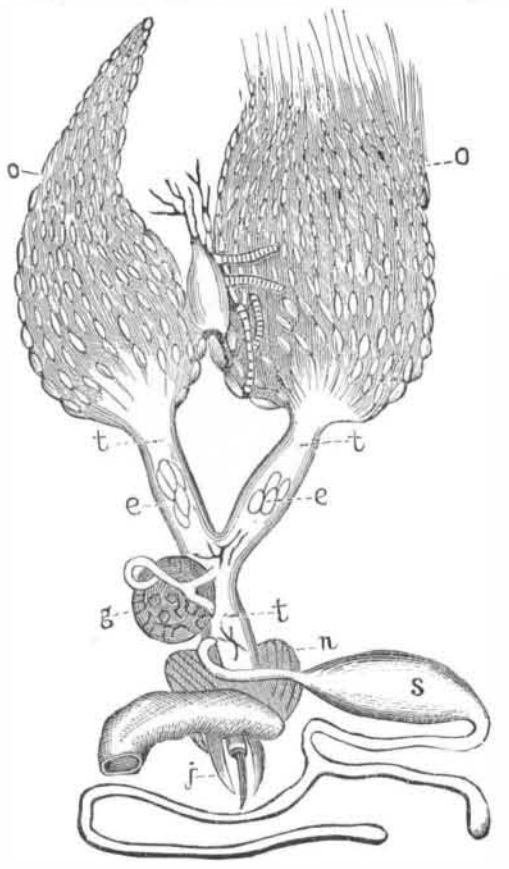
most birds, the act of copulation takes place outside of the hive in the air during flight. It happens sometimes that a queen bee, from injury or from malformation, defective wings, for instance, is unable to fly and cannot leave the hive. Under these circumstances she is incapable of fecundation, and yet has been seen to lay eggs, and these eggs invariably produced males or drones. This fact gave the clew, and successive observations proved beyond a doubt that the workers were always born from fecundated, the drones from unfecundated eggs. It remained a mystery how, in the same ovary, a certain number of eggs could come under the fertilizing influence while the rest remained untouched.



OVARIES, ETC., OF BEE.
o. o. Ovaries. e. e. e. Eggs in oviducts. g. *Receptaculum seminis.* n. j. Sting. s. Poison bag.

Siebold ascertained by a skillful anatomical investigation that the special organ of the queen bee, in which spermatic particles are received, has a muscular apparatus which enables her to close or open it at will. This organ, known as *receptaculum seminis,* is placed just at a point of the oviduct or canal through which the eggs are passed when they are dropped from the ovary, half way between the ovary and the outlet of the oviduct. The queen stands on the edge of the cell in which either fecundated or unfecundated eggs are to be deposited. If the former, she has the power to open this receptacle, the organ in which the spermatic particles have already been received, and to allow one or two such particles to come into contact with the egg; if not, she can close the organ and allow the egg to pass out unfecundated. Siebold has shown that eggs cut out above the opening of the *receptaculum seminis* into the oviduct, at which these organs connect, are always unfecundated.

Siebold has investigated a similar set of facts in the history of another species of hymenoptera, a kind of wasp of the genus *tolistes.* In this case, the queens, which are fecundated in the autumn, begin to lay their eggs early in the spring; out of these eggs are born a variety of individuals, workers and males, as in the bee community. By a careful destruction of all the males, which was accomplished without injury to the comb, Siebold ascertained that parthenogenesis obtains in this family also. Plenty of eggs were laid after the males were destroyed, but the perfect insects they produced were always males and never a single female. It is now clearly proved, not only for wasps and bees, but also for a number of other insects belonging to the hymenoptera, that virgin females may produce male offspring without any participation of males.

Scientific Prizes.

The report of the prizes offered by the *Société d'Encouragement pour l'Industrie Nationale* of Paris for 1873, is as follows:

Chemical arts.—Six prizes have been offered: 1. Prize of $400 for the industrial application of distilled water; no candidate. 2. Prizes of $200 for the industrial application of any cheap and abundant mineral product; no candidate. 3. Prize of $200 for a useful application of recently discovered metals; no candidate. 4. Prize of $600 for the artificial preparation of a black compact diamond; one candidate appeared, but, as the experiments of the committee showed that the specimens sent did not fulfil the conditions required, the prize was not awarded. 5. Prize of $200 for a process capable of effecting the prompt and durable disinfection and clarification of sewage; the engineers of the Municipal Service of Paris, commissioned to study the question of disinfection and the application of sewage water, have presented a complete and detailed account of the experiments made, and the remarkable results obtained; as these experiments have been conducted on a very small scale, and, as important sewage works are in progress, the Council of the Society has decided to suspend the award of the prize. 6. Prize of $200 for refining, in France, Bolivian nitrate of soda, and extracting the iodine which it contains.

Economic arts.—Prize of $600 for an apparatus giving an electric current, constant in direction and intensity whose electro-motive force and conductibility shall be comparable to those of a nitric acid battery of sixty to eighty ordinary sized elements, and showing superiority in economy or salubrity over the machines now in use; the prize was awarded to M. Gramme for his magneto-electric machine.

Correspondence.

Deep Sea Soundings.

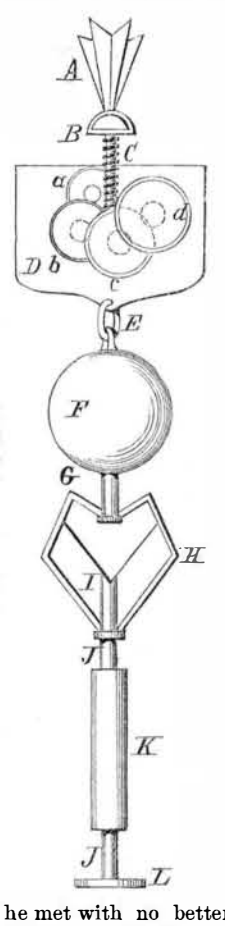
To the Editor of the Scientific American:

Dr. George Robinson, in an article published in your journal of April 19, suggested the idea of dispensing altogether with a line in deep sea soundings, and explained how an apparatus might be so contrived as to re-ascend to the surface after touching the bottom. Mr. Charles H. Lewis suggested afterward that the use of a pressure gage might obviate the difficulties presented by under currents, and by headway or leeway; if sounding is done from a ship. Several other correspondents have agitated the question, but as they are evidently unaware of the many experiments that have already been made to ascertain the depth of the ocean, a perusal of a short article, published in the *Nautical Magazine* forty-one years ago (in 1832), may prove interesting to them and to many of your readers.

Even if the idea of dispensing with a line in deep sea soundings were new, the obstacles described so clearly by Mr. Hawley N. Cargill, of Grand Rapids, Mich., present the real difficulties, namely, the under currents, the immense pressure of water, and the low temperature at a great depth. This correspondent takes a practical view of the matter, and I am as ready as he is to consider the suggestion, by Mr. Lewis, of a pressure gage as perfectly reliable and practical as far as a line could be made to reach; it is so practical, indeed, that it has been in use for many years, and I used it myself in the French navy at least twelve years ago. But to show the ideas of our grandfathers on this subject, here is a copy of the article, addressed by a correspondent to the *Nautical Magazine,* over forty years ago:

"The depth of the ocean is a subject on which many opposite opinions have been advanced; and with the hopes of determining so interesting a problem, a few years ago I constructed a machine, somewhat resembling that by Mr. Massey, but differing from his in not requiring the assistance of a line. The principal obstacles with which I considered that it would have to contend, were seaweed, tides, and under currents, which latter might sweep it away from the place where it was sent down. However, regardless of these, I set to work and completed the machine. My first experiments with it were made in shallow water, and, to ascertain its correctness, I attached it to a line that was marked. The results were most successful; and I was delighted to find it answer so well, for I invariably found the depth of water given by the machine precisely the same as that by the measured line.

"After being satisfied that my plan was likely to succeed, I submitted it to the Admiralty, and to my friend Captain Mudge, who communicated it to a scientific friend of his at Woolwich. This gentleman soon after inclosed me an etched plan of the apparatus, with his remarks on it, informing me, at the same time, that the celebrated Dr. Desaguliers had made an attempt, something similar to mine, with a glass globe; but that, after various essays, he could never recover the machine. This he attributed to drift, or to the bursting of the globe from excessive pressure; but as the trials had been made under many unfavorable circumstances, no positive inference could be drawn from them.



"The following is an explanation of the machine as annexed: A is the vane and flies; B, two connecting swivels; C, perpetual screw; D, plate for the wheelwork; *a b c d,* wheels of different diameters, similar to Massey's; E, suspension ring; F, float glass globe; G, catch with shoulders; H, clasps disengaged by the arm at I, connected with the rod, J J; K, lead to sink the whole; L, foot to the rod, in case of an oozy bottom.

"It will be readily seen that, when the weight is disengaged from the rest of the machine, by the opening of the clasps caused by the rod striking the bottom, it will remain there, and the globe will carry the other part to the surface."

Here ends the article; and as nothing has been heard of the experiments made afterwards by the inventor in deep water, it is probable that he met with no better success than Dr. Desaguliers. The method of adapting a pressure gage to a sounding apparatus must, according to the article in the *Nautical Magazine,* have been invented by Massey about fifty years ago.

LAURENS DE WARU.

Baltimore, Md.

Psychic Force on the Slate.---No. 2.--An Exposition.

To the Editor of the Scientific American:

In my former article (on page 195, volume XXVIII) I gave a description of what appeared to be a wonderful phenomenon. After having witnessed the performances of the so-called spirits at several *séances,* I have at last hit upon the way the thing is done. I now give it to your readers that they may not be gulled as I have been. It may be made the source of a great deal of amusement.

Procure a slate and a number of short pencils, also a small table (one with four legs is the best). Cover the table with a cloth, and turn the lights down—this is done for concealment—but explain that spirits will only write in the dark for you, therefore the table must be carefully covered to exclude the light. Grasp the slate with the right hand, lay a pencil near your thumb, hold the slate under the table horizontally, place the left hand on top of the table. At first it is best to sit so that your knees will not be suspiciously close to the table. After holding the slate a few minutes, say that you don't know that the conditions are favorable. Presently throw the pencil off with the thumb or finger, or get it between the thumb and finger and shoot it up against the table, as a boy would a marble. Call attention to it, and say there appears to be something there. Replace the pencil and presently shoot it up again. Do this several times and it will excite a great deal of wonder, especially if you make as little movement as possible. Next place a pencil between your fingers under the slate, rap with it about a dozen times, ask: "Is there a spirit present? If so, rap three times for yes, twice for no." Answer: "Yes." "Can you write?" Answer: "Yes," if the spectators are not watching you too closely; otherwise rap "no," and continue to rap the answers. Now get closer to the table. To write on the slate, hold the pencil between your thumb and finger, and the slate between your third and little finger; rest the slate against your left knee, or between the knees if convenient, or against the side of the table. This will give you more freedom to write. After writing an answer on the slate, shoot up the pencil; turn the slate over, grasp it as at first, withdraw, and, wonderful to behold, the answer is written on the bottom of the slate. Not one in a thousand will suspect how it was done, if you are expert and make no perceptible movement. Always be willing for any one to test; and if they catch you, it will be your own fault, for it is very easy to fail and say the "conditions are unfavorable."

If any person desires to hold the slate with you, for a test, first contrive to draw or write something on the slate; and after turning, hold the pencil under the slate in position for rapping. Ask him to hold the side of the slate opposite you and pull against you. After numerous questions, to which you can rap answers, beg the spirit to write or draw something on the slate. Presently drop the pencil and have the other party take it out. He will think the writing was done while he held the slate. To ring a bell, show a "spirit hand," and perform many other wonders, suspend the slate by holding it between your left knee and the table, or any other way to free your hand. It excites more wonder to withdraw the slate with the pencil in its original position, after ringing the bell, etc. S. C. DODGE.

Chattanooga, Tenn.

REMARKS BY THE EDITOR.—This is a very clever way to imitate the spirit slate-writing, and for dark *séances* the trick would doubtless succeed very well. But the most accomplished spirit slate-writing mediums now discard the darkness, and do not touch the slate. A bit of a pencil is placed between a pair of slates which are laid on the table. No cloth. The gas lights, in full blaze, illuminate the scene, while the friction of the pencil on the slate may be distinctly heard; and on opening the slates, a written communication thereupon is found.

Prevention of Incrustation in Steam Boilers.

To the Editor of the Scientific American:

We have a backwoods way of cleansing scale out of boilers, down in this section, which may be useful to some of your readers. Introduce a few green hickory poles in at the man hole, and let them boil with the water a day; then blow out about one third of the water. Repeat the process for a few days, and the inside will be as clean as a society shirt, and the hickory poles as brittle as rotten wood. A.

Eutaw, Ala.

A FLOATING CANNON BALL.—In the pavilion of the Ministry of Agriculture, at Vienna, a floating cannon ball may be seen. Although weighing 50 lbs. it lies like a down feather on a silvery mass, consisting of pure quicksilver from the celebrated mines of Idria; 150 cwt. of this metal is exhibited in a large iron cauldron, offering a sight seldom to be met with, and on it rests the solid iron ball. It was interesting to observe the emptying of the quicksilver into its receptacle. The metal is very cleverly stowed away in bags of white sheep leather, specially prepared for the purpose, each containing 50 lbs. of the mass, the bags being tightly bound round the top, and then put into small wooden barrels, carefully bunged up. Formerly, this liquid metal, which penetrates easily all porous substances, was transmitted in wrought iron bottles of very expensive make.

ELECTRICAL GAS LIGHTING.—A novel device for lighting gas by electricity, lately patented, is made as follows: A glass cup is immersed in liquid; and when the gas is turned on, it enters under the cup and lifts the same, thereby establishing connection with a battery which heats a platinum wire placed over the burner, and thus ignites the gas. Mueller and Meier of Hanover, Germany, are the inventors.