

over a mile long. The breakwater was constructed with the aid of caissons. The huge ship by which the Vatican obelisk was brought from Egypt was filled with concrete until it sank, then it was strengthened with rocks until it was above the level of the sea, when it was crowned by a lighthouse. The Emperor Trajan, in A. D. 103, founded Porto, as the harbor constructed by Claudius as a substitute for that of Ostia had soon shared the same fate. Trajan constructed a new canal, which now forms the main arm of the Tiber. Trajan's port is now two miles inland, and is a shallow lake surrounded by ruins. It resembled in every way a modern port; it was hexagonal in shape, and the basin communicated with the Port of Claudius. Trajan's harbor is one of the most interesting works of Imperial Rome.

Egypt alone shipped 190,000,000 bushels of grain to Rome, and Sicily, Sardinia, and other places poured in their enormous supplies of foodstuffs. In addition to this may be reckoned the vast quantities of building materials, especially marble, which were imported. The Claudian harbor was also used as a great naval station, and here was also the central post office for foreign correspondence. In modern times harbors have been constructed on even a larger scale than the three harbors mentioned, which successively served to receive the great ocean-borne commerce of Rome, but none of them ever possessed the same magnificence.

In addition to the discovery of the mummy of King Menepthah, the "Pharaoh of the Exodus," there have been other remarkable discoveries. The season was a productive one as regards exploration in Egypt. M. Legrani, while setting up the fallen columns of the temple, came upon a city gate, the first that has been found in Egypt; it is of great height and is made of large blocks of squared limestone and is double, having one gate within another. Two chariots could easily pass through it abreast. It was built by Amenhotep II. of the eighteenth dynasty. The Exploration Fund has been restoring the temple of Der-el-Bahari at Thebes, and one day while Mr. Carter, the inspector of antiquities in Upper Egypt, was riding up to the door of the house occupied by the excavators, he noticed that his horse's hoofs sank in a hole in the ground. Further investigation brought to light under the house the entrance to a large tomb of the eleventh dynasty in a perfect state of preservation.

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

RIDING-CULTIVATOR.—DANIEL V. FORSBERG, Laurel, Neb. Each shovel-beam of this riding cultivator can be quickly and conveniently adjusted by the hands of the rider, either to be raised or to be shifted sidewise. The shovel-beams can be vertically adjusted at their forward ends and held in adjusted position, enabling the beams to be set so that the shovels will enter the ground to a greater or less degree.

MECHANISM FOR OPERATING CUTTING APPARATUS OF MOWING-MACHINES.—JOHAN A. DAUGAARD, 1 Helgolandsgade, Copenhagen, Denmark. Contrary to the usual custom, no cog-wheels are used for transmitting the motive power from the axle of the machine to the connecting-rod actuating the knives of the cutting apparatus. A driven wheel has an undulated periphery engaged by two of the arms of a three-armed lever, the third arm being provided with a socket in its end, by which a pin carried by a lug is received. A crank-lever has one member connected with the lug, the other member being connected with a pitman operating the cutter-bar. By regulating the length of the arms, the necessary movement of the knife can be obtained, even with very flat waves upon the rim of the driven wheel.

WEEDER.—LOUIS J. KLINGER, Dufur, Ore. This weeder comprises a short main frame attached to an axle. A draft-tongue is extended in front and rear of and beneath the frame, and is flexibly connected therewith. A cross-beam is rigidly attached to the rear end of the draft-beam and is provided with plows or scraping devices. The construction relieves as much as possible the strain put upon the draft animals and enables the weed-cutters to be readily raised or lowered.

Electrical Apparatus.

ELECTRIC-BATTERY ATTACHMENT.—HENRY B. WARE AND CHAUNCEY C. CORNELL, Wymore, Neb. This invention provides an insulated tray to be placed between the elements of a gravity-battery to catch any particles that may fall from the upper or zinc element, thus preventing waste and the oxidation of the copper element, and maintaining an equal internal resistance of the battery and a uniform electromotive force.

TROLLEY.—JOHN H. WALKER, Lexington, Ky. The inventor has devised a simply-constructed trolley-harp and efficient means for catching and directing a trolley-wire into the groove of a trolley-wheel. Protected cold weather will be but a slight impediment to the practical working of the device, for the exposed surfaces and bearings are so arranged as to afford ice but little opportunity to accumulate in the joints. The trolley-harp and catch device not only prevent a large percentage of the wear and tear of the wire and wheel, but also obviate the occasional expense caused by the pulling down of the wires and breakage of suspension-poles.

ELECTRIC RAILWAY.—AUGUST CASAZZA, Hoboken, N. J. The invention relates to a class of electric railways in which the cars or trains take their supply of electricity from a sectional power-conductor, the sections of which are successively connected with the live wire as the car or train passes over them. In Mr. Casazza's arrangement, a second sectional conductor is employed together with switches, each of which is con-

nected in series with two adjacent sections of the second or switch conductor and controls the connection of the power-conductor sections with the feeder. In applying this system to overhead conductors, the inventor employs a special construction of supporting plates for the sectional conductors.

Engineering Improvements.

VALVE-GEAR FOR GAS-ENGINES.—CHARLES WERNER, Pine Grove, Penn. A spring-closed air-admission valve is employed, to which an arm is secured, provided with a catch. The catch is engaged by a hook carried on a rod reciprocated from the engine. Devices are controlled by the exhaust-valve-operating mechanism, whereby the engagement of the reciprocating rod with the air-admission valve is controlled and made to follow the opening of the exhaust.

Mechanical Devices.

FLOUR-BOLTER.—FREDERICK W. BROWN, Lee Bell, W. Va. The inventor arranges the bolting-chambers in triangular form, suspends them from the angles of the triangle, and locates the operating mechanism in the space formed by the chambers. Thus a compact bolter of great capacity is produced, which can be easily balanced to secure a uniform, gyratory motion without any backlash. Provision is made for supporting three bolting chambers from three links and equally distributing the weight on the links. A portion of one chamber is made to serve as a housing for the cut-off of the adjacent chamber, when the cut-off is withdrawn from over its bolting-cloth.

FAN ATTACHMENT FOR ROCKING-CHAIRS.—FRANCIS C. and GEORGE E. MERTZ, Port Chester, N. Y. The object of the invention is to produce a device which is attachable to any rocking-chair and which is adapted uniformly to rotate a set of fans mounted to turn upon the chair. The result is secured by the insertion of a spring between the operating mechanism and the fan, the spring being wound up by the rocker and running down as the fan-carrying shaft is turned.

FUEL-PRESS.—GEORGE W. MURPHY, Northfield, Minn. This press is designed to press straw into compact form for use as fuel. The apparatus has a spirally-threaded conical compression-chamber at the large or receiving end of which a plunger is mounted to reciprocate, serving to force the material to be compressed longitudinally into and through the compression-chamber. The thread of the compression-chamber serves to turn the material to be compressed, causing it to be rolled into compact form.

SPEED-GEARING.—ABRAHAM A. A. LEVIN, Manhattan, New York city. By means of this simple gearing the speed of an operated machine or device can be gradually increased over the speed of the driving-engine, thus saving steam. A series of independent main crank-shafts are employed, on each of which a gear-wheel is mounted. Supplemental and independent crank-shafts are also employed. Connecting-rods join the cranks of opposite crank-shafts. Pinions on the auxiliary crank-shafts engage with the gear-wheels on the first-named crank-shafts. On a power-shaft, gear-wheels are longitudinally movable to engage the pinions. By this device three separate machines can be operated.

Correspondence.

"The Armor-Plate Fiasco."

To the Editor of the SCIENTIFIC AMERICAN:

Your article on page 370 on "The Armor-Plate Fiasco" is true in every word; not only that, but because of the foolish acts of Congress, the government has laid itself liable for more than half a million of dollars damages to the contractors for detention of their work and delay in delivering their ships.

The Cramp firm already have a large claim against the government for just such detention on account of non-delivery of armor, and they will collect it too, not at this Congress or the next probably; but it will be collected. *Vide* the large collections made by the contractors of the Civil War, and the claims for damages for all the present contractors are much more meritorious than any of those of the Civil War.

And from the expenses of navy yard work, no one believes that the government can manufacture armor for less than \$1,000 per ton.

Then, again, how about the up-keep of the establishment when we do not need armor?

JOHN R. THOMAS.

Washington, D. C., June 15, 1900.

Removing Foreign Substances from the Eye.

To the Editor of the SCIENTIFIC AMERICAN:

A simple way of removing cinders or any foreign substance from the eye, is to gently hold the eye open with the fingers and thumb of one hand, while with the other hand to dash light handfuls of water in and across it, so as to produce a current of water flowing over all the surface of the eye, and the under side of the lids. The effect of this almost invariably is to push the intruding object from the eye.

This simple method should not be mistaken for washing the eye or immersing the face in water and opening and shutting the lids. Any misdirected help often tends to imbed an object so that the removal is difficult.

The eye should not be rubbed or one lid drawn over the other, or a silk handkerchief drawn across the affected part, but the eye should be kept from winking as much as possible while prompt action is being taken to cause a current of water to pass over the surface of the ball.

This method is a copy from nature, for when very fine dust enters the eye, nature seeks to relieve it by means of the fluids which moisten and lubricate the eye; and when larger objects enter, and cling more tenaciously, the irritation causes a copious discharge of tears so that the eye overflows, as nature tries by flushing it to propel along and float away with the current the cause of the irritation.

M. T.

Springfield, Mass., June 16, 1900.

[Our correspondent's advice, while excellent, will not, we think, answer in all cases. In turning metal on a lathe, chips are very apt to fly into the eye with considerable force, producing painful, if not serious, wounds. To add to the difficulty the chips are often hot. Water would hardly tend to dislodge foreign particles of this kind. It is also essential to have clean water for flooding the delicate tissues of the eye. Chips of metal in the eye are of such a serious nature that many eye hospitals have most powerful magnets for use in removing the chips.—ED.]

The Current Supplement.

The current SUPPLEMENT, No. 1278, has many articles of unusual interest. "The Mount Prospect Laboratory" describes the chemical and biological laboratories for the examination of Brooklyn (New York) drinking water. The various forms of apparatus for collecting samples are illustrated, as well as the portable ice chest for transporting the bacteria samples. "The Duddell Oscillograph" describes a most ingenious electrical testing instrument. "Liquid Air as a Means for the Manufacture of Oxygen" is by Prof. Henry Morton. "The Palaces of Fine Arts of the Exposition of 1900" is accompanied by two large engravings. "Hot Water Heating from a Central Station" is by H. T. Yaryan.

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WIRE-TIGHTENER.—JAMES P. HADDIX, Merna, Neb. The wire-tightener comprises a frame having a notched segment and feet for engaging a fence-post. An angular lever is fulcrumed on the frame and has forked members. Notched bars are pivoted to the forked members of the lever and are adapted to extend on opposite sides of a fence-post. A pawl is carried by the lever and engages the notched segment in tightening the wire.

CAN-FILLING MACHINE.—DAVID F. BALDAUF, Eden, N. Y. On a frame, shafts, geared together, are mounted. Cams are extended on the shafts in opposite directions and are designed to move frames at the ends of the machine. A tray holds the cans to be filled; and a hopper feeds the material. The beans or other material are placed in the hopper. When motion is imparted to the shafts, the tray and hopper are rocked up and down alternately at opposite ends. This movement will cause the material in the hopper to spread out evenly and pass into the cans.

COMBINED LATCH AND LOCK.—LEWIS C. WETZEL, Bellefonte, Penn. This invention provides a novel gravity-operated lock, so constructed that the sliding latch-bolt serves as a locking-bolt which can be operated only from the outer side of the door by a suitable key. The lock can be cheaply constructed and is efficient in operation.

MACHINE FOR UNDERMINING COAL.—ANDR. OCHTINSKY, Rockvale, Colo. This invention relates to mining machines and provides a portable machine adapted to be operated by hand and capable of easy shift laterally and in an advanced direction as the picks undermine the coal. The invention consists in special forms of devices for feeding the machine forward and for turning it laterally, and in other details of construction and arrangement of the parts.

TURBINE WATER-WHEEL.—JOHN W. TAYLOR, York, Penn. The object of the invention is to improve the construction of that class of turbines which receive the water upon the upper part of the buckets through stationary chutes surrounding the wheel, the admission of water being controlled by means of an annular or cylindrical gate, adjustable to open or close the water-inlets or chutes. The inventor provides a gate which is adapted to open downward and close upward, so that water is admitted at the top of the wheel, to produce the greatest effect practicable before being discharged from the wheel.

Miscellaneous Inventions.

WATER-COCK.—JAMES P. BENTON, 187 Second St., Dalles, Ore. The invention relates to water-cocks and faucets, intended for out-door purposes. The construction of this mechanism permits of the automatic bleeding or venting of the water of a stand-pipe. This is readily and completely effected without siphoning the water in the hose back through the stand-pipe. It causes the bleeder to be put into action by the stand-pipe instead of by keys, thereby venting the pipe every time the water is shut off.

THILL OR POLE COUPLING.—ALBERT H. FORSYTHE, Sarcoux, Mo. Mr. Forsythe, in this invention, improves upon a former coupling. He combines the several parts so that they can be conveniently applied to any axle, and so that the shaft can be coupled to or

uncoupled from a vehicle with less trouble and greater rapidity than heretofore. All rattling is completely prevented. The coupling comprises a clip, having cheeks which receive the knuckle of the pole. The clip has an attachment consisting of side pieces. A pin is secured to one of the pieces, the opposing piece being arranged for locking with and disconnecting from the pin. In pivotal contact with a locking and an opposing side piece, is a connecting bar. This bar carries a spring, the free end of which extends transversely below the pin.

PORTABLE BUILDING.—JOHN C. KARR, 1020 East Ravenswood Park, Chicago, Ill. By this method a light, portable building can be constructed so as to be quickly set up and taken down. The foundation comprises a plurality of sections with mitered ends where they meet at the corners and square abutting ends where they meet along the sides or ends of the building. Cast plates bolted to the wooden foundation have semicircular upward projections at the section joints, and other plates have circular projections secured to the foundation with bolts, which have hooks at the end to catch brace wires. An angle iron on each section receives siding, so that when the pipe-posts are set in the projections, the pieces are fastened together. This supports the siding, posts and roof on the foundation.

ACETYLENE GAS GENERATOR.—WILLIAM BURNOWS MINOR, Deposit, N. Y. The operation of the apparatus is automatic. Arranged to prevent waste of carbide, the apparatus permits a ready recharging without danger of the escape of gas into a room, or without interruption of its generation. A supply-pipe and a series of generators are arranged to receive water; valves are adapted to govern the supply. Floats in the generators open and close the valves. A locking device at all the generators except the last, automatically holds the respective valves in position, and a connection between the locking devices and the float of the last generator allows the former to release the valves when the float is raised.

VENTILATOR.—CONRAD J. VOLLMER, Lafayette, Ind. The ventilator or grate in this device has a frame, slats terminating at their upper ends below the top of the frame form a space between the frame top and the upper ends of the slats. The grate has a cover provided with slats for covering the spaces between the slats of the grate. It is free to move transversely through the space formed between the frame top and the upper ends of the grate slats. Lugs on the cover abut against the frame top to hold the cover in a nearly horizontal position. The ventilator is for use on buildings, and permits the passage of air to or from the part to be ventilated; or, allows its exclusion in winter time or during rainy weather.

HYDROCARBON-GENERATOR.—FRANCIS M. BAKER, Lomira, Wis. The device embodies novel means for regulating the generation of the vapor, by transmitting to the retort the necessary heat. The transmission is through separate conducting parts which are in contact to transmit the heat, and which upon being moved out of contact cease to pass the heat. In this way the generation of vapor is stopped. A wick feeds the oil or alcohol to the retort by capillary attraction instead of by gravity air-pressure.

ARITHMETICAL SLATE.—HARRY CLAUD SEILER, Milton, Penn. A slate-frame, a slate therein having