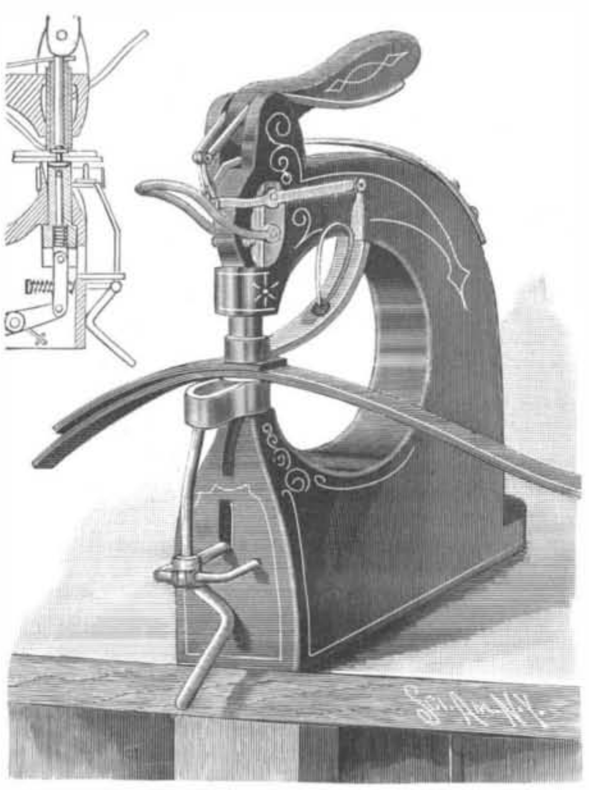
A LEATHER RIVETING MACHINE.

The machine shown in the accompanying illustration has plungers or rods to puncture the material, insert the rivet and washer and upset or head the end of the rivet shank. It has been patented by Christian A. Skeie, St. Hilaire, Minn. The small figure is a central sectional view. The presser plunger, which moves vertically in the arm of the machine, is tubular, and moving vertically in it is a washer-holding plunger,



SKEIE'S RIVETING MACHINE.

also tubular, to receive an inner riveting plunger. A spring plate attached to the upper side of the arm has a forked outer end surrounding the upper end of the riveting plunger and bearing upon the washer-holding plunger, the spring forcing the plunger down on a washer. Pivoted to the outer end of the arm is a hand lever for forcing the riveting plunger downward, and pivoted also at the same point is a bifurcate lever adapted to be rocked in one direction by the hand lever. Communicating with a side opening in the lower portion of the plunger is a curved washer chute, the washer being held in place in the chute by a spring finger, which yields sufficiently to allow the washer to be forced forward by a pusher connected to a pivoted lever whose other end has a pivoted link connection with the bifurcate lever, so that the washer may be fed by the operation of the hand lever which forces down the riveting plunger. Moving in line with the plunger, in a tubular portion of the base, is an anvil whose lower end has a link connection with a pivoted rock arm, the lower end of which is connected by a link with a driving power or foot treadle. A puncturing tool or awl is movable vertically in the anvil, and the lower end of the tool is attached to a yoke plate in such manner that, by the interposition of a coiled spring, the puncturing tool may be moved upward to puncture the leather without moving the anvil upward. Connected to a yoke whose arms extend through holes in the hollow base is an upwardly extending rivet pusher finger, movable in a slot in the bottom of a rivet tray, the finger being moved to push a rivet into position by a depending angle lever handle.

To place the work in position for riveting, the plunger is raised by a forwardly extending, curved, yoke-like handle, the plunger being then allowed to return to bear upon the yoke. The bifurcate lever is then rocked to push the washer down upon the work, and the treadle is operated to punch the hole, the rivet being forced into position by the angle lever handle; the anvil is then pushed upward to force the shank of the rivet through the perforation, and the hand lever is moved to force the riveting plunger down upon and upset the end of the rivet.

REMARKABLE POTATO GROWING.

Mr. C. E. Ford, of Rusk, Texas, who writes that he has been taking and has kept files of the SCIENTIFIC AMERICAN for thirty years, sends us a photograph, from which the accompanying picture was made, and gives us particulars of the remarkable success he has achieved in raising potatoes. The potatoes he prefers for forcing are of the Early Rose variety, the vines or stalks growing 6 to 8 feet, and but seldom blooming or having balls. The Triumph is said to make a crop quicker than the Early Rose and to stand the dry weather better. Mr. Ford believes in "intensive" culture, or the higher fertilizing and increased labor on a small piece of land, rather than little labor and fertilizing on a large tract. He sprouts his potatoes to the size of English peas or marbles before planting and then raises a crop in from four to six weeks, all of large size, without a peck of small potatoes to an acre. He writes:

"There were forty seed the size of peas planted to every double hill. I plant my potatoes in the water furrow and leave a balk 4 to 6 inches wide, and when the potato seed is dropped on the balk a part of the seed fall on each side of the narrow balk. I cover with two furrows of turning plow. I make my rows 3 feet apart; the hills 18 inches apart in row, which makes 140 hills across an acre and 70 rows to the acre makes 9,800 double hills of potatoes to the acre, or 19,600 single hills. As you will see, a hill of 40 seed potatoes goes across the balk, making the hill cover some 18 inches, or half the ground. I never plant less than 20 and have planted 60, and the 60 will every one make as fine potatoes if we have plenty of rain. I also give my potatoes fertilizing with liquid manure every rain. It takes from 60 to 75 potatoes to make a bushel, never more than 75. I have kept the same seed for 26 years and have potatoes both sweet and Irish the whole year round.

"By sprouting your potatoes you have eating potatoes in less than one-half the time it takes under the old style of planting. It takes from four to six weeks to sprout the seed potato to the size of peas; the sprout room I keep warm by a small charcoal fire in a bake oven. One barrel of charcoal will be plenty for the whole time. I put my potatoes into old barrels or small boxes, so as to get them warm easier than in a big heap or bunk. The smaller the boxes, the easier and quicker they will sprout. When the potatoes get large enough, I knock off the hoops, take down the staves, and there are thousands upon thousands of small potatoes from the size of a bird's eye to that of peas and a few the size of marbles; the whole mass is held together with small roots. I take a hand barrow (not a wheel barrow) and carry the seed down the row, and the third person breaks off as many as you wish—not less than twenty to forty—and let them fall on the balk in the water furrow and give two plowings. My sprout house has double walls and is filled in between with sawdust, also overhead, and has double doors."

EARLY ROSE POTATOES—3000 BUSHELS TO THE ACRE.

STEAM AND SOLAR HEAT.

La Nature recently published a description of a vessel found at Pompeii with an internal fire box provided with tubes. The discovery of this apparatus or of another analogous to it dates back twenty years, for the Revue des Deux Mondes mentions it in its number of September 1, 1866.

Seneca, in his Natural Questions (vol. iii, p. 24) speaks of the Draco, a sort of boiler formed of a large spiral tube placed against the interior walls of the cylinder forming the furnace.

Heron, of Alexander, is still more explicit, and, in his Pneumatics, describes the very arrangement of the Pompeiian apparatus under the name of Miliarion, a Greekized Latin term applied to the heat generator in general on account of its resemblance to a milestone.

I was the first to give a French translation of this description in a volume now out of print. I give a summary of it here with the aid of a figure that has been skillfully restored by our draughtsman from the simple line drawing of Heron, and which shows, besides, the arrangement indicated by the Alexandrine engineer for producing one of those effects of amusing physics of which the ancients were so fond. Fig. 1 shows in the center the furnace in the form of a vertical cylinder. All around there was a boiler, likewise cylindrical, filled with water. A certain number of tubes, such as K, M and N, put its different parts in communication in passing through the furnace and thus increasing the heating surface.

The cock, T, served to draw off hot water and the cup, L, to introduce cold water into the boiler through a tube running to the bottom of the latter. The object of the bent tube was to allow of the escape of the air when water was poured in and to give exit to the steam that might be produced. In this way was prevented the projection of water through the cup, L. In the figure is seen a closed compartment into which the water did not enter, and which was designed to set in motion various figures through the aid of steam and a several way cock. This cock consisted of two concentric tubes capable of revolving, one within the other, with slight friction. The external tube, A, was fixed to the top of the heat generator, through which

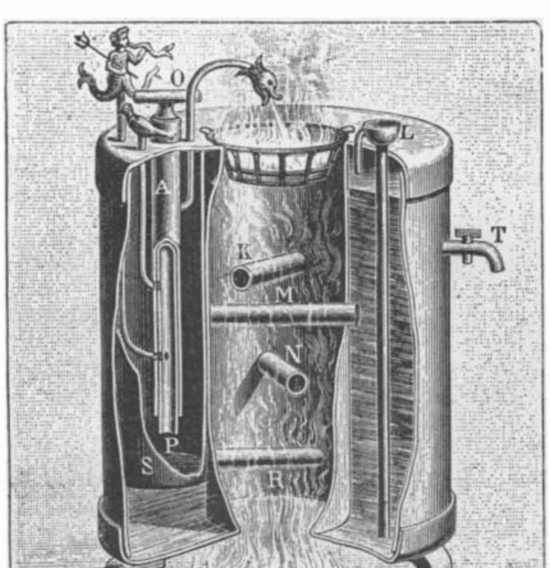


Fig. 1.—HERON'S TUBULAR BOILER.

Fig. 2.—EOLIPYLE CHIMNEY.

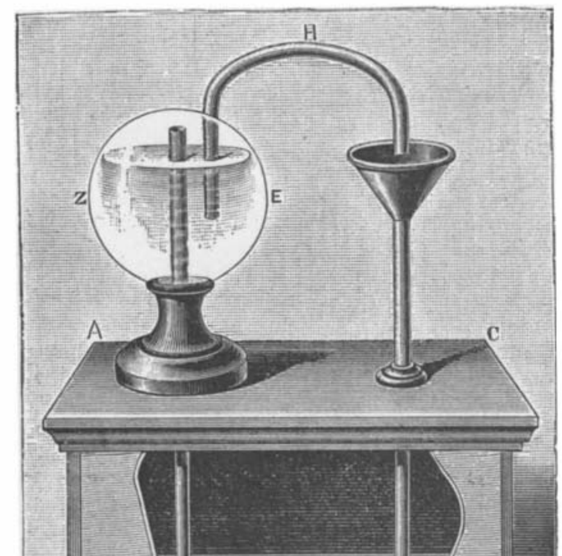


Fig. 3.—THE SOURCE.

it passed and descended vertically into the interior. It was provided with three apertures placed at different heights and communicating through small tubes with the figures to be spoken of hereafter. The internal tube, P, was open at the bottom and thus communicated with the interior of the compartment. It was closed at the upper part, which debouched above the generator and which was capable of being maneuvered with a handle, O. It was provided with three apertures at the same heights as those of the external tube, but pointing in a differing direction, so that when, through a rotary motion of the tube, P, one of its apertures was brought opposite an aperture in the tube, A, of the same height, the two others did not correspond. Marks made upon the visible part of the two tubes showed the positions that it was necessary to give in order that such correspondences should take place. One of the small tubes terminated in a snake's head which was apparently looking into the furnace. The second ended in a triton holding a trumpet in the mouth. Finally, the third carried at its extremity a whistle that debouched in the body of a bird full of water.

It will now be seen what occurred. The tube, T, was removed and a little water was poured into the closed compartment. This water flowed into the tube, R (which passed into the furnace and was closed on the side opposite its opening in the closed compartment), and was converted into steam. After the tube, P, had been replaced, it was possible at will to cause the steam to pass into the body of the bird, which would warble, or into that of the triton, which would sound the trumpet, or into the head of the serpent, which would blow upon the fire and quicken the flame.

It has been asserted that steam was employed by means of the eolipyle, in the fifteenth century, in the mines of Joachimsthal (Bohemia) for revolving a windlass designed to draw up ore from the shafts. It is certain that in France, even before that epoch, the idea had been conceived of utilizing steam. The following, in fact, is what Vincent de Beauvois says apropos of Gerbert: "He constructed, according to the principles of mechanics, a clock and some hydraulic organs into which the air, introducing itself in a surprising manner, through the force of heated water, filled the cavities of the instrument, and, escaping through brass tubes, rendered modulated sounds at their thousand apertures."

Returning to the eolipyle, we find it recommended by Philibert Delorme for preventing chimneys from smoking. "By another invention it would be very well to take a copper ball or two, 5 or 6 inches or more in diameter, and, having made a small aperture above, to fill them with water and then put them in the chimney at a height of 4 or 5 feet, or thereabout (according to the fire that one desired to make), in order that they might become heated in proportion to the amount of fire reaching them, and, through the evaporation of the water, cause such a draught that there would be no great amount of smoke that would not be driven out through the top." . . . "And, in order that you may better know how they should be applied to chimneys, I give a figure hereafter for the front of a chimney, as well as for the interior, so that it may be easy for you to know how they must be placed and heated, and also how they expel the smoke" (Fig. 2).

It had occurred also to Heron to utilize the heat of the sun for raising water, and the apparatus of Porta was certainly inspired by the following passage borrowed from the Pneumatics of the Alexandrine engineer:

"The apparatus, called the 'source,' allows the water to flow as soon as it is struck by the rays of the sun (Fig. 3). Let A B C D be a base through which passes a funnel whose tube extends to within a short distance of the bottom. Let E Z be a globe from the top of which starts a tube that runs to the bottom of the base. Let H be a siphon, and let us pour water into the funnel. When the sun shines upon the globe, the air that it contains, being heated, will expel the liquid, and the latter, led by the siphon, H, will flow through the funnel into the base. But when the globe is placed in the shade, the air passing through the sphere, the tube will take up the liquid again and fill the vacuum that has been produced therein; and this will occur every time that the sun enters it."

It will be remarked that Heron explains the effect of the condensation of the air in the globe by the exit of the molecules rendered sufficiently tenuous, through the effect of the heat, to traverse the pores of the glass. He expresses this opinion, moreover, apropos of cupping glasses. "The fire that is placed therein," says he, "destroys the air contained in them, just as it consumes other bodies (water or earth) and converts them into more tenuous substances." And, a little further along: "Water also, when it is consumed by the action of fire, is converted into air, for the vapor that rises from a heated kettle is nothing more than the molecules of water, rendered more tenuous, that pass into the air." Salomon de Caus (Les Raisons des Forces Mouvantes, Paris, 1624, Livre I, Prob. xiii) improved Heron's little apparatus and described it under the name of the "Continual Fountain."

It is generally thought that the materiality of the air was not recognized until the seventeenth century. This is an error, and the following is the way in which Philo of Byzantium demonstrates it in his Pneumatics:

"If I take an empty vessel (or supposed empty, in common opinion), wide in the middle and narrow at the top, like the amphoras manufactured in Egypt, and if I immerse it in water having a sufficient depth, hardly any water will enter it until a portion of the air makes its exit, and the entrance of the water will not occur until after the exit of the air. This is the way in which I demonstrate it. Let us take a vessel with a narrow neck, as I have indicated, at the bottom of which has been formed a small aperture that is closed with wax. Let us afterward invert the vessel in water of sufficient depth, in taking care to hold it erect. Then let us immerse it with the hands until it is completely submerged. If we remove it gently by degrees, we shall find it dry in the interior, and none of its parts save the neck will have been wet. Hence it is clearly shown that the air is a body. If, in fact, it were not a body, and if the internal cavity were empty, the water would flow in without anything occurring to prevent it. In order to show this still better, let us immerse the said vessel and with the same precautions, and let us remove the wax that closes the aperture, and the exit of the air will at once become perceptible. If the aperture is below the level of the water, we shall see bubbles in the water, and the vessel will become filled with water on account of the exit of the air through the aperture. What necessarily causes the air to make its exit is the movement and pressure due to the water when the latter enters the vessel."—A. De Rochas, in La Nature.

Natural History Notes.

An Incombustible Tree.—The Gardeners' Chronicle gives some interesting details concerning a tree of Colombia which truly merits the name of vegetable salamander. This tree, the Rhopala odorata, of the order Proteaceæ, presents a remarkable power of resistance to fire. In the district of Rolima it is customary every year, during the dry season, to set fire to the plains in order to destroy all the dry weeds that, during rains, might interfere with the growth of the young and tender vegetation. This periodical conflagration naturally produces the most disastrous effects upon the trees, which gradually disappear without being replaced, since it is difficult for an old tree to resist, and still more so for a young shoot of one or two years. A single tree forms an exception, and that is the one above mentioned—the Rhopala. Small, distorted, and scraggy, and having a wild and desolate appearance, this tree not only does not suffer from the fire, but derives profit therefrom. It gradually establishes itself in localities abandoned by other trees and installs itself therein. We have here a very topical case of a survival of the fittest. It, alone capable of resisting fire, witnesses the disappearance of its rivals, and is seen to gradually encroach upon an always more extended domain. Its resistance to fire is due to its bark. The external portion of the latter, more than half an inch thick and formed of dead cells and fibers, acts like a protective jacket with respect to the more central and living parts, and it is this that assures its triumph in its struggle for existence against fire.

Sense of Sight in Spiders.—Professor and Mrs. Peckham, in continuing their studies of spiders, have published in the Transactions of the Wisconsin Academy of Sciences some extremely interesting observations upon the sense of sight. Concerning the range of vision the authors think their experiments "prove conclusively that Attidæ see their prey (which consists of small insects) when it is motionless, up to a distance of five inches; that they see insects in motion at much greater distances; and that they see each other distinctly up to at least twelve inches. The observations on blinded spiders and the numerous instances in which spiders which were close together, and yet out of sight of each other, showed that they were unconscious of each other's presence render any other explanation of their action unsatisfactory. Sight guides them, not smell."

The authors also experimented with the color sense of spiders, and reached the opinion that "all the experiments taken together strongly indicate that spiders have the power of distinguishing colors."

Wasps and Suicide.—A short time ago, Mr. Henry, a Frenchman, being curious to see the effect of benzine upon wasps, put some of it under a glass in which one of these insects was imprisoned. The wasp immediately exhibited signs of great annoyance and anger, darting at a piece of paper which had introduced the benzine into its cell. By and by it seemed to have given up the unequal contest in despair, for it lay down upon its back, and, bending up its abdomen, planted its sting thrice in its body, and then died. Mr. Henry allowed his scientific interest to overcome his humanity so far as to repeat the experiment with three wasps, only to find that the two others acted in the same manner. He is, therefore, of the opinion that wasps, under desperate circumstances, commit suicide.

An Insect Parasite of Books.—Mr. E. A. Schwarz, in Insect Life, describes the Nicobium hirtum, an insect of the family Ptinideæ, and which, indigenous to Southern Europe, has recently invaded the United States. This little insect inhabits old books, and its range in Europe seems to be quite limited. It has evidently been brought thence with the large quantities of old European books that are shipped to this country for public or private libraries. A large number of old editions have crossed the ocean in this way, and, very naturally, the parasites of such volumes have crossed it likewise. There is mentioned a Louisiana library of eight or nine thousand volumes of which, in all likelihood, it will be necessary to burn a portion in order to save the rest and prevent it from being invaded by the destructive insect. No efficient means of destroying it are known. It would seem, however, that certain fumigations ought to effect the object.

The Oldest Rose Bush Known.—The oldest rose bush in the world is found at Hildesheim, a small city of Hanover, where it emerges from the subsoil of the Church of the Cemetery. Its roots are found in the subsoil, and the primitive stem has been dead for a long time, but the new stems have made a passage through a crevice in the wall and cover almost the entire church with their branches for a width and height of forty feet. The age of this tree is interesting both to botanists and gardeners. According to tradition, the Hildesheim rose bush was planted by Charlemagne in 833, and the church having been burned down in the eleventh century, the root continued to grow in the subsoil. Mr. Raener has recently published a book upon this venerable plant, in which he proves that it is at least three centuries of age. It is mentioned in a poem written in 1690, and also in the work of a Jesuit who died in 1673.

Influence of Low Temperature Upon Fishes.—The sudden and total freezing of watercourses, as sometimes observed in northern countries, is usually regarded as the fatal cause of the death of all their inhabitants. Mr. P. Regnard thinks that such a belief is not borne out by the facts. Having progressively refrigerated the water of an aquarium, he found that, toward 0°, a carp seemed to go to sleep, that it no longer moved its fins, and that its gills moved but slightly. At −2°, the animal seemed to be fast asleep, but had not frozen. Finally, at −3°, it was in a state of apparent death, but still perfectly limber. When the temperature was then slowly raised, the carp awoke and seemed in nowise to have suffered. This is a proof that the polar seas, which never descend to a temperature below three degrees, are perfectly capable of giving asylum to living animals, which become acclimated to such low temperature.

Are Animals Left or Right Handed?—Mr. David Starr Jordan communicates an article on this subject to the November number of the Popular Science Monthly. It is well known that left-handedness has often been observed in animals. According to Vierordt, parrots seize objects with the left claw by preference or exclusively. The lion strikes with the left paw, and Livingstone tells us that all animals are left handed. Mr. Jordan was desirous of verifying this statement as regards the parrot. He observed that this bird makes a readier use of the left claw for climbing upon the finger that is offered to it. But it must be observed that most people being right handed, it is the right hand that is offered to the animal, and as in most cases one places himself just opposite the animal, it results that it is rather the left than the right claw that he solicits. And what shows this is that, upon offering the left hand to the animal, the latter in most cases extends the right claw, which is the nearest. However, Mr. Jordan finds that there is a slight preference for the use of the left claw, and he explains it by the fact that the habit of having to do with right-handed persons has developed a preference for the use of this claw. Evidently, in order to solve the question, it would be necessary to observe parrots in a state of liberty and without fetters, and that had not been trained by man, and to see what claw they use by preference for the habitual acts of life—for commencing to climb, for example, and for seizing their food, the latter being placed in positions of easy access and not requiring the use of one claw rather than the other by reason of the position that the animal is obliged to assume in order to reach it.

A CURIOUS ice formation recently attracted a good deal of attention in the river just below the falls at Lewiston, Me. There are strong eddies in the water, and the combined action of wind and currents during the hard frost has caused the formation of a great wheel of ice about two hundred feet in diameter, perfectly circular, and rounded smooth on the edge. This great ice wheel swings slowly and continuously round and round in the circling current of water at the foot of the falls.