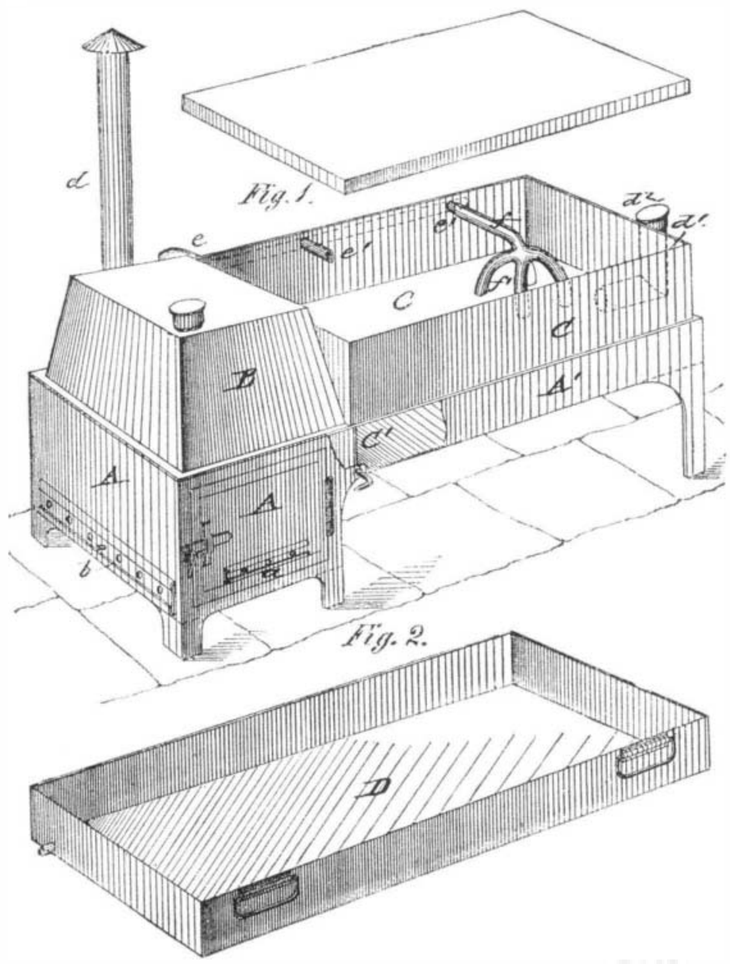
A NEW FOOD STEAMER.

Mr. Thomas B. H. Andrews, of Mansfield, Ohio, has patented through the Scientific American Patent Agency, November 28, 1876, an improved apparatus for-steaming food of all kinds, boiling sugar, canning fruit, and for other purposes, which we illustrate herewith.

A represents the furnace, and B the steam chest, which is placed upon the same, and supplied with water for generating steam from a reservoir. The food-steaming box, C, is supported on an extension chamber, A', of the furnace. which may be made in one piece therewith, of cast or sheet iron, and separated therefrom by a hinged damper, C', so that the gases of combustion may be drawn through the same, or not. The furnace has two additional dampers—namely, a front damper, *a*, and a side damper, *b*—the hinged damper, C', and side damper, *b*, being closed when the apparatus is used, as shown in Fig. 1, for the purpose of steaming food. The smoke, etc., is then drawn through a pipe, *d*, at the rear of the furnace, and transferred to a short elbow, d^1, commonly closed by a gap, d^2. When the apparatus is used for boiling sugar or other purposes, the hinged damper is opened to draw the fire through the entire extension chamber for the heating of the evaporating pan, D, placed on the furnace.

The steam chest, B, is connected by a steam pipe, *e*, and branch pipes, *e'*, with the food box, detachable pipes, *f*, with branching arms, *f'*, that open near the bottom of the food box, being applied to the branch pipes, *e'*. The steam issues near the bottom of the food box, and is thereby distributed throughout the food, a cover being placed on the same to retain the heat. The food is thereby steamed in a quick and effective manner, while, by taking off the steam chest and food box, the furnace may be employed for other purposes.



ANDREWS' APPARATUS FOR STEAMING FOOD

NATURAL HYGROSCOPES.

A very simple and quite accurate little apparatus, for determining the degree of dampness in air or any other medium, may be made from the screw-shaped appendage of the seed of the *pelargonium*. To the species and varieties of this botanical genus the name geranium is popularly given though the pelargonium differs from the true geranium in several characteristics, the most obvious of which are the half shrubby character of the stems and the somewhat irregular flowers. The mode of constructing the hygroscope is shown in Fig. 1. E is the support of the pelargonium spiral, F, inserted in a block of wood. G S is a light wooden needle or piece of straw fixed by collodion to the spiral extremity. The end, S, turns over a dial, C D, divided as shown. On this circle, zero corresponds to the greatest humidity, and 100° to the greatest dryness. Between these extremes are traced five spiral turns, as the helix does not usually unwind on itself more than four times. Each turn marked is considered as beginning on the diameter, 0 to 100. Thus, for example, if the helix makes two twists and a half, the indicated degree is read on the

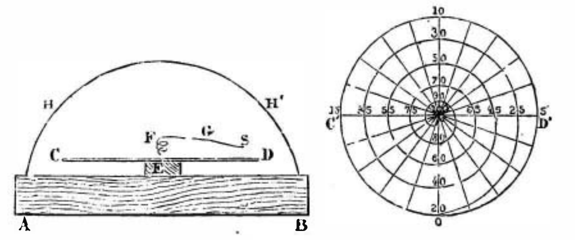


Fig. 1.

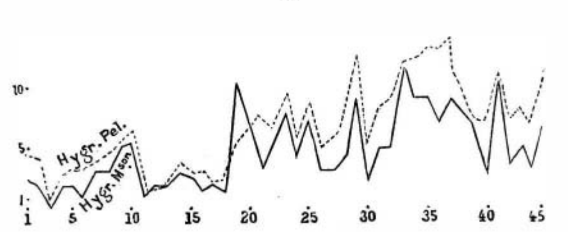


Fig. 2.

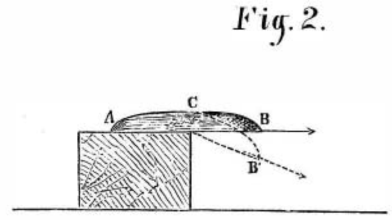


Fig. 3.

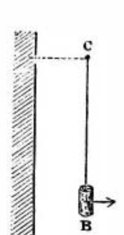


Fig. 4.

third turn of the spiral marked on the dial where the needle points to 50°. As the helix is quite fragile, a few copper wires may be arched over it, as at H H', to protect it from chance injury. Fig. 2 shows the indications of the pelargonium hygroscope, as compared with a Mason hygrometer of fine construction. The accordance of the indications in it is quite remarkable.

There are two other hygroscopes noted by *La Nature*, which are even more simple than the foregoing. The first, Fig. 3, is a cork, B, in which a needle is inserted as a pointer, suspended from a nail by a catgut cord. The catgut cord contains more or less twist in proportion to the quantity of moisture in the air. The needle, therefore, as the cord turns, swings in one or the other direction; and by a little experimenting, a dial can easily be made from which its indications may be interpreted. The simplest hygroscope of all is a ginger snap or spice cake, placed on a ledge, as shown in Fig. 4. This kind of cake is very sensitive to variations of humidity in the air; and when dampness is present, it bends, as indicated by the dotted lines, from C B to C B'. During dry weather, it returns to its horizontal position. A straw may be fastened to it as an index, and a dial, as above noted. be constructed by experiment.

NEW YORK ACADEMY OF SCIENCES.

The regular monthly meeting of the chemical section was held at the Mott Memorial rooms, Monday evening, January 15, 1877. Professor J. S. Newberry, President, in the chair. Notwithstanding the inclemency of the weather, the attendance was unusually large. Mr. Geo. F. Kurz exhibited

A NEW MINERAL

from Mexico, which contained sulphur, selenium, mercury, zinc, cadmium, and iron, in fact a sort of cinnabar, remarkable for the large percentage of selenium, about 1·8 per cent. It has been named *guadalcazarsite*, from the locality where it was found. It is said to be sufficiently abundant there to be employed as an ore of mercury, thus furnishing a means of developing the silver deposits. Mr. Kurz also exhibited a specimen of jeffersonite. The first paper of the evening was by Dr. Peter T. Austin, on the

CONSTITUTION OF THE ADDITION COMPOUNDS OF PICRIC ACID WITH HYDROCARBONS.

The author first called attention to the fact that picric acid combines directly with hydrocarbons, like benzol, and that this property is often taken advantage of in preparing perfectly pure hydrocarbons, as some of these picric acid compounds are very finely crystallized, and may therefore be readily purified. Dr. Austin objected to the use of the term physical compounds as applied to these substances, claiming that there is but one class of compounds—namely, molecular compounds. After illustrating, by means of graphic symbols, the probable constitution of these molecules, and offering some facts in substantiation of his theory, he closed by stating that certain substances, like paradinitro-benzol, are more easily prepared from these picric acid compounds than from any other source.

LABORATORY NOTES FROM THE UNIVERSITY OF CINCINNATI,

was the title of a paper by Professor F. W. Clarke, read by the chairman of the section, Professor Leeds. In the analysis of certain minerals, where it is customary to fuse them with bisulphate and fluoride of sodium, Professor Clarke finds that chloride of sodium may be substituted for the more expensive fluoride with but slight inconvenience. The mixture employed by him contains 3 parts chloride of sodium and 12 parts bisulphate of sodium to 1 part of the mineral. He recommends it particularly for refractory iron ores and for chromite.

Professor Clarke has succeded in preparing a fluoride of nickel containing three molecules of water, $Ni\ F_2,\ 3\ H_2\ O$. It has a specific gravity of 2·15 at 19°, and retains the water at 130°. He also prepared a fluoride of zinc with four molecules of water. He was unsuccessful in making the fluorides of gold and of platinum.

Professor Clarke is perseveringly at work on the subject of molecular volumes. (See SCIENTIFIC AMERICAN, June 3, 1876.) He gave a list of 17 haloid salts, with their actual densities (determined by experiment), their molecular volumes, and the theoretical density calculated from their molecular volumes, which agreed in a remarkable manner. In all these cases, the volume was 5·5, 11, 16·5 or 22, all multiples of 5·5 the volume of hydrogen.

NEW METHOD OF DETERMINING FERROUS OXIDE IN SILICATES,

was the subject of a brief paper by Professor A. R. Leeds. It consists in the method of preparing and using hydrofluoric acid. The ore is pulverized and placed in a platinum dish which is supported on a platinum triangle within a platinum retort or still. The still is charged with fluorspar and sulphuric acid, and filled with dry carbonic acid. On heating the retort, dry hydrofluoric acid gas is evolved, which dissolves the ore and removes all the silicon. The carbonic acid is again passed through the retort until cold, when the ore may be removed, dissolved, and titered with permanganate of potassium. This furnishes the best means of determining the amount of protoxide of iron in an ore or mineral. The objection to the use of the liquid acid imported in gutta percha bottles is that it is not strong enough, and contains enough organic matter to render it totally unfit for use in determining protoxide in the presence of the peroxide of iron. Photographs of the apparatus employed were exhibited. It is to be hoped that some less expensive apparatus may be devised for this process, when it will, no doubt, meet with popular favor.

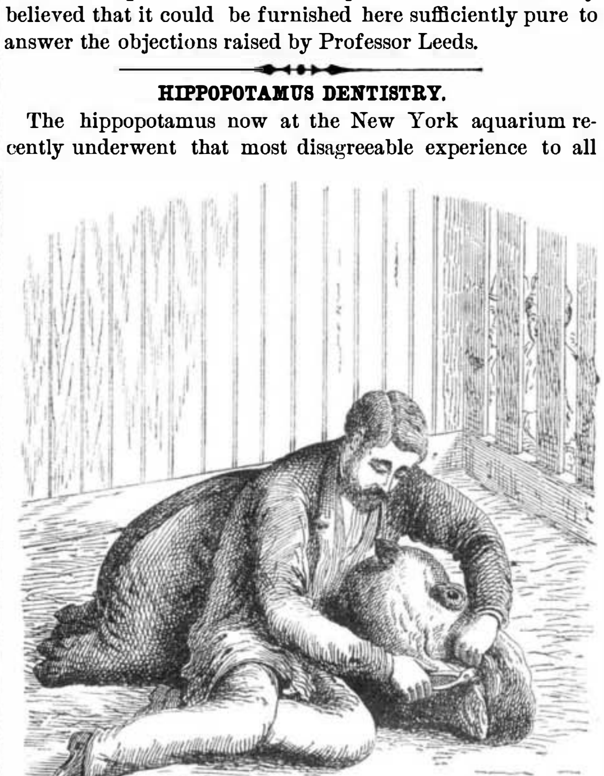
At the conclusion of Professor Leeds' paper, Professor Charles Seeley made some interesting remarks on

HYDROFLUORIC ACID.

This acid is now very largely employed in this city in making the ornamental glass signs, usually supposed to be made by the sand blast. This involves its preparation on a large scale, as some establishments consume 100 lbs. per month. Iron retorts are employed, and are found to be better than lead, and last much longer than the leaden pipes which are attached to the retorts for condensing the acid. In regard to the physiological effects of the acid, Professor Seeley thinks the text books exaggerate its dangers. On dipping the hand into hydrofluoric acid, no immediate effect is produced; but if not washed off at once, in the course of half an hour the fingers begin to ache worse than the teeth with toothache; they swell up, and in a day or two the true skin begins to separate and crack open. These sores do not heal for two or three weeks. If, however, the hand is washed immediately in water or dilute alkali, no more inconvenience is suffered than from sulphuric acid. Lead bottles are used to transport it; and although gutta percha will last three times as long, its cost is much greater in proportion. Hydrofluoric acid can be made very cheaply, and sells in quantities at 18 cents per lb. Professor Seeley believed that it could be furnished here sufficiently pure to answer the objections raised by Professor Leeds.

HIPPOPOTAMUS DENTISTRY.

The hippopotamus now at the New York aquarium recently underwent that most disagreeable experience to all



juveniles, the extraction of a tooth. "Baby," as the unwieldy young female is named, is now some twenty months old; and her second set of teeth or tusks are pushing out the rootless milk teeth. This is attended with considerable suffering, and the animal has been very uneasy, constantly rubbing her snout along the floor or against the bars of the cage, and instinctively endeavoring in many ways to rid herself of the pain.

To remove a tusk from a grown hippopotamus would be rather a difficult and possibly a perilous proceeding; but Baby, who is but little larger than a good sized hog, is very gentle, and, when it was decided to resort to the forceps, she submitted to being rolled over on her side and only kicked and grunted moderately when, after two or three attempts, a strong pull and a stout twist wrenched forth the offending tusk. Dr. Kohn, the keeper of the hippopotamus, performed the operation, the main object of which was not only to relieve the animal, but also to prevent her swallowing the tooth. It is a curious fact that brutes in a wild state almost always swallow their milk teeth; and it frequently happens that they thus commit involuntary suicide. In members of the cat tribe, the teeth are quite large and sharp when they are shed, and it may easily be imagined that the keen points may produce serious wounds in the internal organs. This is a cause of mortality which we have not seen considered in natural histories, and which might exercise a potent effect in reducing the number of wild animals.

Dr. Kohn calls our attention to a curious phenomenon in relation to the hippopotamus, regarding which naturalists are not wholly in accord. It is known that, after the animal has remained out of water for a brief period, a handkerchief passed over the skin becomes colored with a reddish liquid. This is commonly believed to be an oily secretion, something analogous in quality to the oleaginous material which occurs in feathers of aquatic birds. If, however, the period of the animal's absence from water be extended, the skin becomes mottled with spots which, on close examination, prove to be true scabs. Microscopic examination of these, as well as of the red liquid, Dr. Kohn informs us, distinctly shows the presence of blood globules, similar in all respects to those found in the blood of the hippopotamus; so that it is hardly possible to conclude otherwise than that the animal actually undergoes a sweat of blood. The pores of the skin are unusually large and widely spaced apart; and at the orifice of each, a scab is formed.

Communications.

The First Steamboat on the Mississippi.

To the Editor of the Scientific American :

In the communication under the above heading, published in your issue of January 3, F. L. I. says that the *Navigator*, published in 1814, contains no information except that relating to the Orleans. Having been upon the river in 1831, I have preserved documents and papers relating to the history of steamboating in the West, in which I find the following facts: All statements in regard to the Orleans agree with those given by your correspondent, except the tonnage. The boats were, in custom house measurement: 1. Orleans, of Pittsburgh, 200 tons, in the year 1811; 2. Comet, of Pittsburgh, 25 tons, 1813: 3. Vesuvius, of Pittsburgh, 90 tons, 1814; 4. Enterprise, of Brownsville, 75 tons, 1814; 5. Ætna, of Pittsburgh, 361 tons, 1814; 6. Despatch, of Brownsville, 75 tons, 1816; 7. Buffalo, of Pittsburgh, 250 tons, 1816; 8. James Monroe, of Pittsburgh, 156 tons, 1816; 9. Washington, of Wheeling, Va., 212 tons, 1816. Of the above I propose at this time to give the history of two only, and this because they were both commended by Henry M. Shreeve, to whom undoubtedly the honor belongs of having successfully established steam navigation on the Mississippi. The Enterprise, 75 tons, was built at Brownsville, Pa., on the Monongahela, by Daniel French under his patent, and was owned by a company at that place. She made two voyages to Louisville in the summer of 1814, under the command of Captain I. Gregg. On December 1, she took on board a cargo of ordnance stores at Pittsburgh, and sailed for New Orleans, commanded by Captain Henry M. Shreeve, and arrived at New Orleans on the 14th of the same month. She was then dispatched up the river in search of two keel boats laden with small arms for General Jackson's army, which had been delayed on the way. She returned to New Orleans with the cargoes of the keel boats, after an absence of six days and a half, in which time she ran 624 miles. For some time after she was actively engaged in transporting troops. She made one voyage to the Gulf of Mexico, one to the rapids of Red River with troops, and nine trips to Natchez. She departed for Pittsburgh on May 6, 1816, and arrived at Louisville on the 30th, twenty-five days out, being the first steamboat that ever arrived at that port from New Orleans. The citizens of Louisville gave a public dinner to Captain Shreeve for having accomplished in 25 days that which, up to that time, had never been accomplished by the barges and keel boats in less than three months. The Enterprise proceeded to Pittsburgh. The command was then given to Captain D. Worley, who lost her in Rock Harbor, Shippingport, Ky. Captain Shreeve, on surrendering the command of the Enterprise, proceeded to fit out the Washington, of 212 tons, the hull of which was being built at Wheeling, Va., and the engines at Brownsville, Pa. Shreeve's experience on the Enterprise had suggested some radical changes, which he proceeded to make in the Washington. It had been the practice on the boats previously built to carry the boilers in the hold, in the after part of which the cabin for passengers was also located. They were removed and placed upon the main deck, and a hurricane deck built on them. He rejected the upright cylinders of Fulton and the vibrating cylinders of French's patent; and he placed the cylinders in the Washington in a horizontal position, and connected them to the water wheels with pitmans working on cranks at right angles. Fulton and French used single low pressure engines. Shreeve discarded these, and used high pressure. But his greatest improvements were the cam cut-off and the use of flue instead of cylinder boilers; and by using these, one half of the fuel was saved.

On September 24, 1816, the Washington passed Louisville on her first trip to New Orleans, and returned to Louisville in November. While in New Orleans, Captain Shreeve had an interview with Edward Livingston, who informed him that they (Fulton and Livingston) would commence suit against him for infringement on their patents. The severity of the winter compelled the Washington to remain at Louisville until March 12, 1817. On that day, she departed on her second trip to New Orleans, and performed this voyage by returning to the falls of the Ohio in forty-one days. The run from New Orleans to Louisville was made in twenty-four days.

It being now practically demonstrated that steamboats could ascend the river in one fourth less time than was required for barges and keel boats, the general public were satisfied that steam navigation was an established fact. At a public dinner given to Captain Shreeve, on the completion of this trip to Louisville, he predicted that the time would come when the trip from New Orleans to Louisville would be made in ten days. This statement was regarded in the same light that Stephenson's was when he predicted that locomotives would be run at 20 miles an hour. Both predictions were a long way within the facts. The trip from New Orleans to Louisville, that required twenty-five days to perform in 1817, was made by the A. L. Shotwell in 1853 in four days and ten hours.

All doubts in reference to steam navigation having been dispelled by Shreeve's success, shipyards were established, and the building of steamboats was actively commenced. Among those who were watching with intense interest the progress made by Shreeve was Edward Livingston. He claimed that, under patents owned by Fulton and Livingston, they held the exclusive right of steam navigation on all the rivers of the United States. Upon the arrival of the Washington in 1817 in New Orleans, Livingston commenced suit in the United States District Court. The Washington was seized by the marshal, and the case went to trial. Shreeve fought it out, and had the pleasure of hearing the claims of Fulton and Livingston declared to be unconstitutional; and the right of free navigation of the rivers of the United States by steam was secured to the people for ever.

Geneva, Ill. EDWARD H. BEEBE.

Railroad Bridges.

To the Editor of the Scientific American :

Have engineers considered the plan of two or four strong wire cables to be braced and drawn tight under every span of all high dangerous bridges? It is the last feather that breaks the camel's back; and it is just a little too great a load, coupled with the motion of the train, that breaks the bridge. A plan that would supply this additional strength would seem to be what is needed. Would not wire cables, which never break suddenly, and are not much affected by the frost, be just the thing? Has a wire suspension bridge of so short a span ever broken? This plan would combine the truss and the suspension. It would seem as if it would be cheap and effectual in preventing the many such disasters as the one on the Lake Shore road. Certainly, with such disasters, the science of bridge building cannot be complete. There is much yet to learn. Ought not the State Legislatures or Congress to take hold of the matter? The cost of this plan on all dangerous bridges, even on a long line of road, would not equal the loss by the recent calamity, to which should be added the more important saving of hundreds of lives, and the loss of reputation of the line. And if all of the bridges on any of the great through lines were known to the traveling public to be thus secured, would it not greatly increase the patronage of such line? A. WATSON.

Washington, D. C.

Boiler Explosions.

To the Editor of the Scientific American :

I consider the explanation of explosions in boilers in the communication of E. G. A., of Monticello, Pa., to be entirely wrong. For if the boiler was merely hot enough to convert the water into steam, there would be no danger of explosion; the sudden cooling of the iron, and consequent unequal contraction of its parts, would merely strain the boiler and cause it to leak. According to my experience, the boiler has to be hot enough to prevent evaporating, which generates a gas causing the boiler to rend; and to effect this does not require "a large amount of water to be introduced." Again, the very fact that employers repose confidence in their engineers is conclusive proof that they are worthy of that confidence. And when the employer has been besieged by pedlars of patent appliances of every description, until he is bored to death, he, in order to get rid of them, sends them to the engineer, who, as a general thing, has enough to attend to beside arguing the merits of whatever article the agent may have to sell. His answer is usually short and decisive.

Now, as to low water reporters or alarms, there are a number of points in regard to their working, which E. G. A. should remember. In localities where there is any amount of vegetable matter in the water, it causes a sediment to be precipitated in the boiler: this sediment, entering the water end of the reporter, becomes, from constant disuse and from the fact that there is very little circulation in the pipe, solidified. This prevents the water falling in the pipe, so as to allow the steam to enter and blow the whistle, which is done by the hot steam expanding a brass tube which acts upon a valve connected with the whistle.

There is a rule, adopted pretty generally by insurance companies, to the effect that they will not insure a building containing a steam boiler, unless the said boiler has a safety plug. This plug is hollow, the hole being larger upon the inside than upon the outside. The hole is filled with a patent composition composed of tin and lead, and it is all right, so long as it is covered with water; but as soon as the water level falls below the plug, the more intense heat of the steam and iron melts the composition and blows it out. I think all engineers who desire safety would prefer the plug to any low water reporter, as, in case of low water with a reporter, a single cup of cold water dashed upon the brass tube contracts it, and stops the whistle; while, with the plug, the steam has to be allowed to run down before a new one can be inserted. This causes delay and the unavoidable disgrace of the engineer in charge, if the circumstance be due to his carelessness. AN ENGINEER.

Cambridgeport, Mass.

[We shall be glad to hear from engineers in response to E. G. A.'s strictures; but we would caution our correspondents that vituperation is not argument, nor is it likely to assist our readers in appreciating the merits of either opposing views. For this reason, we omit publication of some replies already received.—EDS.]

Ideation in Utero.

To the Editor of the Scientific American:

Two objections, which seem to me quite serious, suggest themselves against the "Ideation in Utero" theory, which you quote from the English *Lancet*. These are:

1. If the unformed brain of the embryo is capable of receiving any impression, and retaining the same during the long period which must elapse before a child's brain can develop sufficiently to enable the child to express its idea in speech, why is not the more perfect brain of the child after birth impressed by external occurrences (especially if of a phenomenal nature) sufficiently to produce memories afterward of events happening during the first few months of existence? In other words, is it reasonable to assert that the embryonic brain is capable of receiving ideas of locality, etc., when we know that the brain of the very young infant is not? Certainly no living person can recall any experience of the first year of his babyhood.

2. But, it may be urged, this impression is due in some mysterious manner to the close linking of the embryo and the mother's body. The circulating blood, therefore, must be the medium, since the nervous connection in the umbilical cord is but slight. Why, then, did not one Siamese twin influence the ideas of the other, when between them there was both a blood and a nerve connection, far more highly organized than any connection between child and mother, and on the integrity of which the actual lives of the brothers depended? It is well known that the mental and intellectual existences of the pair were totally distinct. B.

The Recent Railway Accident.

To the Editor of the Scientific American:

The accident that recently occurred at Ashtabula, Ohio, whereby about 100 persons lost their lives, of course brings forth many theories as to why the bridge gave way.

The bridge was a Howe truss, of one span 157 feet long, built at Cleveland, by the Lake Shore and Michigan Southern Railway; it had been in use about 11 years, and had stood the test of 6 heavy engines, and was considered safe by the chief engineer of the road, who stood on it but a few days before the accident while an engine was passing over, and could see no sign of weakness.

The engineer of the leading engine felt something give way when about two car lengths from the end, and pulled the throttle open wide, breaking the drawhead between the tender and train, and thus saving his engine. Some good engineers think that a portion of the train must have been off the track and struck and broken one of the chords, as the bridge fell one way and the cars the other. The chief engineer and others, including your correspondent, could not see the least signs of the cars being off when they went on the bridge; and if a single truck had been off, it would have left marks on the ties. Others think that the frost and the heavy storm raging at the time caused it to give way. My opinion is that the bridge had been greatly weakened by the vibration and concussion of passing trains. These and the cold weather, combined, caused it to give way.

For two years, I ran a printing press, printing forms just as large as would go on, so that the clamps came solid against the chases. When the bolts were made of the best iron I could get, they would break without any seeming cause, the iron looking crystallized and brittle. The strain could never exceed 30 lbs. on each bolt, the latter being 1¼ inches in diameter. One broke in 66 days, having run about 286,000 impressions; the other broke three days after. I then had two pairs made of Swedish iron: the first pairs used ran for about three months. I then put in the others, putting a piece of wood ⅜ inch thick between clamp and chases, when they run 105 days, and broke about the same time. They always broke in the same place.

Is it not probable that the same principle is at work on our iron bridges, and that the strongest will give way from this cause, if it be not renewed in time? J. H. S.

Erie, Pa.