INVENTIONS.

A means for preserving the vertical position of vehicle springs in their up-and-down movement when the vehicle is in motion, and also for preventing the breaking of the springs, has been patented by Mr. August Reinwald, of Gallipolis, O. The invention consists in a novel construction, arrangement, and combination with the vehicle body and springs, of two plates, and devices connected therewith and with the vehicle body and springs.

An improvement in the class of machines adapted for removing stones, dirt, etc., from peanuts, and also for polishing and assorting them, has been patented by Messrs. Charles W. Nicholson and Richard H. Leigh, of Assamoosick, Va. The improvements consist, first, in the construction of the cleaning cylinder, through which the peanuts are passed to remove foreign substances; second, in the construction and arrangement of a spout and chute for facilitating and regulating the action of a blast on the nuts; and, third, in the construction of a flexible belt or apron, which is armed with bristles for use in polishing the nuts.

Mr. James A. Davidson, of Cow Bay, Nova Scotia, Canada, has patented an improvement in instruments for sea-sounding, by which the depth of water is read from a graduated scale upon the instrument instead of by the length of the line. By this invention soundings can be taken while the sailing vessel or steamship is in motion as quickly as if the ship were at rest. The principle upon which the depth is found is by the weight of water due to its height, the weight being equalized by compressed air and the power of a spring. The indicator is provided with a heavy end, which keeps it upright in its descent and confines the air, which becomes compressed until an equilibrium is found, and at that moment a spring closes a valve and stops the admission of water, so that if the indicator becomes inverted or falls horizontally the air cannot escape or take in water.

Mr. John Meissner, of New York city, has patented an improved car brake, which consists of a horizontal frame having bowed or curved end bars and provided with side sockets for holding the brake shoes, the frame being held in position against the bottom of the car by longitudinally movable end clamps or racks in such manner that it is free to accommodate itself to the relative positions of the wheels on curves in the road, said clamps or racks being connected with brake rods or shafts, whereby the frame may be moved longitudinally for applying or turning off the brake.

Levee Building on the Mississippi.

Mr. William L. Murfee, Sr., in *Scribner's Magazine*, thus describes the modern method of building a levee: The space which it is to occupy is first carefully cleaned off; trees, roots, stumps, logs, weeds, even grass and leaves are removed. Then in the middle of the space, extending longitudinally the whole length of the proposed work, is dug a ditch three feet wide and three feet deep, which is to be straightway filled up again. This is called a mock ditch, or as some people say, a "muck ditch," but why "muck," is one of the things that has not yet been found out. The object of this is twofold—to close all root holes and to mortise the superstructure into the natural earth, thus preventing any sliding under the pressure of the water. As the levee is built of loose earth, its mass coalesces with the loose earth with which the mock ditch was filled, and when the levee has been completed and settled it forms, with the contents of the mock ditch, a homogeneous mass anchored three feet all along the line in the solid ground. The next process is to build the levee. The material is to be taken only from the outside, or side next to the river, and should not be cut nearer than twenty feet from the base of the levee; the earth is carried in wheelbarrows upon run plank. The dimensions of levees have varied from time to time, according to the amount of funds available for their construction. In any case the top of the levee should be three feet perpendicular above high water mark; the base line should be five, six, or seven feet, according to the ratio in force, for every foot of perpendicular height; the top should be level, and as broad as the levee is high. Thus, where high water mark is four feet above the level of the natural bank, the perpendicular height of the levee should be seven feet, the breadth at the top should be seven feet, and its thickness at the bottom 35 feet, 42 feet, or 49 feet, as the ratio of five to one, six to one, or seven to one might be in force. Taking for illustration, a seven foot levee constructed upon this last ratio, it will be observed that with the water standing four feet deep, there will be on a horizontal line 25 feet of solid earth between the surface of the water outside and the air inside, and 49 feet between the bottom of the water without and the air at the natural surface of the earth within. The last but indispensable step in the process of levee building is the "seep water" ditch, which is dug some thirty or forty feet from the inner margin of the levee and parallel with it. The function of this ditch is to receive and conduct away the seep water, or transpiration water, which oozes in considerable quantities through even the most compact of levees. If permitted to remain it would render the ground about the inner base of the levee intolerably muddy, and would operate as a great disadvantage in case of emergency. The seep water ditch must be connected with plantation ditches or otherwise put in communication with the swamp in the rear, so that the water can be carried away. Finally, as a finishing touch to the new levee, it should be planted with Bermuda grass. If tufts of this grass be set two or three feet apart all over the surface of the levee, it will in a year or two cover it completely with a very dense sod, and by its interlacing roots add materially to its water-resisting capacity. When water stands for a long time against a levee, the current and the waves seriously abrade its surface, cutting in sometimes so deep that an inopportune wind storm would assuredly break it. A heavy coat of Bermuda sod is a very efficient preventive of this kind of disaster. I have seen at the end of a long period of high water, a piece of levee deeply indented all along the line, and in some places cut more than half through, while adjoining it was a strip of Bermuda covered levee, subject to the same exposure to wind, wave, and current, which had not apparently lost a pound of earth or a tuft of grass.

Hardening Steel.

The effect of occluded gases in iron and steel is now being carefully studied by metallurgists in general, and a committee of the Institution of Mechanical Engineers recently raised the question in one of its reports as to whether the hardening and tempering of iron and steel might not be produced by the expulsion of occluded gases during the heating process and their subsequent exclusion by the sudden cooling and contraction. Professor Chandler Roberts has undertaken to answer this question, and by heating rods and spiral wires of steel *in vacuo* by means of the electric current, and suddenly quenching them in cool mercury, he demonstrates that steel will harden when there are no gases to absorb. The metal was, of course, robbed of its occluded gases by means of an air pump connected with the vacuum chamber, and the parts which were quenched in the mercury were found to be glass hard, while those which did not reach the cold fluid were found to be quite soft. Professor Roberts, therefore, concluded that gases do not play any part in the process of hardening and tempering. Professor Hughes, who has made numerous experiments on the subject, believes that the temper of steel is due to the chemical union of the iron with the carbon. At low temperatures this union takes place only in a slight degree, and hence in soft steel we have the carbon keeping aloof from the iron; but as the temperature is raised the combination is furthered, until, in the case of gray or glass hard steel, we have really a kind of diamond alloyed with iron. Sudden cooling is necessary to fix the combination, for in slow cooling the carbon separates from the iron. This theory is a very promising one, and is supported by a variety of facts; Mr. Stroh, for example, having observed that when an electric spark passes between two iron contact pieces and fuses them the fused part becomes diamond hard, and will scratch a file.—*Engineering.*

Mosquitoes.

Mr. Ivers W. Adams writes from Bathurst, N. B., to *Forest and Stream*, that he tried a dozen prescriptions for repelling mosquitoes, flies, and similar pests, and found none of them effective until he came across the following, which are dead sure every time:

"Three oz. sweet oil, 1 oz. carbolic acid. Let it be thoroughly applied upon hands, face, and all exposed parts (carefully avoiding the eyes) once every half hour, when the flies are troublesome, or for the first two or three days, until the skin is filled with it, and after this its application will be necessary only occasionally. Another receipt, equally efficacious, is: Six parts sweet oil, one part creosote, one part pennyroyal. Either of these is agreeable to use, and in no way injurious to the skin. We have both of these in our camp with us, and all flies keep a safe distance."

Bells on Sheep.

Mr. James S. Grinnell, writing in the Springfield *Republican* of bells on sheep as a protection against dogs, gives this illustrative experience:

"A good farmer in Leyden, who keeps about a dozen excellent Southdown ewes, always belled, was grieved and surprised one morning to find that dogs had raided his flock, killed two, mangled others, and scattered the rest. On collecting his little flock into the yard after a day's search he found that the tongue was lost from the bell. This was replaced, and never since have his sheep been worried. The experiment is so simple and cheap that it is worth trying."

How to Come it Over Hornets.

Mr. James T. Bell's account, in the Canadian *Entomologist*, of the easy capture of hornets may possibly serve as a useful hint to some agricultural reader in an emergency. The nest was unexpectedly found in a stump during a walk in the Belleville forest:

"A few days after, taking advantage of a cool morning, I sent my two boys to the woods with a small bottle of chloroform and a hard rubber syringe. According to directions, they injected about a drachm of the liquid into the hole, and threw a handkerchief over the entrance. In about five minutes they opened up the nest, when they found the inmates in a perfect state of slumber, and transferred them without trouble to their cyanide bottles. In about an hour they returned, bringing me forty-eight specimens of the insect."

Jetty Lights.

Experiments with the electric light have been lately made by MM. Dalmin, at Barcelona, on the mole or jetty head of San Ramon. Five electric lamps were used, the wire passing to each in succession, but, at the last lamp, instead of returning to the machine, the wire was brought down into the ground and to the sea, at about 8 meters distant, an arrangement (says *La Lumiere Electrique*) completely new and original, and we call attention to it as realizing considerable economy in illuminating with the electric light at a great distance. The electric machine used was one of the Gramme system, a new type patented in October last, and meant specially for division of the electric light. The system, which seems to have given satisfaction, was exhibited in various other parts of Barcelona.

Eruption of Mauna Loa.

Late advices from Honolulu, Sandwich Islands, describe increased activity of Mauna Loa, with great hazard to the port of Hilo. The new outbreak is described by an eyewitness as follows: "About June 22 the old mountain was observed to be more than usually active, the whole summit crevasse pouring forth immense volumes of smoke. By Friday noon the three southern arms had all joined into one, and rushing into a deep but narrow gulch, forced its way down the gulch in a rapid flow. By Saturday noon it had run a mile. The flow was on an average 75 feet wide and from 10 to 30 feet in depth, as it filled the gulch up level with its banks. The sight was grand. The whole frontage was one mass of liquid lava carrying on its surface huge cakes of partly cooled lava. Soon after we reached it the flow reached a deep hole, some 10 or 15 feet in depth, with perpendicular sides. The sight, as it poured over that fall in two cascades, was magnificent. The flow was then moving at the rate of about 75 feet an hour. If it goes through Kukuau, probably all the lower or front part of the town will fall a prey to Madame Pele."

Bishop Coan, of Hawaii, writes from Hilo, under date of June 28: "The northern wing of the line is less than six miles from us, and the southeastern is less than two miles distant, while the center of the line appears the most sanguinary. From the southeast wing the seething fusion has fallen into a rough water channel, 20 to 50 feet wide, which comes down from the main bed of the flow almost direct to Hilo. We found two streams of liquid lava coming down in rocky channels which are sometimes filled with roaring waters, but nearly dry at this time. These two gulches are too small to hold the seething fusion, and the fiery flood overruns the banks and spreads out on either side. The united width of these streams may vary from 50 to 200 feet."

Two days later the venerable Bishop described the lava stream, which was approaching Hilo, as "fearfully active. It is about 50 to 100 feet wide where it is confined in the gulches, but it is sure to spread indefinitely where there is space. By night the sanguinary glow is fearful, like a flaming banner lifted high in the heavens. Some days its progress toward us is one-eighth to half a mile a day. From the town you can walk up to the lava stream in 40 minutes, and return in 30. Thousands of people visit it, sometimes a hundred in a day. I have been up to it, and dipped up the fusion. As it comes down the rocky bed of the ravine the roar of the lava is like that of the Wailuku River in flood, but a heavier and deeper sound; it is the bass, and the other the tenor. Sometimes the sound is like distant thunder. Its explosions and detonations are rapid and startling. I counted ten in a minute. In some places it has overflowed its banks and spread out 200 or 400 feet laterally, burning the jungle and cutting down the trees.

"We now expect the lava stream to enter Hilo Harbor in a few days. What damage it will do there remains to be seen. Should it spread out when it reaches the low and level parts of Kukuau and Punahawai, joining Punahoa, where we live, it may burn many houses and cut our village in two, but Hilo will not be entirely destroyed unless the vast masses of fire that are accumulating upon the mountain slope should come down upon us."

The Hawaiian *Gazette* of July 6 says: "The past week has been one of great excitement in Hilo, in consequence of the renewed activity in the volcanic fires on Mauna Loa. One arm of the fiery stream has pushed itself into the Kukuau gulch, and is within three miles of the village of Hilo. All Hilo may be said to have visited the flow during the last few days. Men, women, and children, some on foot and some on horseback, have made the pilgrimage. As seen on Wednesday, June 29, it presented a view never to be forgotten. A mile above the lower end of the stream the lava was flowing in a liquid, living torrent, some 30 feet wide along its course, consuming everything in its way. From this point about half a mile of the seething, surging torrent could be seen. The belt covered with lava was some 500 feet wide, all hot and liable at any moment to break out into renewed activity. At night the scene was awfully grand beyond description."

Skull Measurements.

Professor Flower, the well-known English anatomist, has published some further results of his researches with reference to the human skull. He states that the largest normal skull he has ever measured was as much as 2,075 cubic centimeters; the smallest, 960 cubic centimeters, this belonging to one of those peculiar people in the center of Ceylon who are now nearly extinct. The largest average capacity of any human head he has measured is that of a race of long flat-headed people on the west coast of Africa. The Laplanders and Esquimaux, though a very small people, have very large skulls, the latter giving an average measurement of 1,546. The English skull, of the lower grades, shows 1,542; the Japanese, 1,486; Chinese, 1,424; modern Italian, 1,475; ancient Egyptian, 1,464; Hindoos, 1,306.