MECHANICAL INVENTIONS.

Mr Newton P. Merchant, of Blaine, Mich., has patented an improved stump-puller, so constructed that it can readily be adjusted to operate with a quicker movement and less power for pulling small stumps and snags, or a slower movement and greater power for pulling larger stumps. The invention relates to that class of stump-pullers having inclined posts connected at their upper ends, a suspended frame for supporting the operating mechanism, and wheels and a pivoted shoe to adapt the puller to be readily moved from place to place.

Mr. Dolphus Torrey, of New York City, has patented an improvement in bells, which consists in a bell swaged from a composite plate made by inclosing steel in a box-pile having iron top and bottom plates, and sides made by bending a narrow plate of iron so that its ends overlap each other, heating the pile so formed, and subjecting it to hammering or rolling to produce a plate having a steel center and iron surfaces thoroughly welded together. It is claimed that such plates are harder, stronger, and more sonorous than iron plates, and possess better welding qualities than steel plates; and that out of them may be made bells lighter, stronger, and more durable than those of cast metal.

An improvement in traction engines, patented by Mr. Samuel S. Barr, of Waukon, Iowa, provides better means for guiding and controlling the movements of such engines than has hitherto been supplied. To the centrally pivoted front axle is attached, on each side of the center, the ends of a rope, which is coiled tightly around a rod journaled in boxes attached to the under side of the vehicles. A cog wheel is attached to one end of this rod, and is actuated by suitable gearing. Turning the bar winds off the rope at one end of the coil, and on at the other, thus inclining the axle in accordance with the turning of the wheel.

Mr. James H. Gressom, of Erin, Wis., has patented an improved wagon coupling, by which the front axle and sand-board are not weakened by the mortise commonly made for the wagon-reach, and by the usual nine bolt holes for the three bolts which ordinarily hold together the axle, sand-board, and front bolster. Other objections are also overcome by his improvement, in which he employs a coupling block transversely mortised on the under side to fit over and upon the sand-board and front axle, to which latter it is held by a single fore-and-aft bolt, and having a circular socket in its top for the reception of the circular base of the bolster support, held therein by a cover and provided with a rearward forked lug that clamps the forward end of the wagon reach.

Mr. James J. Kean, of San Francisco, Cal., has patented a spark arrester for locomotives, etc., which consists in a revolving turret, closed at the top, and formed with sides of perforated material, and a receiving chamber for the sparks; also in a conical and perforated sleeve, which is fitted within the turret, for assisting in breaking up the sparks, and a movable scraper for cleaning the inside of the turret.

Mr. Agustin Blasco y Fabregas, of Manila, Philippine Islands, has patented an improvement in vehicle wheels. The felly, or rim, and the hub combine great strength and elasticity, and any of the spokes may be removed without necessitating the removal of others or of the tire or rim. The felly is composed of laminæ of wood fastened together by screws; and on the metal tire which confines it are placed strips of leather which constitute a layer of elastic material. These strips of leather are separated at the ends, and on them are laid segmental steel plates, which form the peripheral portion of the wheel and sustain the wear. The hub is formed of the tapered butts of the spokes with lateral metal rings and tie-bolts.

Mr. Frank B. Galloway, of Farm Bridge, Ill., has patented a car-mover for starting and moving railway cars by hand. It consists of a lever provided with a hook at one end for the engagement of the car axle, and a spring pawl which engages the perimeter of the wheel. Devices for adjusting the instrument to different sized wheels and for varying the purchase are supplied.

A car coupling attachment, patented by Mr. Thomas C. Steward, of Chattanooga, Tenn., permits coupling of cars by the common link and drawhead without requiring the operator to enter between the cars. An adjustable bar or lever is employed to manipulate the link and guide it into the drawhead.

Mr. Henry Kenney, of New York city, has patented a machine for bending iron bars, for use in railroad work and where angular braces or stays are required, which is simple in construction and both convenient and powerful in operation. A bed-block with inclined arms, a top-block with inclined perforated and countersunk arms, with an arrangement of bolts, nuts, spiral springs, and a pivoted crosshead having a lever whereby the machine can be adjusted to bend different sized bars, are the principal features of the invention.

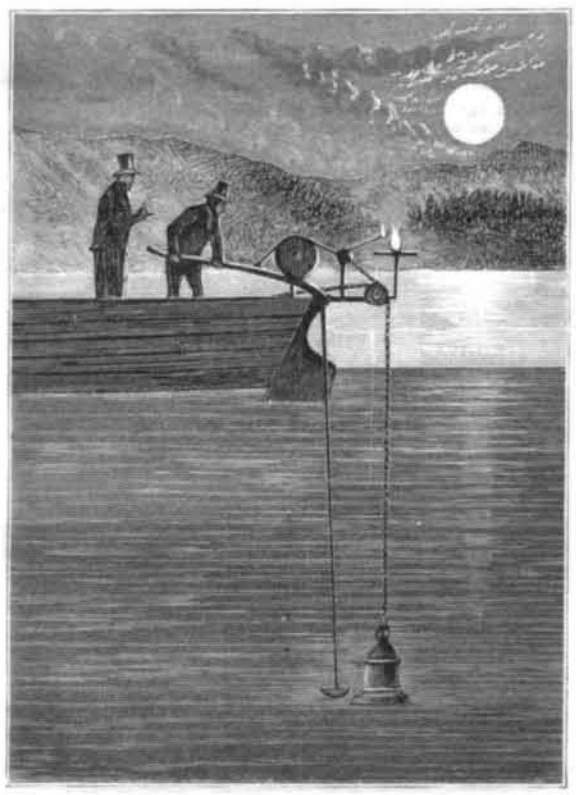
Mr. William Shortlo, of Springfield, Ill., has patented a fish-plate joint which consists in the combination of an inner plate having screw-threaded bolt holes, an outer plate having inner and outer longitudinal keyways, bolts having their shanks flattened on one side, and keys to fit in the keyways and bear against the shanks and heads of the bolts to prevent them from turning.

Mr. Lockhart Bibb, of Madison Station, Ala., has patented an automatic car coupling. The coupling link is provided with dogs or hooks at its ends, and is also longitudinally slotted for the reception of a safety pin which holds the cars coupled should either of the dogs break. The dogs on the link are engaged by spring-actuated drop catches to automatically couple the cars when the draw heads are brought together. The drop catches are raised by chains or other suitable device when uncoupling the cars.

Mr. Teodor Remus, of Dresden, Germany, has patented a pocket light which consists of a tubular case provided with a cylindrical cover with a roughened outer surface, which case contains a small candle or taper and a piece of tape covered with inflammable matter so arranged that when the cover is drawn off from the case the taper is ignited. The device is simple in construction, safe, convenient, and reliable.

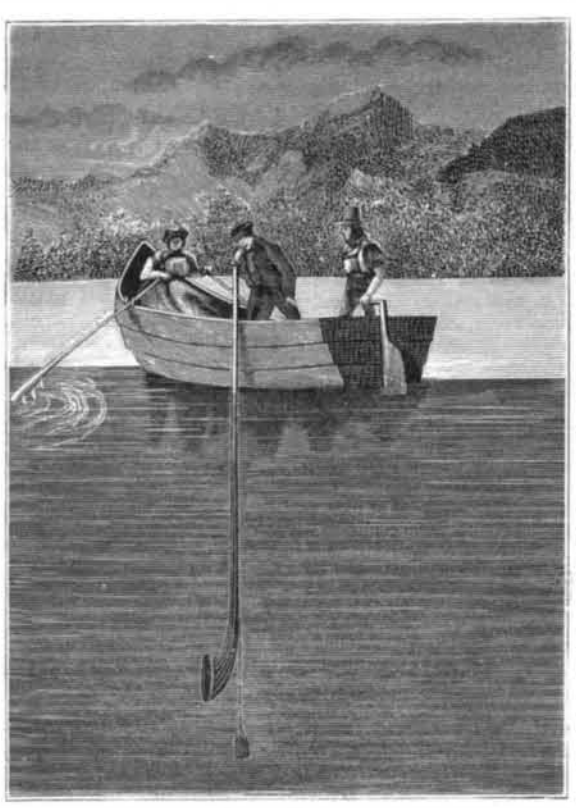
EXPERIMENT ON THE LAKE OF GENEVA TO ASCERTAIN THE VELOCITY OF SOUND IN WATER.

The velocity of sound in water has been the subject of patient investigation. Observers were placed in two



SOUND PRODUCING.

boats, which were moored at a certain distance apart on the Lake of Geneva. One boat was furnished with an apparatus, by which a submerged bell was struck, at the same instant that a charge of gunpowder was ignited in the air above it. In the other boat an ear trumpet was used to detect the arrival of the sound through the water, the lapse of time between the noise and the flash being noted by a chronometer. By this means it was ascertained that sound travels in water at the rate of 4,708 feet per second, being about four times



SOUND RECEIVING.

more quickly than in air. It must be understood that the velocity of sound in water, as in air, is subject to variation by temperature; the higher the temperature the greater the velocity.

PRESERVATION OF THE COLORS OF DRIED PLANTS.—According to M. Storbzl the slow immersion of the fresh plant in a boiling solution of one part of salicylic acid in six hundred parts of alcohol, and then shaking off superfluous moisture, previous to pressing in the usual way between blotting paper, will more nearly preserve the natural color than any other method.

GEOLOGICAL SURVEY OF NEW JERSEY.

We are in receipt of the Annual Report of the State Geologist (Prof. Geo. H. Cook) of New Jersey for the year 1879, setting forth the progress of the geological survey of the State. The survey being charged with work of an economic and practical character, the reports are necessarily largely confined to results related to this work. Joined to this there is, however, some work of a scientific character, and every year something is added to geological science.

The practical topics discussed in the report pertain to the iron mines of the State, soils, drainage, water supply, artesian or driven wells, economic geology of the State, topographical map of northeastern New Jersey, and the U. S. geodetic survey of the State.

Considerable space is devoted to the discussion of artesian or driven wells, of which there appears to be a large number, some of which supply water of a fair quality for economic purposes. In general, however, there is a large percentage of mineral matters held in solution. The deeper wells appear to afford water of a less satisfactory character than the shallower ones. Sulphates of lime, soda, and magnesia abound in nearly all the water drawn from deep wells in the State, and render it unfit for use in steam boilers or other apparatus in which scale is liable to accumulate. The water is of great use, however, for cooling purposes in breweries, etc., and for washing and rinsing where neither heat nor soap is required.

The question of water supply is of very great importance to New Jersey. It is difficult, if not impossible, in many localities to obtain water sufficiently pure for drinking and domestic purposes, except by the collection of rain water in cisterns. Especially is this the case in thickly settled regions near the seaboard. While these regions were sparsely inhabited the surface water, easily obtained by shallow excavations, could be used with comparative safety; but there is now so much danger of contamination from surface drainage that the use of such water is attended with great risk.

The report is an able and interesting document.

Hot Ice and Critical Pressure.

Prof. Carnelley's paper upon the effect of pressure on melting points which was published in the SCIENTIFIC AMERICAN of Oct. 23, 1880, continues to attract considerable attention at home and abroad. The fact that boiling points are influenced much more by pressure than are melting points has long been known. An increase of a single atmosphere (760 mm.) will raise the boiling point of water, for example, from 100° C. to 121·4°, equal to an increase of 39° Fah., while sulphur, which melts ordinarily at 111·5°, will melt at 133·2° under a pressure of 520 atmospheres, an increase of less than half a degree for each atmosphere of pressure. Since the temperature at which a substance boils can be depressed by simply diminishing the pressure upon its surface, it was but reasonable to expect that we could attain such conditions as would place the boiling point of a given substance below its melting point. In that case sublimation would precede and of course prevent fusion. Under the ordinary pressure the boiling point of metallic arsenic is lower than its melting point, so that it is only possible to melt it under increased pressure, which pressure is Carnelley's critical pressure. In the same manner ice has a boiling point lower than its melting point, provided the pressure be reduced to 4·6 mm. of mercury. It does not, therefore, appear probable that the actual temperature of the ice in his experiment, was higher than 32° Fah., for it is well known that when a body has been heated to its boiling point all the heat subsequently imparted to it is converted into work and rendered latent by converting said body into a gas. Neither can we heat any substance above its boiling point until it has been entirely vaporized. Ice boils at 32° under a pressure of 4·6 mm., and no amount of heat can raise its temperature above 32° under this pressure.

Carnelley tells us that for corrosive sublimate the critical pressure is 420 mm. Haass, therefore, proposes, in a communication to the German Chemical Society at Berlin, to use the corrosive sublimate for an instructive lecture experiment to illustrate "critical pressure." Take a strong glass tube, says he, sealed at one end, and place in it a piece of this substance, then connect the other end with a common filter pump provided with a manometer. As soon as the mercury has fallen to 420 mm. the corrosive sublimate may be heated as strongly as it is possible to do with a gas burner, and yet the salt does not melt, but sublimes into the colder part of the tube. If a little air is admitted so that the pressure is increased to 450 mm. it begins to melt. The experiment will prove an interesting one for the lecture table.

The phenomenon is easily explained. Corrosive sublimate melts at 265° C., and boils, under ordinary pressure (760 mm.), at 295° C. We notice here a very slight difference between the boiling and melting point, hence we ought not to be surprised to find that a comparatively slight reduction of pressure, less than half an atmosphere, would bring its boiling point below its melting point.

The critical pressure of Carnelley signifies, when translated into familiar language, the pressure at which the melting and boiling points of a substance coincide or pass each other. Probably, in the exhaustive paper on boiling points which he promises to publish soon, Carnelley will take the same ground as above laid down, and admit that his hot ice was not heated above 32° Fah.

E. J. H.

Atlanta, Ga., Jan. 15, 1881.