

Luminescent Electric Lights.

Mr. H. Ebert recently contributed a paper of great interest to Wiedemann's Annalen on the production of light by high frequency currents, in which results are indicated which are likely to prove of the utmost importance. The fundamental difference between the light and that associated with Tesla's name seems to be in an insistence upon the principle of resonance. He says that it is not necessary to use high tensions, since it has been found that intense light effects can be produced by the movement of exceedingly small quantities of electricity, provided only that the oscillations follow each other regularly and are persistent. The luminous substance of Ebert's "luminescent" lamp is said to be a small disk of compressed luminous paint. This is inclosed in an exhausted glass receiver upon the external surface of which are glued two strips of tinfoil, to which the terminals of the circuit are attached. When the electric oscillations act upon these coatings, active cathode rays are formed on the inner surface. These, though almost invisible themselves, produce a strong luminescent light upon the surface of the luminous paint.

To determine the efficiency of the lamp, it was compared with the amyl acetate standard. Its candle power was found to be about one-thirtieth of this, which is approximately equal to the standard candle. It was found that the energy actually expended in producing this light was only about one millionth of a watt.

Manufacture of Aluminum.

The suit between the Pittsburg Reduction Co., owners of the Hall patent, and the Cowles Electric Smelting and Aluminum Co. was decided some time ago by Judge Taft, United States Circuit Court, Ohio, in favor of the Pittsburg Co. The judge in his decision gives the following interesting explanation of the Hall electric process for making aluminum:

Electrolysis is a process for separating a chemical compound into its elements by passing through it an electric current. The current is effective for this purpose only when the compound is reduced to a liquid state, either by solution or fusion. The compound which is decomposed by the current is called the "electrolyte."

Aluminum is a metal which was first isolated by Wohler in 1827. There is great difficulty in obtaining the pure metal from its compounds because of the

tenacity with which it unites with other substances. The compounds of aluminum are very abundant in nature. The most common, perhaps, is the oxide of aluminum, called "alumina," one molecule of which is composed of three atoms of oxygen and two atoms of aluminum. Alumina is insoluble in water and practically infusible.

Fluorine unites with the metals to form fluorides. The fluoride of sodium and the fluoride of aluminum united form what is known as the "double" fluoride of aluminum and sodium. There are several minerals found in nature which are double fluorides of aluminum and sodium, of which cryolite is much more common than the others and is found in large quantities in Greenland. Its uses are so extensive that it has become a well known article of commerce.

More than fifty metals are known to chemists. When one of these is united with non-metallic substances and the compound is reduced to a liquid state by solution or fusion and subjected to an electric current which decomposes it, the non-metallic element of the compound will be drawn by the current to that point in the bath where the current enters it from the positive pole, called the "anode," and the metal will move in the direction of the point where the current leaves the bath for the negative pole, called the "cathode." Metals differ, however, in the ease with which the current can draw them to the cathode, and when one is more sluggish than another in yielding to this influence, the one is said to be more electropositive than another. Scientists have arranged all known metals accordingly.

The only metals more electropositive than aluminum are magnesium, calcium, strontium, barium, lithium, sodium, potassium, rubidium, and caesium. All other metals yield more readily to the current. When several compounds in solution or fusion are electrolyzed, the current will attack and decompose that compound whose parts are least firmly united, or, as the phrase is, which is least stable. As might be supposed from the foregoing, the more electropositive a metal is, the more stable its compounds are likely to be. Alumina is so common in nature that every one, in a desire to get pure aluminum, would naturally turn to that as one of the simplest of its compounds, but the fact that the oxygen has proved to be so firmly united to aluminum as to resist the action of the highest heat has been very discouraging to chemists. Hall, the original patentee of the patent in suit, was a resident

of Oberlin, Ohio, and a graduate of the college of that place. He had a strong taste for chemistry, and after leaving college in 1885 gave his attention, among other things, to the aluminum problem, which had baffled so many before him. He conceived the idea of obtaining aluminum from alumina by electrolysis, and concluded that, if he could find a bath made up of compounds more electrically stable than alumina, which would freely dissolve alumina, the application of the current to the mixture would precipitate the aluminum upon the cathode and would free the oxygen at the anode. He discovered that the fluoride of aluminum, when united with the fluoride of any metal more electropositive than aluminum to form a double fluoride, would, when heated to fusion, dissolve alumina as freely as sugar will dissolve in water, and that an electric current passed through the fused mixture would deposit pure aluminum at the poles. Hall took out one patent for the process in which he used a double fluoride of sodium and aluminum, and in this patent he also claimed the general process broadly, as we have stated it above. This is the patent in suit. He also took out other patents, as permitted by the practice of the Patent Office, covering the process when the fluorides or other metals more electropositive than aluminum are used.

The two claims of the patent in suit which are here involved are as follows:

1. As an improvement in the art of manufacturing aluminum, the herein described process, which consists in dissolving alumina in a fused bath composed of the fluorides of aluminum and a metal more electropositive than aluminum, and then passing an electric current through the fused mass, substantially as set forth.

2. As an improvement in the art of manufacturing aluminum, the herein described process, which consists in dissolving alumina in a fused bath composed of the fluorides of aluminum and sodium, and then passing an electric current, by means of a carbonaceous anode, through the fused mass, substantially as set forth.

A DISPATCH from Ishpeming, Mich., states that as men were prospecting for a continuation of the Ropes gold mine vein, a short distance from the main shaft rock containing bismuth, a mineral entirely new to the Upper Peninsula, was discovered. From present indications a large quantity of the mineral exists.

RECENTLY PATENTED INVENTIONS.**Railway Appliances.**

CAR COUPLING.—Otto G. Ogden, Louisville, Ky. This is a coupling device of the side-latching type, arranged to reliably interlock with a similar coupling on another car or adjustable to permit of conveniently coupling with the ordinary link and pin devices. An L-shaped latch block is pivoted between two jaws in the front portion of a forwardly recessed draw-head, and a spring pressed dog slides vertically in the upper side of the block to lock it in open adjustment. The coupling operates to couple automatically two meeting cars fitted with the improvement.

CABLE GRIP.—George C. Ormerod and John H. Charles, Asbury Park, N. J. A leading feature of this invention is a vertically movable slide frame having opposite spring members at its lower end, these members carrying jaws to engage the cable, and there being inclined blocks on the outer sides of the members, vertically movable rollers running on the blocks. The improvement affords a simple, strong, and efficient grip, which may be attached to an ordinary car and operated by the customary brake and grip shaft, its jaws being quickly clamped on and released from the cable, and the grip being readily raised and lowered.

SEAL LOCK.—Thomas Gaskins, Arcadia, Fla. This is a simple, accurate, and inexpensive seal to readily indicate whether the car has been opened, the inspector being able to see at a glance by the flash of his lantern at night whether the seal has been tampered with. The seal box has a main and a movable section, a slide fitted to the box holding the sections closed when inserted, and one of the parts having a card receiver, while the other has a marker. After the seal is applied to a car, the only further cost attending its use is the light one of the cards employed.

CAR BRAKE SHOE AND DRESSER.—James E. Warwick, Americus, Ga. To keep that part of the wheel or flange which does not come in contact with the rail to its original shape, this improvement affords an inexpensive device designed to maintain a perfect cutting surface at all times in the face of the shoe. The shoe or dresser has a body portion of soft iron, while a hardened steel portion extends in sinuous and angular form from end to end of the shoe, forming transverse reversely curved cutting members, the soft body having depressions on alternate sides of the reverse curves of the cutting portions.

Mechanical.

MECHANICAL MOVEMENT.—Isaac S. Bryaut, La Junta, Col. This is an improvement on a former patented invention of the same inventor, for converting reciprocating into rotary motion in a simple and effective manner, at the same time avoiding all dead centers. On a crosshead whose central portion moves in the slideways of a frame are rigidly clamped end jaws, and other jaws pivoted on each side of the slideways, with their outer ends extending in opposite directions, and a reciprocating rod is pivotally connected with the inner ends of the pivoted jaws, the rod and the crosshead being arranged essentially in longitudinal alignment, while an

endless chain passes between the pivoted and the clamping jaws.

MOTOR.—George W. Browne and John W. Little, Brooklyn, N. Y. This motor is especially adapted to be operated by water, but may also be operated by steam or compressed air. It is simply and inexpensively built, is very compact, and is designed to be very effective. It has two cylinders, the pistons in which actuate the drive shaft through cranks, piping provided with inlet and exhaust being connected with the cylinders, and there being in the piping opposing valve casings and connected valves simultaneously operated. A weighted trip arm is connected with the valves, and a trip shaft connected with the arm is rocked from the drive shaft.

PUMP.—Edwin M. McGee, Carleton, Neb. This is a simple and easily operated instrument for use either as a suction or injecting pump. It has two nipples, one for injection and the other for ejection, and by simply turning a plug in the instrument the action of the valves is reversed and water which has been injected through one nipple may be drawn back through the same nipple and ejected through the other nipple. The construction is such that all the parts may be conveniently removed for cleaning or renewal.

VALVE OPERATING DEVICE.—Charles Otis, New York City. This inventor has devised means for automatically opening and closing the throttle valve of a pump by which water for operating an elevator is pumped, the devices being actuated to open and close the valve by the rising and falling of a float in one of the tanks. Combined with a yoke pivoted to rock and having connection with the valve is a float connected with the yoke and controlled by a weighted cord or chain, there being a shifting weight on the yoke, and a counteracting weight connected by a cord or chain to the yoke.

DRILLING MACHINE.—Wendell P. Norton, Torrington, Conn. This is a machine of simple construction, adapted for use as a single or duplex drill, and more especially designed for drilling and reaming lathe spindles, billets, ingots, bars, and other bodies requiring a comparatively long but straight and true hole throughout their entire length. The invention consists principally of a hinged work-supporting head adapted to swing in or out of alignment with the drill or drills, the head carrying a revoluble chuck head.

Electrical.

ELECTRO-MAGNETIC SWITCH.—John G. Hartel, Keokuk, Iowa (deceased), Florence L. Hartel, administratrix. According to this improvement the switch is held in closed position by a spring-actuated catch with which is connected a releasing mechanism, there being an armature placed on the field magnet of the motor and connected with the releasing lever. The device is especially designed to prevent the burning out of motors when the current comes into the wire after having been interrupted.

Agricultural.

HAND CULTIVATOR.—Edward Franklin, Boston, Ga. This is an implement designed to be

especially advantageous for use as a garden plow, the oblique downward pressure of ordinary plows being dispensed with, and force being required only in a forward and horizontal direction. The wheel of the cultivator is relieved of the usual downward pressure, and travels easily over the ground, all the weight of the implement being sustained by the slide or heel of the plow. The implement runs very lightly, and may be built to have little weight of itself.

BAND CUTTER AND FEEDER FOR THRASHERS.—Michael G. Schauer and Alden A. Bartlett, Pipe Stone, Minn. This is an improvement upon an invention patented in 1891, according to which the various parts are compactly and simply geared together and operated in perfect unison. The invention provides an auxiliary or lower feed board which forces or carries the chopped or divided material to the thrasher cylinder, even should the upper set of feed devices fail to act, but when the two feed devices act together a perfect and regular feed is secured, although the knives are carried only by the upper feed devices. The construction of knives provides for the removal of individual groups of blades for the repair or replacement of broken sections or cutters.

Miscellaneous.

COAL OR ORE SEPARATING APPARATUS.—Frank Pardee, Hazleton, Pa. To conveniently separate coal from slate, and ores from their impurities, or a heavy from a light material, this invention provides a tank with inclined bottom, and a delivery chute at its upper end, an endless traveling belt being arranged parallel to the bottom, the belt being held in a movable frame, which has a reciprocating motion, while the belt travels longitudinally. The material carried through the water is thus subjected to a shaking motion and a floating action, to separate the lighter from the heavier particles, and carry the latter out of the tank.

REMOVING WATER OR OIL FROM GAS WELLS.—Raleigh H. Staley, Sheridan, Ind. According to this invention the gas is confined in the well to raise the water or oil in the pipe provided for its overflow, a jet of gas being then returned and discharged through a smaller pipe into the upper end of the raised column of water or oil, just below its surface, thus causing a continuous flow of liquid at the top of the well. The improvement also provides for the separation of any gas that may rise through the fluid outlet, conducting such gas to a place of storage or use.

SELF-LOADING CART.—George F. Fischer, Rochester, N. Y. This invention provides an improvement in two-wheeled carts, and one capable of effective service as a military transport, or in a rough country, where skilled labor is not available. Its construction is such that the contents may be dumped in a heap or distributed and leveled over a given surface, this being effected from either the front or back of the cart, whose frame and body may be lowered to any position on the supporting wheels, and the body may be lowered on the frame and independent of the frame, the front end of the cart being in all respects similar to its rear end.

MANHOLE COVER.—Charles Parkins, Hoboken, N. J. The manhole ring, according to this improvement, has lugs on its inner side, and the cover has inclined ways or grooves to engage the lugs, the grooves having notches in their upper walls, and there being holes in the cover top. The ring and cover cost no more than those in ordinary use, but they are so made that the cover may be quickly placed in position and removed, yet it cannot be accidentally displaced, and cannot be moved except by first lifting it with a suitable tool and then turning it laterally.

CONVEYING MATERIALS.—Frederic E. Duckham, Millwall Docks, London, England. This is a method of elevating and conveying grain and similar substances in bulk by a current of compressed air, and the improvement consists in injecting the air current into the midst of the grain within a closed chamber, the grain being fed by gravity directly into the path of the blast, to be carried thereby as fast as it is fed in an upward direction, the exit of the grain being in inverse direction to the feed. The blast and exit nozzles are adjustable relatively to one another to vary the intervening space.

GRAIN CONVEYOR.—This is a further patent of the same inventor for an improvement according to which the exit nozzle has its mouth opening downward, a surrounding air blast sleeve being in communication at its upper end with a compressed air supply pipe, and there being an inclosing chamber within which the nozzle and sleeve are immersed in the midst of a mass of grain to be elevated, the chamber having an air lock or equivalent means of charging it with grain without permitting the escape of air.

PNEUMATIC GRAIN CONVEYOR.—Another patent by the same inventor, for similar purposes, provides for an exit nozzle having its opening downward, while an upwardly directed air blast nozzle is arranged in substantial axial alignment with the exit nozzle, and located near the lower part of a closed chamber containing the mass of grain in the midst of which the nozzles are immersed. The nozzles are separated by such an interval that the grain can flow by gravity directly into the path of the blast, the distance between the nozzles depending upon the angle of repose of the grain, the amount of air pressure, and other variable working conditions.

DREDGING APPARATUS.—Frank A. Hyatt, Beaumont, Texas. In this dredge a frame is pivoted to a plow having a rear concave side, there being an endless chain elevator running on drums in the frame, the lower drum being arranged in the concave and the buckets of the elevator being hinged and adapted to fold parallel to the frame. Attached to the under side of the frame are guide bars which have their lower ends in coincidence with the concave of the plow. The frame is supported at a suitable angle in operation, and the scoop hinged to its lower end works horizontally.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.