

The Division of Vegetable Physiology and Pathology of the Department of Agriculture.

The Division of Vegetable Physiology and Pathology of the United States Department of Agriculture has done important work during the fiscal year ending June 30, 1899. One of the most important lines of work of the Division is that relating to nutrition. The science of plant pathology is rapidly crystallizing and there is nothing that will put it on a firmer basis than the study of the phenomena of life. The primary object of this work is to preserve and make useful the life of plants, and this can be done only when we fully realize the importance of the life functions themselves. After all, disease is only a manifestation of the loss of vitality and how to prevent this loss is a problem of the greatest scientific, as well as practical importance. Closely related to nutrition is the problem of heredity, and its bearing on the improvement of plants by breeding and selection. To breed scientifically the functions of the cell itself must be better understood, otherwise the work must be looked upon as more or less empirical.

No systematic attempt has been made in this country to investigate the many serious diseases of timber. As soon as the tree is cut it becomes subject to the attacks of many fungi which often cause serious loss. With a view of obtaining some preliminary data for use in inaugurating more extensive investigations, an agent has been appointed to study some of the more important diseases affecting timber. Field studies of some of the more destructive diseases are being made and information is being gathered which will be of use in determining the line of work looking toward the prevention of the troubles. A study of the diseases of forest and shade trees is closely related to the work on the diseases of timber. Some more or less preliminary studies have been made of the diseases of trees, and it is planned to extend these investigations. The diseases are, as a rule, of such a nature as to necessitate much painstaking work to discover their cause, many of them being produced by unfavorable surroundings, such as improper soil, or food, or the presence of noxious substances. To determine the cause, and the combinations of the influences at work in such cases, is usually a great problem.

Special investigations have been made relative to the little peach disease, and to diseases of pomaceous and other fruits. Studies were also made on the diseases of truck and garden crops, and important results have been obtained in the treatment of a number of diseases of the Irish and sweet potato. The work on plants under glass has been continued and a number of interesting conclusions were secured. The

diseases of violets, carnations and roses, have received special attention, as also the diseases of such crops as lettuce, tomatoes and lemons. This Division has from time to time received complaints relative to the serious diseases of cotton in various parts of the South, especially the one affecting the Sea Island cotton grown off the coast of South Carolina. This cotton is exceedingly valuable and the lands on which it can be grown successfully are in great demand. It has already been shown that the trouble is due to a fungus which attacks the roots of the plants and occurs not only on cotton, but also on other crops when grown in the infected soil. This fungus has great vitality and may live in the soil for years and attack cotton when again planted there. An assistant is making studies with a view to breeding cotton which will have for its object the improvement of varieties now grown both as regards marketable qualities and the ability to resist various diseases. Various facts have been obtained relative to cereals and cereal diseases and extensive work on the curing and fermentation of tobacco has been inaugurated, the investigations being carried on in co-operation with the Division of Soils. The primary object of the work is to obtain, if possible, the cause of the peculiar flavor and texture of different kinds of tobacco and the possibility of controlling these in the finished product.

Some important advances have recently been made in the use of pure yeasts for the production of grape, apple, berry and other wines. Ordinary fermentation in the juices is brought about by the organisms occurring on the fruits themselves, and these organisms are often of such a nature as to seriously interfere with the production of high-class wines. By using a large quantity of yeasts known to be pure, the difficulties resulting from the presence of undesirable organisms can be overcome. Some yeasts were obtained in Germany and preliminary experiments were made to determine their effects on the fermentation of cider. The different forms of yeasts were found to possess distinctive characteristics as far as the production of flavor and bouquet are concerned. Experiments have also been inaugurated with a view to determining the affection of the accumulation of copper in the soil, copper sulphate forming the basis of nearly all fungicides used.

Considerable time was also devoted to the inspection of plants and seeds introduced from various countries for the purpose of distributing them in this country. It is, of course, of the highest importance that all plants and seeds brought in in this way shall be carefully inspected and, if necessary, treated so that no serious fungus or other parasite may be destroyed with them.

Special attention is paid to plant breeding and further work was carried on with hybrid citrus fruits. The walnut crop of California was investigated and it was found that the vine disease, which has been more or less prevalent in Southern California for a number of years, can be kept in check by grafting on certain kinds of roots which are resistant to the disease, and the crossing of raisin grapes has now gone sufficiently far to warrant the statement that time and judicious crossing are all that are necessary to obtain a hardiness of the plant and the fruit qualities required in California, Arizona and Nevada to withstand the cold spring winds.

A sub-tropical garden at Miami, Fla., has been placed at the disposal of the Department, and contains about six acres. The plan is to use this garden in making preliminary tests of hybrid fruits, etc. On the ground is a well-equipped laboratory, which was erected free of cost to the Department.

The Division, of course, bears its part in the correspondence and lectures of the Department. B. T. Galloway, Esq., is the Chief of the Division of Vegetable Physiology and Pathology.

The Current Supplement.

The current SUPPLEMENT, No. 1283, has many articles of unusual interest. "The Electrical Tower at the Pan-American Exposition" is accompanied by a full-page engraving. There are also illustrations of the park lake and two of the buildings. "Transmitter Using the Sine Wave for Cable Telegraphy," by Crehore and Squier is an elaborate article, fully illustrated, describing this remarkable instrument. The "American Engineering Competition," III, deals with the heavy iron and steel trade. "Some Twentieth Century Problems" is by William Trelease. "The German Antarctic Expedition" is described at considerable length. "A Votive Adze of Jadeite from Mexico" is an interesting archaeological article. "Tycho Brahe" is a very full article on the early Danish astronomer.

Contents.

| Contents. | |
|--|--------|
| (Illustrated articles are marked with an asterisk.) | |
| Agriculture of the tropics..... | 67 |
| Artillery practice*..... | 68 |
| As others see us..... | 67 |
| Bicycle, musical..... | 75 |
| China, education in..... | 70 |
| China, resources in..... | 66 |
| Comet, new..... | 67 |
| Chronoscope*..... | 68 |
| "Deutschland"..... | 65, 72 |
| Dynamite magazines, protection..... | 69 |
| Flood-gate, automatic*..... | 69 |
| Food, chemical..... | 75 |
| Indian..... | 67 |
| Mining production in Great Britain..... | 74 |
| Oyster, guardian of the*..... | 71 |
| Packing, improved*..... | 69 |
| Partridge, photographing a*..... | 75 |
| Patent, \$50,000 for a..... | 72 |
| Patent suit..... | 66 |
| Perforator for printing presses*..... | 69 |
| Petroleum, organic bases in Baku..... | 75 |
| Power generating plant of the Paris Exposition*..... | 73 |
| Preservation of wild animals of Africa..... | 67 |
| Propeller, replacing broken..... | 71 |
| Rail joints and street noises..... | 66 |
| Sash-weight*..... | 70 |
| Sulphuric acid, new processes for Tunnel, Park Avenue, equipment of..... | 66 |
| Vegetable physiology..... | 76 |
| Violet scent..... | 75 |

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

SULKY ATTACHMENT FOR HARROWS.—LEON D. HOWARD, Marston, S. D. This attachment is so constructed that it can be turned from side to side as occasion may demand, without exerting corresponding influence on the harrow. Only a single wheel is needed. The driver is seated close to the team, enabling him easily to control the animals. Since the horses are harnessed by whiffletrees to the tongue or pole, the driver is out of the dust. The attachment can be applied to any harrow; and when applied, will cause the harrow to draw much more easily than the customary harrow.

PLOW.—JAMES A. FREEMAN, Belleview, Fla. The stock is so constructed that cutters, sweeps, cultivator-blades or shares, and the like can be flexibly or adjustably applied thereto, so as to accommodate the plow to any character of soil. A landside is provided which is attached to the stock. Sweeps or like blades can be adjustably secured upon the landside. When the landside and stock are connected with the beam and handles, the plow will operate close to a line of fence.

CULTIVATOR ATTACHMENT.—HENRY T. CROSBY, Coleman, Tex. The device can be conveniently attached to the standards or footpieces of any cultivator, and holds different numbers of small plows or harrow-teeth for the cultivation of any crops, or for use at any place where a small harrow is needed. It is of light and simple construction, so that it can be cheaply made.

COW-MILKING MACHINE.—MODESTUS J. CUSHMAN, Waterloo, Iowa. The inventor has devised and put in successful practical use a milking-machine in which suction and traction are applied to the animal's teats, and in which the vacuum in the teat-cups is made alternately to increase and decrease, thus closely imitating the action of a calf's mouth, without injury to the teats or annoyance to the animal, so that a larger yield of milk is obtained.

SEED-COTTON CLEANER AND FEEDER.—VANDER H. TALTON, Columbus, Ga. This apparatus is designed to remove foreign substances from seed-cotton and at the same time to even and feed the cotton uniformly to the gin. Heretofore an endless traveling apron has been employed in connection with one or more toothed cylinders and a screen arranged under one of them for separating the foreign matter. Mr. Talton dispenses with the apron and employs in place of it a rotatable cylinder having tangential teeth. The cylinder is arranged in connection with another, more rapidly rotated, toothed cylinder, whereby the apparatus is reduced in size, made less expensive and more efficient.

Mechanical Appliances.

BOTTLE-FILLING MACHINE.—SAMUEL C. MILLER, Louisville, Ky. The invention provides a bottle-filling machine which employs a vertically-movable liquid-holder; spaced filling-tubes depending therefrom to enter the necks of bottles placed beneath the tubes to receive liquid; and means to cut off the flow of liquid

when the bottles are filled. The liquid is accurately controlled, while passing into one or more bottles. The machine is devoid of all complicated parts and is very efficient in its operation.

BOILER-TUBE SCRAPER.—WORTHINGTON H. INGERSOLL, Hamburg, N. J. The scraper belongs to that class in which a shank carries a series of spring-pressed arms provided with cutting-blades or cutting edges. The inventor has improved the cutting-blades; provided a stronger construction of shank; given the arms a strong support when closed, so as to prevent the breaking of the rivets by which the arms are pivoted to the shank; and constructed the tool so that the scale and dirt will find a ready exit and will not interfere with the pivotal movements of the arms.

MACHINE FOR MAKING FIREPROOF COVERINGS FOR WALLS OR CEILINGS.—PATRICK RYAN, Manhattan, New York city. This machine comprises an elongated supporting-frame having a table on its upper portion; a holder, for liquid coating material, having compartments; a mixing-tank for the liquid coating material, adapted to supply the holder compartments; and a number of paper-sheet carriers, arranged in sequence over the table and from which elongated webs of paper may be extended over one another to rest upon the table. The escape of the liquid from the holder-compartments upon the sheets is readily controlled. The coating material is evenly and thinly distributed as the sheets are moved on the table. A device perforates and scallops each paper-sheet. All the coated sheets are compressed together, thus forming a continuous plaster-board. The compound web is cut into sheets or completed plaster-boards, as it approaches the discharging end of the machine.

Railway Contrivances.

SEAL-LOCK.—CHARLES A. RASCO and JOHN T. TAYLOR, Americus, Ga. This seal-lock for freight-car doors has a casing in which a hook-latch is mounted to swing in the casing; and a hook-bar is designed to be attached to the car-door and to be engaged by the hook-latch. An arm is extended outward from the hook-latch through a slot in the casing; and a lug on the arm has a recess to receive one end of a seal. A keeper-block is mounted to rotate on the casing and has a recess to receive the other end of the seal. A rotary movement of the block while engaging the seal is prevented. The seals are made of glass and hence are very cheap.

LOCOMOTIVE-EXHAUST AND MEANS FOR REGULATING DRAFT.—WILLIAM H. PRENDERGAST, 416 Montgomery Street, Savannah, Ga. With the smoke-box an exhaust steam passage communicates, an independent passage being provided for the exhaust-steam. Two rocking-valves are applied to these passages, which valves are mounted upon shafts on which spur-gears are keyed. An intermediate gear meshes therewith; and a lever-mechanism operates the intermediate gear, whereby the oscillation of the intermediate gear effects the opening and closing of the valves. The draft may be left unaffected, while exhaust-steam is allowed free in-

dependent discharge. The amount of exhaust-steam permitted to enter can be regulated by adjusting the valves.

Miscellaneous Inventions.

BIT-GUIDE.—FREDERICK A. LAMBERG, Hot Springs, Ark. The invention provides a mechanism which is small and easily transported, which can be secured to the side of a bench or table, and which will serve for accurately guiding a boring-bit and brace, so that a series of holes can be bored at the same angle or a hole can be bored at any desired angle.

BUCK-SAW.—CHARLES T. REDFIELD, Glenhaven, N. Y. The saw comprises opposite frame-bars between which an arch-bar extends, curved upwardly from end to end. A continuous brace-bar overlies the arch-bar and is made straight, and rigid at its center with the arch-bar at the crown of the latter. The brace-bar can be secured positively to the frame-bars at the ends of the brace-bar. The longitudinal tension exerted on the saw-blade operates longitudinally on the straight brace-bar to hold the arch-bar from moving up between the frame-bars and thus increases the rigidity of the saw.

ANCHOR-IRON.—WALTER R. MADISON, Springfield, Mass. The anchor-plate is adapted to be set in a wall and is provided with an eye. The joist has on its top between the ends an upwardly-extending hook arranged to engage the eye. The anchor-iron is applicable to the ends and sides of a floor and joists and is arranged for holding the joists securely in place on the supporting-walls, but in such manner that, should the joist break or be turned over or otherwise give away, it will readily fall without pulling down the structure.

EYEGLASS-HOLDER.—CARL F. KABISCH, Manhattan, New York city. This holder is so constructed that the eyeglasses can be instantly brought into position for use and as quickly returned within their case, both operations being accomplished by the movement of the thumb of the hand in which the holder is held.

INK-WELL.—OWEN V. FARRELL, Deposit, N. Y. The well comprises a body-portion and a neck-portion. In an opening in the top of the body-portion a bulb is arranged. The neck-portion is provided with a cover. By pressing on the bulb, the cover is swung up and ink forced up the neck-portion. Upon removing pressure from the bulb, the cover drops and the ink sinks.

THEATRICAL APPLIANCE.—CLAUDE L. HAGEN, 542 W. Twenty-sixth Street, Manhattan, New York city. This stage appliance, giving one the illusion of an object passing over a surface (ground, water, ice), is particularly adapted for use in horse or chariot races. The inventor employs a number of narrow endless belts or aprons, arranged on the floor of the stage, between which, chariots and other objects which are supposed to be moving, are placed. The belts are painted to represent the ground over which the chariots run, so that when the belts are driven, it appears to the spectators as though the chariots were actually moving rapidly over the ground. The appliance contributed considerably to the success of the play, "Ben Hur," presented in New York. In an early issue we purpose to give a more extended description.

CHEESE-CUTTER.—WALTER G. DOTY, Middletown, Ohio. The invention provides a machine by means of which any desired amount can be cut from a cheese by a very little power. A simple means is provided for determining the proper position for cutting off a desired weight of cheese.

ATTACHMENT FOR OIL-CONTAINERS.—WILLIAM L. CLAYTON and NEWTON R. PERSINGER, Central City, Neb. The invention relates to a device for filling lamps and the like from a can or barrel. The oil is forced out by air-pressure. A valve-chamber communicates at its middle with a tube or hollow column. One end of the valve-chamber is open to the atmosphere; and the other end communicates with air-pressure devices. A valve is mounted to reciprocate in the valve-chamber and is movable over the mouth of the tube or hollow column, the valve seating in either end of the valve-chamber and serving alternately to place the tube in communication with the air-pressure devices and with the atmosphere.

GATE.—TOBIAS BEARD, Columbiana, Ohio. Simple mechanism whereby a gate can be opened and closed by a person while sitting in a vehicle, forms the subject of this invention. The gate is mounted to swing upon a pivot-bar. An opening-bar is provided, which has arms from which ropes or cables extend. On the bar is a cross-head. Levers are pivoted on the forward end of the gate and are connected by draw-rods with the cross-head. Spring-latches are operated by the levers.

FIREPROOF-SHUTTER.—EMILE F. VERDEL and FELIX L. SAINO, Memphis, Tenn. This metal shutter consists of two spaced corrugated metal plates, the corrugations of one plate being disposed at an angle to those of the other. A fireproof lining is located between the plates and in contact therewith at intervals only, so as to leave on each side of the lining air-spaces running in different directions. The construction renders warping impossible.

COLLAPSIBLE SHIPPING-CRATE.—ZACHARY T. STOCKS, Everett, Wash. The box comprises a front, a rear side, and a bottom hinged to the front and having a sidewise hook connection with the rear side. A cover or top is hinged to the rear side. Spring-pressed catches are pivoted on the front and are adapted to swing into engagement with keepers on the top. Ends are hinged to the front and to the rear side, each made in sections hinged together.

TOBACCO-HOLDER.—WILLARD P. SMITH, Manhattan, New York city. It is the usual practice to wrap chewing-tobacco in tin-foil; and when so wrapped, it becomes dry and practically useless in a very short time. The present invention provides a package or holder practically air-tight when closed, thus preventing the escape of the tobacco's moisture, and so constructed as to permit the forcing out of a quantity of tobacco whenever desired.

NOTE.—Copies of any of these patents can be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.