of the button proper. Fig. 2 shows a bottom view of the button, and Fig. 3 the blank for forming the shank and plate in one piece. This invention has been patented by Messrs. Read Benedict and Harry M. Scott, who should be addressed for further particulars at No. 171 Broadway, New York city.



The Bryant Egg Beater.

Referring to the Bryant egg beater, engraving of which we published in SCIENTIFIC AMERICAN of August 22, we are requested to say that Messrs. Paine, Diehl & Co., 12 Bank Street, Philadelphia, Pa., are the manufacturers.

Flies and Their Relation to Disease.

It is a common belief that the absence of flies for a season is a percursor of an epidemic, and flies being this year less numerous than some other seasons, some of our contemporaries have reasoned that the cholera or some other dreadful epidemic is to inflict our land, or as one of contemporaries puts it, "without more flies, everybody is going to be sick, and a great many people are going to die." The process of reasoning on this subject is about as follows, given by a writer more rational than superstitious, which we find in the Midland *Industrial Gazette*: "The absence of flies does not exactly presage an epidemic—that is, the flies are not killed by the poison in the air, as many superstitious persons who have noticed the coincidence between disease and a small fly crop believe—but their absence is in itself a cause of sickness and epidemics. The scarcity of flies this year is attributed to the somewhat phenomenal weather prevailing in the North this spring. In February there was a remarkably warm spell, a mild temperature that hatched out most of the pupæ, and brought many of the little flies prematurely into the world. This was followed by a period of long continued and severe cold in March, which killed these young flies before they could get in their work upon the bald and sleepy. Hence a short fly crop. And now as to its relation with disease: The fly is a vulture, a buzzard on a small scale. It is the most important, because the most numerous, destroyer of pest-breeding material. It gets in on foul and decaying matter that can be reached by no other insect or animal, and it destroys it. The quantity of this pestilential matter thus removed cannot be estimated, because the fly is always getting away with it in summer, while in winter the cold prevents its evil influences being felt. When, therefore, there are too few flies to thoroughly consume all the forms of the dead and decaying substance that fills the earth, the surplus pollutes the air, the soil, and water, and creates and propagates disease. It is suggested, therefore, to New York, that, in view of its fly famine, that city stands in imminent dread of an invasion by that great enemy, the cholera, and the citizens are warned to be more than usually careful, and to supply the lack of fly by exercising extraordinary care in the removal of everything calculated to beget or nourish a pestilence."

In contradistinction to the above, Doctor Grassi, in an article in the *British Medical Journal* in 1883, on danger from flies, claimed to have made an important and by no means pleasant discovery in regard to flies. It was always recognized, said the learned Doctor, that these insects might carry the germs of infection on their wings or feet, but it was not known that they are capable of taking in at the mouth such objects as the ova of various worms, and of discharging them again unchanged in their fæces. This point has now been established, and several striking experiments illustrate it. Dr. Grassi exposed in his laboratory a plate containing a great number of the eggs of a human parasite, the *Tricocephalus dispar*. Some sheets of white paper were placed in the kitchen, which stands about ten meters from the laboratory. After some hours, the usual little spots produced by the fæces of flies were found on the paper. These spots, when examined by the microscope, were found to contain some of the eggs of the tricocephalus. Some of the flies themselves were then caught, and their intestines presented large numbers of the ova. Similar experiments with the ova of the *Oxyuris vermicularis* and of the *Tænia solium* afforded corresponding results. Shortly after the flies had some mouldy cream, the *Oidium lactis* was found in their fæces. Dr. Grassi mentions an innocuous and yet conclusive experiment that every one can try. Sprinkle a little lycopodium on sweetened water, and afterward examine the fæces and intestines of the flies; numerous spores will be found. As flies are by no means particular in choosing either a place to feed or a place to defecate, often selecting meat or food for the purpose, a somewhat alarming vision of possible consequences is raised.

Purify the School Buildings.

The *Sanitary News* urges the sanitary examination of school buildings during vacation. To give force to its own opinion, it quotes the words of Mr. William Paul Gerhard, an eminent sanitary engineer. In a recent article on school and college sanitation, he says: "The annual vacation term would seem to be a particularly fit time to undertake a sanitary inspection of the school buildings, of their interior construction, sanitary arrangements, and of their immediate surroundings." He calls attention to the absolute necessity of such a periodical inspection, by qualified persons, and the correction of such structural and sanitary defects as may be discovered. While the water supply, drainage, and ventilation should be examined into, it is necessary to demonstrate the entire absence of dampness, and to examine the methods of lighting the class rooms, of heating the building, the means of egress in case of fire, the arrangement of seats and desks, and finally into the plumbing appliances.