

SAFETY SHIELD FOR CIRCULAR SAWS.

In using circular saws as usually arranged the workman is in great and constant danger of maiming or destroying his hands or arms by bringing them into contact with the cutting edge of the saw. He is also in great danger of being struck by splinters, blocks, or boards which are liable to catch in back side of the saw and be hurled forward with sufficient force to injure or kill the workman.

The engraving shows a self-acting safety shield, by which the descending or front part of the saw is automatically protected, so as to prevent anything coming into contact with this part of the saw until the shield is temporarily removed, for the purpose of sawing, and the shield is extended so as to shield or cover the back or ascending part of the saw to prevent anything from coming into contact with it there.

This self-acting safety shield is made of a plate of iron or steel, of about the thickness of the saw, the shield being curved to the radius of the saw, and is of sufficient breadth to give the proper rigidity. It is placed at a given distance from the teeth of the saw, and is provided with movable plates and adjustment slide and screw to suit the alterations in the diameter of the saw by wear, or the substitution of smaller for larger saws, or stuff deeper than the cutting part of the saw.

The shield is attached to an arm hung upon a stud concentric with the saw mandrel, and is balanced by a counterpoise under the table. The semicircular shield is about 1½ inches deep and the same thickness as the saw. The forward end is so formed that the piece of timber to be cut raises the shield, but the latter rests upon the timber and forms an effectual guard which prevents the workman from bringing his hands or arms into contact with the cutting edge of the saw.

As soon as the timber has passed from the saw the shield returns to its original position, entirely covering the saw, and so remains until raised by the next piece of timber.

This device received the highest award at the trial at the Royal Agricultural Society at Derby, in July, 1881, and it will commend itself to all mechanics.

Further information may be obtained by addressing Mr. R. W. Taylor, Patent Safety Shield Works, Bury St. Edmunds, Suffolk, England.

ELECTRO-MAGNETIC BRAKE.

We give an engraving of Mr. Edison's recently patented electro-magnetic brake. It is designed for use on any style of railroad vehicle, but is more especially intended for use in connection with a system of electro-magnet railways.

The invention consists in placing an electro-magnet in such relation to some rotating metallic portion of the running gear of the vehicle to be stopped that the magnetic circuit shall be through the rotating metallic portion, the electro-magnet being furnished with movable heads, which may move toward and clasp the rotating portion whenever the circuit of the magnet is closed. Upon the axle, and at or near its center, is rigidly fixed a disk of iron, which rotates with the axle and between the polar extremities of an electro-magnet supported from the bottom of the car. The cores of this electro-magnet are extended beyond the coils, forming a spindle, which is reduced in size when necessary, the ends being screw-threaded to receive nuts. Upon each spindle is placed a block of iron forming a polar extension, secured in place by the nut.

The orifices in the blocks, into which the spindles pass, are elongated, so that the blocks or polar extensions may have a movement to or from the fixed disk upon the axle rotating between them. The polar extensions are normally held away from the disk by suitable springs of low resilience. When it is desired to use the brake a circuit from any suitable source of electricity is closed through the coils of the electro-magnets, when the polar extensions mutually attract the disk, and the attractive force causes them to move to the disk and grasp it between them, causing a retardation or stoppage in its rotation, and so acting as an effective brake upon the wheels.

Cannel Coal in Iowa.

A promising bed of cannel coal has lately been discovered about thirty miles from Des Moines, Iowa, down the river. It was found by parties prospecting for coal in the new line of the Wabash road to Des Moines. The coal occurs in a vein five feet thick, the lower two and a half feet of which is pure cannel coal, and the other half a coal much resembling Blossburg coal. The Des Moines Gas Company pronounce it fully equal to Virginia cannel coal. A six foot vein of common bituminous coal underlies the cannel, sixty feet below.

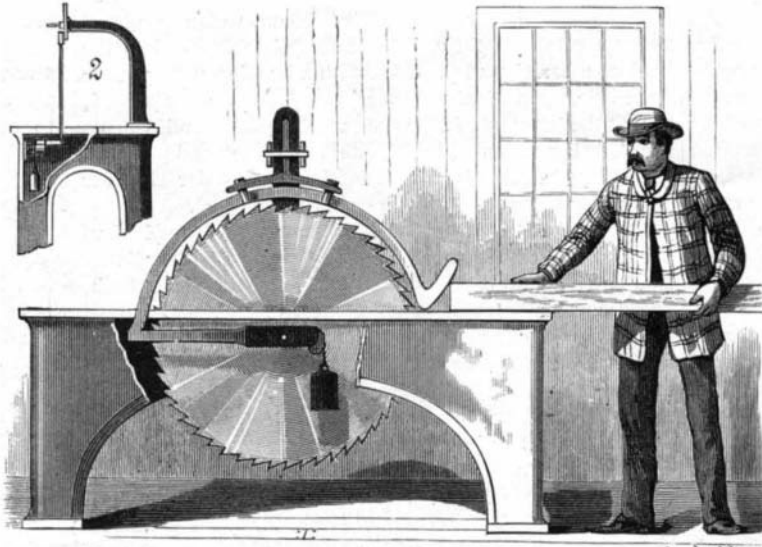
The Proposed Navy.

The House sub-committee on naval affairs have recommended the immediate construction of eleven vessels at an estimated cost of \$9,000,000; this fleet to comprise one

cruiser of the first class of 5,000 tons or over, and an armament of four eight-inch and twenty-one six-inch rifled guns; four cruisers of the second class of 3,000 tons or over, with an armament of four eight-inch and fifteen six-inch rifled guns; two rams; one armored torpedo boat; one cruising torpedo boat, capable of steaming twenty-one knots an hour; and two harbor torpedo boats to steam seventeen knots an hour. The cruising torpedo boat to be armed with one ten-inch rifled gun.

Snow Sheds.

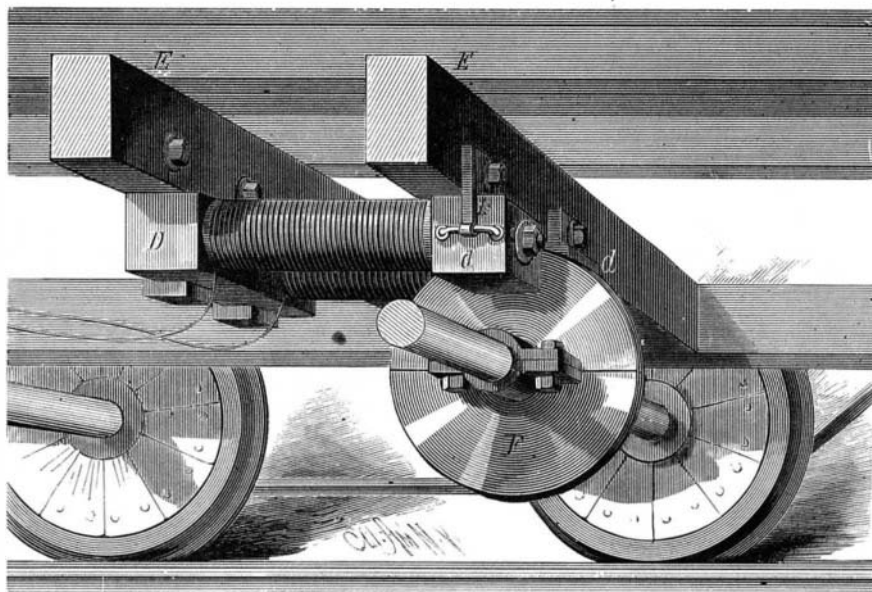
The wonderful snow sheds—tunnels—on the Central Pacific Railroad are of two kinds, one with very steep roofs and the other with flat roofs. They cost per mile from \$8,000 to \$12,000, and in some places where heavy masonry was needed the cost reached \$30,000 a mile. They are firmly

**TAYLOR'S SAFETY SHIELD FOR CIRCULAR SAWS.**

constructed to support the great weight of snow and to resist the rush of avalanches. Fire precautions are very thorough. Corrugated plates of iron separate the buildings into sections, and in the great ten mile section there are automatic electric fire-alarms. At the summit is an engine and tank always ready to flood the ignited spot in a moment. These sheds shut in the view of the great Sierras, but without them travel would be impossible. Sometimes five feet of snow falls upon them in a day, and often thirty feet lies on the ground at one time, and in many places snow accumulates to the depth of fifty feet above these great wooden arches.—*Engineering News.*

MECHANICAL INVENTIONS.

An improved water meter with automatic governor has been patented by Mr. Julius Leede, of Washington, D. C. The operation of this meter depends upon the buoyancy of the water, which, acting upon floats, causes them to rise and fall and operate registering mechanism according to the quantity of water passed through and discharged from the meter. No head or pressure of water being required, the

**EDISON'S ELECTRO-MAGNETIC BRAKE.**

meter is in practice located in the upper portion of the dwelling or other building to which water is supplied, and the pressure at the several discharge spigots is, therefore, such as is due to the height of the column, or, in other words, to the vertical distance between the meter and the spigots. The principal feature of the invention is the governor, which automatically regulates the action of the meter according to the quantity of water discharged. It is practically an automatic cut-off for controlling the induction and discharge according as more or less water is drawn off from one or more spigots in the building where the meter is located. The water flows through and actuates the governor by rise and

fall within a suitable receptacle, thereby acting directly to open or close the valves that control the flow.

An improved gutter holder has been patented by Mr. William E. Brown, of Irving, Kan. This invention consists in the peculiar construction and arrangement of the parts, whereby the sections of a gutter are clamped together and held straight and even while being soldered. The holder is adapted to clamp gutter sections of different diameters.

A novel cotton gin attachment has been patented by Mr. Joseph Kopfler, of Amite City, La. This is an attachment to cotton gins to remove motes, sand, etc., from the cotton while being ginned; and it consists in the combination with the brush cylinder of the frames secured together and provided with a horizontal series of slats and an upwardly inclined series of slats.

Mr. Henry R. Robbins, of Baltimore, Md., has patented an improvement in passenger coaches for street travel, the object of which is to house or close in the pendent steps at the end of the coach, and provide also a door which, while it perfectly closes the body of the coach, will not be in the way of passengers in getting in and out of the coach.

Messrs. James Dempster and Henry Holcroft, of Media, Pa., has patented an improvement in carding engines which consists in combining with the carding cylinder a cylinder having a set of rings of card cloth and one or more strippers which have a longitudinally reciprocating movement between the carding cylinder and ringed cylinder, together with mechanism for actuating this stripper cylinder, whereby all of the fleece of the carding cylinder is transferred to a single cylinder having rings of card cloth, by the lateral distribution of the fleece as effected by the endwise movement of the stripper.

An improvement in steam boilers has been patented by Mr. George F. Major, of Brandy Station, Va. The invention relates to tubular boilers in which the tubes are arranged side by side; and it consists in the peculiar construction of a tube having a reduced end,

and the alternately reversed arrangement of two or more series of such tubes, each series of which is connected with a drum at each end, with the drums so disposed as to form flues between the series of tubes.

An improved station indicator has been patented by Messrs. William H. Hackney, of Laramie County, Wyoming Territory, and Edward G. Hudson, of Lincoln, Ill. This improvement consists in the peculiar means for reversing the movement of the ribbon when wound up. An intermediate shaft is placed between the two shafts carrying the belt or ribbon, which intermediate shaft has a cog wheel adapted to engage with cog wheels on the ribbon shafts alternately by the lateral shifting of this intermediate wheel, the wheels on the ribbon shafts being set in different planes to permit this action, and the intermediate wheel being shifted by the longitudinal movement of the shaft, which is held by a latch entering one of two circumferential grooves in the shaft. The improvement also consists in providing the gear wheel which drives the ribbon shaft with a set of tappets to act on a spring-arm bearing a hammer which strikes a bell.

Mr. James E. Sarjent, of Brownville, Col., has patented a device for holding, upsetting, and welding tires for vehicle wheels, where they require to be shortened. It consists of two strong clamps having set screws, and adapted to be fastened to the tire on each side of the point where it is to be upset or "jumped" together. These clamps are provided with seats that receive the centers or bearings of a large yoke piece which extends from one of the clamps to the other. One of these centers is a screw provided with a handle, by turning which the one clamp is forced toward the other and the tire held by them is upset, so that it may be rapidly finished with a cold weld.

An improved pneumatic lever for mechanical musical instruments has been patented by Mr. Alonzo Durkee, of New York city. The object of this invention is to provide an improved device for receiving air forced under pressure from the air reservoir or chest of a wind musical instrument which is mechanically played or controlled by means of one or more strips or sheets of paper or other suitable material perforated to represent the different notes or sounds it is desired to produce and caused to automatically pass over air ducts, which, accordingly as they are

opened by the perforations in the paper that has a valvular action relatively to them, cause the reeds or pipes to be played as required, and to transmit the pressure to the corresponding pallet or valve, which is thereby opened to permit the escape of air from the pressure chamber to vibrate the reeds or tubes of the instrument.

Mr. George M. Rogers, of Wapakoneta, O., has patented a novel form of car coupling designed to couple with cars using the ordinary link without danger to the employes of the train.

Mr. Charles F. Jacobsen, of New York city, has patented an improved double cone reflecting chandelier, for use in

churches, theaters, parlors, and other public and private buildings, which is so constructed and arranged as to light the ceiling and walls as well as the floor and body of the room. It softens the light, destroying its glare, and diffuses it agreeably through the room, and at the same time is highly ornamental.

An improved bag holder has been patented by Mr. Thomas J. Bogue, of Riverton, Miss. This is a rectangular frame supported upon uprights and having its sides, which are loosely secured in the end pieces, provided with pegs or nails for holding the bag, and spring actuated levers for operating them.

THE HERCULES BEETLE.

The Hercules beetle (*Scarabeus hercules*) is one of the largest and best known of the beetle family. It is found in Guadeloupe, Colombia, Martinique, and occasionally in the neighborhood of Rio Janeiro, and varies slightly in size and color in these different places. In Guadeloupe are the largest specimens, possibly the best developed horns, and its curious habits have long attracted the attention of naturalists and travelers.

The male beetle is of a shiny black color, with long claw-like horns, covered on the under side with reddish-gray hairs arranged like a brush. The wing-cases are greenish-yellow, spotted with black, in the living insect; but occasionally, in preparing them for collections, the wings absorb a black substance from the abdomen and turn gray. This may be remedied by washing in benzine, which will restore the yellow color.

The male is over three inches long, including the horn, which, with the corselet, of which it is the elongation, measures nearly one-third of the whole length.

This insect may often be seen to seize the young shoots or branches of a tree between his strong horns (see illustration), and then turning rapidly around and around, by the aid of his wings, he cuts off the branch.

This revolution is so rapid that when the branch breaks off the beetle is often thrown to the ground with great force.

It has been supposed that he does this to obtain the sap of the tree, though his mouth would seem more suitable for devouring the green leaves.

The female has no horns, so it must be discovered by observation in what way she is able to obtain her food. She differs in other ways so much from the male that she might at first sight be supposed to belong to a different species. She is much smaller and has brown hairy wing cases, very rough and knobby on the shoulders. She deposits her larvæ in the trunks of decayed trees, where she forms a shell of woody debris, glued together for their protection.—*La Nature*.

Ironwood Tree.

One of the hardest woods in existence is that of the desert ironwood tree, which grows in the dry wastes along the line of the Southern Pacific Railroad.

Its specific gravity is nearly the same as that of lignum-vitæ, and it has a black heart so hard, when well seasoned, that it will turn the edge of an ax and can scarcely be cut by a well-tempered saw. In burning it gives out an intense heat.

Sound-Producing Ants.

D. M. Lewis, writing to *Nature*, says: "With reference to the question whether ants produce sounds which are of such a pitch as to be inaudible to the human ear, I should like to make a suggestion which occurs to me, but which I have no means of carrying out practically. It is a well-known acoustical fact that two notes of high pitch sounding together produce a third whose vibrational number is the difference of the vibrational numbers of the two primary notes. If now we suppose a vibration at the rate of, say, 60,000 per second, another at the rate of 38,000 per second would give a difference note of 22,000 per second, which would be well within the range of audibility. If then we send up a note beyond the extreme limit of audibility, we

shall be able to detect the presence of vibrations which exceed that of the note set up by the highest number of vibrations of audible sound. It would be interesting to know if this has been attempted, and if the microphone can be applied to assist in the investigations."

Water Carrying Tortoises.

At a recent meeting of the San Francisco Academy of Sciences a fine specimen of the desert land tortoise, captured at Cajon Pass, San Bernardino County, was shown, and Professor E. T. Cox related some curious circumstances in connection with it. This tortoise, which is as large as a good sized bucket, is a native of the arid regions of California and Arizona. On one being dissected it was found that it carried on each side a membrane, attached to the inner portion of the shell, in which was about a pint of

though food and water were offered them. When killed, however, considerable quantities of water were found in each of them. They lived on the high lava rocks of the islands, where there are no springs or streams, and the only dependence of animal life for water is necessarily upon the irregular and uncertain rain showers. These were of a different species from the one shown. It was generally admitted that it would be useful if the habits and peculiarities of these animals could be noted and some trustworthy information as to how they collect and secrete their water obtained.

Hydrophobia—Its Successful Treatment.

Mr. Ruxton, a surgeon in the East Indies, reports a very remarkable case, which seems worthy of being classed with the small number of cures that are now on record.

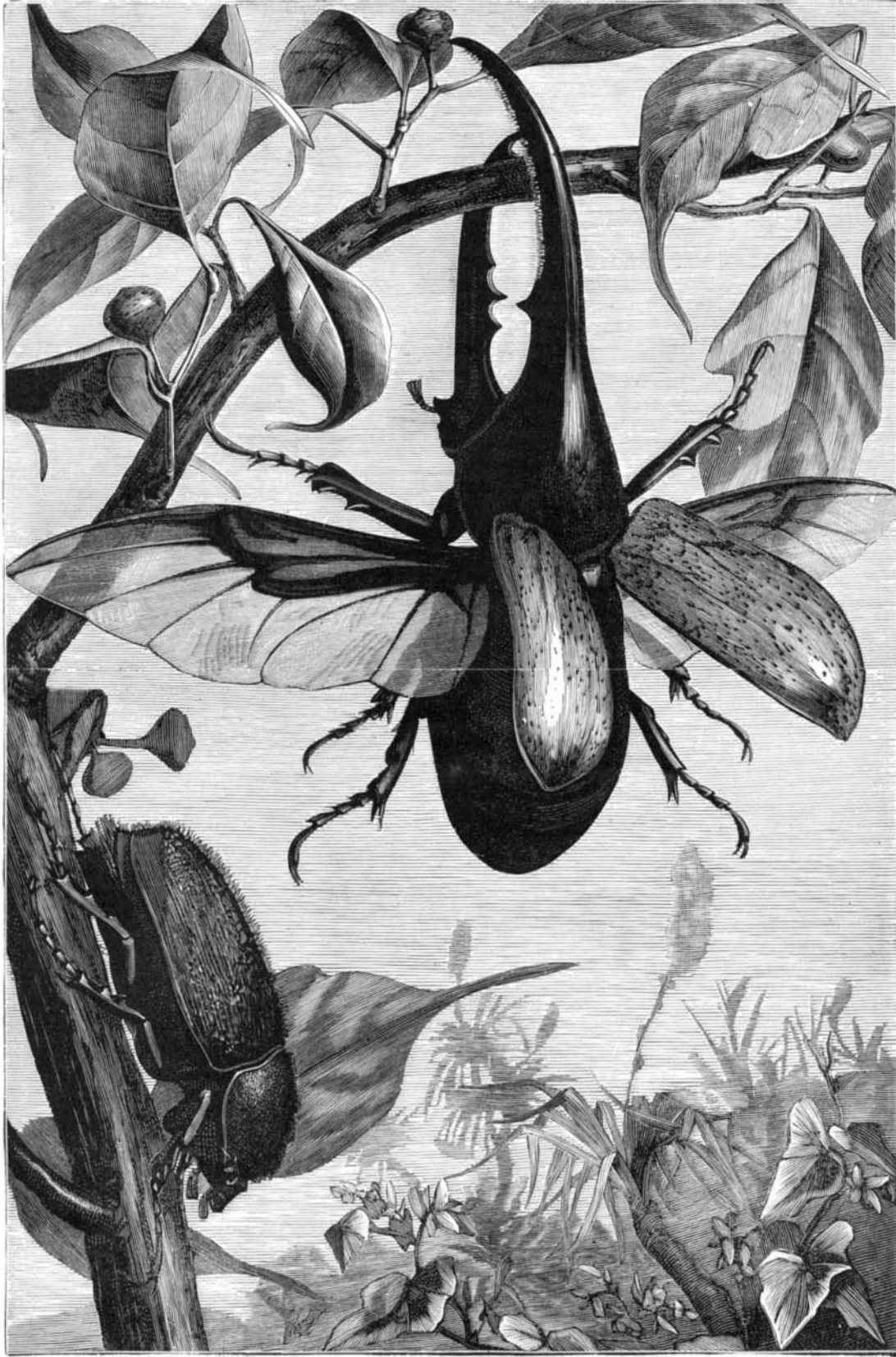
A boy, between five and six years of age, was bitten in 1874, by a bull-bitch that was subsequently killed. The bites were deep and severe, but were freely cauterized with fuming nitric acid, causing considerable loss of tissue. Carbolic oil was subsequently employed as a dressing. A month later he became unconscious, refused to drink, and was exceedingly nervous. Mr. R., finding him with saliva issuing from the mouth, suspected the worst, but ordered, as a temporary measure, the tepid sheet, and a diaphoretic mixture. Tranquil sleep and diaphoresis followed, but about one in the morning the patient awoke screaming, had frequent convulsions, refused liquids, and foamed at the mouth. Thinking that as a palliative, cannabis indica might be usefully employed, five minims of the tincture were given, and a short sleep followed. This dose was repeated after an interval marked by screaming fits and saliva-spit from between the teeth. Deep sleep, lasting ten hours, now ensued. On awaking he recognized his mother—the first time for twenty-seven hours. His pupils were now intensely contracted. A third dose of five minims was given on the evening of the second day of medical attendance, and sleep ensued for eighteen hours. Pulse and respiration remained good all the time. From this point the progress toward recovery was steady and continuous.

Dr. Ewart, formerly deputy surgeon-general in the Bengal army, in the same number of the *British Medical Journal* (November 19, 1881), states that little confidence can be placed in drugs after the symptoms have developed. He advocates cauterization as a prophylactic and as practiced successfully by Youatt in four hundred cases; and he quotes Sir William Guil, who states: "If I had to choose for myself, I would inhale ether and have the whole track of the wound destroyed by strong nitric acid or nitrate of silver." But Ewart places himself on the side of Sir Joseph Fahrner, who says: "If I were bitten by a dog or other animal, even suspected of rabies, I would suck the wound, put in a ligature, inhale ether . . . and have the bitten

part thoroughly cut out, and then cauterized with nitric acid or nitrate of silver, so as completely to disorganize any virus there might remain. Excision, he remarks, may be practiced successfully after the wounds are thoroughly cicatrized."

Utilization of Underground Waters.

Chief Engineer Robert Van Buren, of the Brooklyn Department of City Works recommends for the increase of the water supply the construction of another well similar to those built at the new stations on the water shed between Jamaica and East New York. From this well he proposes to run galleries east and west for a half mile or more, such galleries to take the place of an open canal. If the supply is found to warrant the extension of these galleries, he would urge their extension so as to intercept all of the water running from this watershed to the ocean. The work could be completed, he says, in a year, at a cost of about \$200,000, and the increased supply would be from 3,000,000 to 5,000,000 gallons daily.



THE HERCULES BEETLE—MALE AND FEMALE.

clear water, the whole amount being about a quart. Professor Cox was of opinion that the water was derived from the secretions of the giant barrel cactus, on which the tortoise feeds. This cactus contains a great deal of water. The tortoise is found in sections of the country where there is no water, and where there is no vegetation but the cactus. A traveler suffering from thirst could, in an emergency, supply himself with water by killing a tortoise. They are highly prized by Mexicans, who make from them a delicate soup.

They are oftentimes attacked by foes, both for their water and also for their flesh. They are overcome by the foxes and killed by being dragged for miles over the country at a pretty rapid pace. Mr. Redding afterwards stated that he was on the Galapagos Islands in 1849, where he assisted in capturing 92 land tortoises, varying in weight from 450 lb. to 600 lb. each. These they brought to San Francisco, where they sold them for more money than the whole of the ship's cargo of lumber made. They were two months on board, yet they neither ate nor drank anything,