An Investigation of the Physical Effects of Mountain Climbing.

Some interesting experiments and observations have been made by Signor Mosso, upon the subject of man's endurance in mountain climbing. Up to the present, the highest point to which a man has ever climbed is 23,393 feet—the summit of Aconcagua, the loftiest mountain of the main Cordillera range of the Andes. Signor Mosso asks will it ever be possible to reach 29,000 feet? We live at the bottom of an ocean of air, and our bodies are specially adapted for life at low levels; consequently, when we are placed in unusual conditions, such as exist at great heights, we are affected in different ways. Respiration becomes difficult, the circulation of the blood is altered, the heart is fatigued, "mountain sickness" is experienced, followed by lassitude and exhaustion. The reason that so few men have attempted the ascent of the highest mountain peaks in the world is due to the general conviction that man cannot withstand the rarefied air of these altitudes. From his own experiments and observations, however, Signor Mosso is convinced that man will be able slowly to accustom himself to the diminished barometric pressure of the Himalayas. To accomplish such a climb, it will be necessary for the climber to acclimate himself during a slow rate of progress, in order to reach the top in conditions of health and strength. His victualing arrangements must be generously but prudently made, more especially as the last stages would have to be performed very slowly. Mountain expeditions have hitherto adopted too rapid a rate of ascent. The nervous system consequently has not time to accustom itself to the action of rarefied air, nor the organisms to the cold, the fatigue of the ascent consumes the strength of the climber, and leaves him no time to regain it; whereas by slowly making the ascent the climber adapts himself to the fluctuating conditions as he rises higher and higher.

BEET-TOPPING DEVICE.

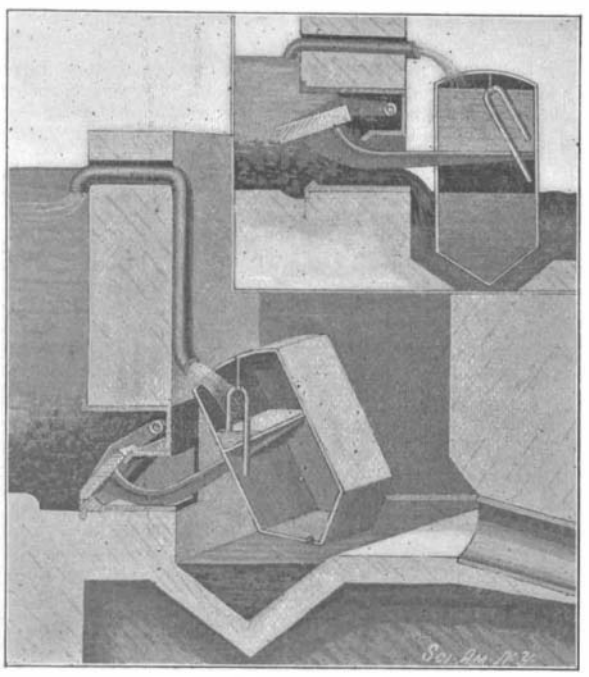
Messrs. Klaas Zuidewind and Adrian Van Putten, of Holland, Mich., are the inventors of a new hand-operated device for topping beets. The top or crown of a beet is of a woody nature, containing little or no sugar, and it is therefore necessary to remove this portion. The device here illustrated is designed to be operated by a person in a standing position, and is so constructed as to release the severed top when the device is open. It is furthermore provided with an adjustable gage for regulating the depth of the cut. This gage automatically centers itself above the meeting edges of the knives employed, and upon contact with the top of the beet will indicate to the operator that the device is in position for topping.

The device as shown comprises two handle-portions pivoted together and provided with shoulders, which when brought into engagement limit the forward movement of the handles. At their lower ends these handle-portions spread out into a forked or bifurcated frame-section. To these sections the knives are adjustably secured, so as to permit adjustment relative to each other when worn out. The cutting edges of the knives are beveled from beneath, and their bottom surfaces are inclined, so that the heels of the knives will not engage with the ground until after the cutting process is completed, thereby avoiding friction and affording the knives a better chance to take hold of the beet at a proper depth. The gage-rod, as shown, is threaded into a carrier which is hung, with some play, on the hinge-bolt of the handles. This freedom of movement permits the gage-rod to always assume a vertical position. Being threaded in the carrier, adjustment can easily be made by turning the rod to the left or to the right. To operate the device, the handles are open and the body-portion brought over the beet to be topped. As soon as the flattened foot of the gage-rod is felt resting upon the upper surface of the beet, the operator will know it is time to close the handle, whereupon the knives, entering the crown of the beet at opposite sides, will quickly and cleanly sever the top portion. It is evident that earth will not collect and interfere with the action of the knives, since the body is open at all sides, and any dirt taken up will quickly find an escape.

BEET-TOPPER IN OPERATION.

AN AUTOMATIC SIPHON OVERFLOW VALVE.

Cases often are found in which it is necessary to have the overflow from a tank pass out at the bottom instead of at the top, when fresh layers of liquid accumulate on the surface. This is necessary, for example, in septic reservoirs for treating sewage by filtration, where, especially by the action of the bacteria, the filtered liquid sinks to the bottom and passes out. This emptying of the tank at the bottom is the end sought and attained in the construction of the Ridgeway valve, illustrated herewith.



AUTOMATIC OVERFLOW.

The illustration shows the valve as arranged in a sewage tank. The outlet opening is in the side of the tank at the bottom, and it leads into the V-shaped intermediate chamber, which in turn overflows into the main sewer. Normally, this outlet is closed by a square clapper that is suspended from a projecting arm pivoted horizontally above it. In this position the clapper is at an angle of 45 deg., as shown. A curved metallic arm fastened to the back of the clapper supports, outside the wall of the tank, a metal box which acts as a float and which is divided into two compartments by a central horizontal partition.

When the tank has become filled it overflows through the siphon pipe seen in the upper part of its side wall (Fig. 1), and the water that thus runs out flows into the upper chamber of the small metal box on the outside, where its weight, coupled with the leverage of the arm attached to the clapper, tends to raise the latter slightly and allow the fluid to escape through the outlet in the bottom. As this outlet is sufficiently large, the liquid escapes rapidly, and soon fills the bottom compartment of the box, and causes the clapper to open wide, because of the additional weight thus exerted upon the lever arm. By this time the upper compartment has become filled (Fig. 2), whereupon it is quickly emptied by a small siphon that connects the compartments.

As the weight of the box is thus considerably diminished the clapper closes by its own buoyancy, aided by the pressure of water in the tank and the rush of the outgoing current. The emptying of the tank is therefore stopped till the water again rises and starts the large siphon once more.

The invention may have some slight defects, such as allowing the surface water that fills the upper part of the movable box to escape; but it certainly is very ingenious, for, by regulating the different openings which let the water into the upper part of the movable box or control its escape therefrom, the time during which the clapper will remain open may be regulated exactly.—La Nature.

The Balloon as a Detecter of Submarines.

The French Naval Department has been carrying cut a series of interesting experiments with balloons for detecting submarine boats, when submerged, the results of which proved that the course of a submarine craft can be easily followed from a balloon in the air. The "Gustave Zédé" was used for these experiments. The boat was submerged to a depth of ten feet and more, but it was easily discovered by the aeronaut when the boat ran counter to the sun's rays, although the balloon remained at a height of 1,500 feet. An ingenious telephonic apparatus was connected from the submarine to the balloon, in order that the latter might signal when it had discovered the boat. The experiments further proved that the green color at present employed in painting submarines is not an effective disguise, and that the ease with which submarines may be descried beneath the surface depends on their angle with regard to the sun.

Mediterranean Trip.

The Count de la Vaulx is making active preparations for another attempt to cross the Mediterranean by balloon, and the experiment will have a better chance of success, as it will be carried out early in the summer. Last year the trip was delayed until late in the autumn, and it was undoubtedly due to the bad weather that the aeronauts were unable to cross. The start is to be made from a different point on the coast this time, at Palavas-les-Flats, near Montpellier, and here a great balloon shed is being erected on the beach. The balloon, after the last trip, was sent to Paris to be reconstructed and will be called the "Mediterranéen No. 2." The balloon shed at Toulon offered a great resistance to the wind, and on one occasion was nearly carried off by a violent storm, although it was well braced by guy-ropes. The aeronauts will profit by this experience and are building the shed in a tent-like form which will offer less resistance. The balloon, which is now in construction, has a volume of 4,160 cubic yards, and the upper part has been made in conical form to shed the rain. M. Hervé has availed himself of the data obtained on the last trip to make some improvements in his steering and floating devices, of which an account will be given later. The balloon is arranged so as to be either attached to the float upon the water or to take a free flight; for the latter case it is provided with an interior air-balloon gaging 1,300 cubic yards which will be kept inflated by a ventilating fan. The former arrangement of water-ballast tanks will be used, and this time will be improved by adding a 12 horse power petrol motor which operates a pump for automatically filling the tanks by a pipe which runs down to the water, and the tank will also be discharged by an automatic device. It is probable also that the balloon will be made partially dirigible by using the motor to operate a propeller.

FASTENING DEVICE FOR HORSES.

It is no longer necessary for a driver to fasten his horse to a hitching post. If provided with the fastening device here illustrated, he needs simply to slip his reins on the catch in the wagon, and the horse will be unable to run away. Mr. Phillis Mayotte, of Wells, Mich., is the inventor of this new fastener. The construction of the device is very simple. Supported in a bracket on the vehicle is a spindle carrying a disk provided with hooks to serve as a fastening means for the reins. Beneath this disk is a ratchet wheel engaged by a spring-pressed pawl. The lower end of the spindle protrudes from the bracket, and is connected by a universal joint to a rod which telescopes in a tube carried in a bracket on the front axle. On the rod are a series of pins, which project through longitudinally ranging slots in the tube, whereby the rotary motion of the tube is communicated to the rod. At the lower end of the tube is a small bevel gear, which engages a large bevel gear on the hub of one of the front wheels. The teeth of these gears are curved outwardly, so as to allow for any unevenness in the road, and all play in the parts is taken up by a spring coiled in the tube and abutting against the end of the rod held therein. A lever on the rod connects with the top of the tube and permits the latter to be lifted sufficiently to disconnect the gears. This will be found useful in long drives, when it is desirable to save the parts from wear.

DEVICE FOR HOLDING HORSES.

To fasten the horse, one needs simply to wind the reins around the spindle and secure them under a hook on the disk. If the horse should start forward, the reins will be quickly wound up on the spindle, and the animal suddenly checked. Any subsequent backward movement would have no effect, on account of the spring-pressed pawl ratchet, which prevents rotation of the spindle in the opposite direction. Hence, whichever way the horse may turn, the wheels cannot be moved.