

employed in achieving the remarkable results, so that we are pleased to announce that in our SUPPLEMENT for next week, No. 1209, we shall publish an elaborate paper upon the kites, windlass, meteorograph, etc. This article has been prepared by Mr. S. P. Ferguson, of the Blue Hill Observatory, who has devised and constructed the apparatus which we have shown.

Szczepanik Again.

Szczepanik occasionally gives interviews to the press at his laboratory, and when Dr. Johannis Horowitz, the Vienna correspondent of The New York Times, went to see him, a short time ago, he found the young man bubbling over with new ideas in which the ultra-violet rays played a major part. The inventor took Dr. Horowitz into a room in which two miniature railway trains were approaching each other on the same track. At some distance from each other they suddenly stopped. This was another one of the great inventions added to his repertoire, and the inventor explains the effect as follows: When the trains are approaching each other on the same line of rails, the ultra-violet rays of light from the lamps act upon the respective electric apparatus, set automatic brakes in motion and thus stop the trains, whether in daytime or at night.

The inventor also thinks that, with the aid of the apparatus he is constructing, he will be able to aim guns with absolute certainty. On the enemy's approach the other army would withdraw, leaving behind baggage wagons and other impedimenta loaded with bombs. The explosives are furnished with a small apparatus, the nature of which he does not

divulge. When the enemy reaches the camp, a powerful electric or magnesium lamp will shed a light on the explosive material, and, at the same moment, when a single ray falls upon the apparatus, the bombs will all be exploded. In the same way submarine mines would be fired, and, of course, it would be useless to aim guns. Guns could be directed against the enemy without even measuring the distance. With a rectangular stop, rays would be sent out which would form a wall of light which could not be penetrated by a bomb, provided with the apparatus without its bursting. Instead of the present problems of aiming and measuring with guns, it should be practically, in the future, aiming at a light. These are only a few of the stories which emanate with delightful frequency from the laboratory of this gentleman who is blest with such a fertile imagination.

Seventy-fifth Anniversary of Franklin Institute.

Franklin Institute of Philadelphia was organized on February 5, 1824, and a committee was appointed to assist in a formal celebration of the event. The splendid work the Franklin Institute has accomplished cannot be overestimated. The additions to the roll of membership, and the subscriptions which have been received to the endowment fund, are practical evidences of the interest exhibited. The library is rearranged, and the model collections have been rehabilitated. The excellent work done by the sections and committees all points to increased activity. Many important discoveries and important inventions were first brought to the attention of the world in the venerable building of the Franklin Institute.

The Current Supplement.

The current SUPPLEMENT, No. 1208, has a number of interesting articles. "Restoration of the Temple of Karnak" is a paper accompanied by an elaborate series of illustrations showing the splendid work which has been accomplished in repairing this wonderful milestone in the world's history. "Tuberculosis in Animals," by W. Hunting, is continued. This is a most valuable article, dealing with one of the most serious problems which now confront us. "Instruments for Measuring Small Torsional Strains" is an article describing a very ingenious measuring instrument. "The Use of Musical Vibrations and Chromatoscopic Figures" describes Dr. Corning's method of treating nervous diseases. It is an entirely unique and successful scientific treatment, requiring the use of the phonograph and stereopticon. "Geographic Distribution of the Vertebrata" is a lecture by Prof. Witmer Stone specially reported for the SCIENTIFIC AMERICAN SUPPLEMENT.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

COTTON-GIN.—EUGENE R. BARBER, Valdosta, Ga. The cotton-gin provided by the present invention has a belt with gripping-plates which grasp the cotton in order to retain it on the belt. The belt passes beneath a stationary blade; and the cotton at that point is acted upon by a set of stripping-fingers, which stroke past the edge of the stationary blade to remove the cotton-seed.

LAWN-MOWER.—EDMUND A. LANDON, Penn Yan, N. Y. The primary object of this inventor is to construct a machine which will cut grass and weeds of any height, and which will cut close to a tree, shrub, or sidewalk. With this end in view, the machine is provided with a finger-bar having a rearward extension formed with a transverse groove in its upper face. A sickle-bar has guided, lateral movement on the finger-bar, and has a rearwardly extending arm provided with a tongue loosely engaging the transverse groove in the rearward extension of the finger-bar. The arm carries a roller engaging the cam-ribs of the driving wheel. By reason of this construction the knife or sickle-bar will be moved quickly and uninterruptedly while the machine is moving forward.

Bicycle-Appliances.

SUPPORTER.—HENRY VANDER WEYDE, London, England. The bicycle-supporter comprises a pair of legs pivoted to work upon universal joints at opposite sides of the rear wheel. Springs are also applied as to tend to swing the legs downwardly about their universal axes. Controlling-links, universally joined to the main frame and to the legs, constrain the legs to diverge outwardly when lowered and bring them close alongside the rear wheel when raised. The legs are operated by a cord passing over pulleys, to the handle-bar. Novel mechanism is provided whereby the cord is wound up to bring the legs into operative position. The supporter is well adapted to hold the bicycle on any surface, even when the roadway is laterally inclined.

Electrical Devices.

AUTOMATIC CIRCUIT-CLOSER.—HENRY F. BLACKWELL, Jr., Brooklyn, New York city. This invention provides means for switching Gamewell, standard cut-out, fire-alarm signal-boxes into circuit. The means in question comprise two swiveling switch-arms having connection with the main circuit. A cam operates to move the switch-arms into position to close the alarm-circuit. The cam is provided with a pinion and is rotated by the rack as it engages the pinion in its downward movement. This downward movement and consequent rotation of the cam causes the switch-arms to close the alarm-circuit in order to sound the bell.

Engineering Improvements.

STEAM-ENGINE REVERSING VALVE.—HARRY E. BROWN, New Matamoras, Ohio. The valve-gear comprises a main and an exhaust-controlling valve. The main valve has a passage extending through it, adapted to receive the controlling-valve, and an exhaust-port within its body connecting with the passage. A hollow controlling-valve mounted to have a limited reciprocation operates to close the passages, and has ports connecting its interior with the exhaust passage at all times, and other ports adapted to connect its interior with either side of the main valve. A reversing-valve is provided, which admits steam to either side of the main valve. It is possible to reverse the engine by the operation of the throttle-valve, thus enabling a number of parts to be done away with and simplifying the valve-gear.

ROTARY ENGINE.—GEORGE H. CARR, Rockport, Tex. This improved rotary engine comprises two rotating piston-disks having peripheral contact and connected to insure uniform rotation by means of gear-toothed sections located at the middle of the length of the disks, a portion only of the teeth and coating gorges extending throughout the length of the disks and forming piston-heads or abutments. To insure evenness of rotation, a toothed section is employed; but in order to maintain a durable tight joint and to reduce the fric-

tion to a minimum, this toothed section is made as short as possible. By this construction a tight joint and a reduction of friction are both secured.

ROTARY-ENGINE.—JAMES J. CALLIHAN, New Orleans La. This engine has a ring-cylinder with circular abutment-cavities opening from the periphery of the cylinder-cavity. Exhaust and supply ports open into the abutment-cavities upon opposite sides of a radial line. A piston-disk is provided having piston-heads fitting the cylinder-cavity. Abutments are mounted to turn in the cavities already mentioned, and have curved recesses adapted to receive and pass the piston-heads. The abutment-edges are cut away on the center line of the recesses, so as to uncover the ports when the abutment is in a radial position.

FUEL-FEED DEVICE FOR FURNACES.—CHARLES GROLL, Roubaix, France. This self-acting apparatus for stoking smoke-consuming furnaces comprises a hopper with regulating-vanes, an endless distributing apron, and a distributing-box, the partitions of which are arranged to allow coal of varying sizes to pass, although each compartment cannot receive a greater quantity of coal than that intended for it. In connection with these parts a stoking-device is used, formed by a fixed channel serving as a support and guide for a series of chains, each acting as an isolated carrier to convey the coal to the several points of the grate. Metal brushes are provided which operate to clean the chains.

CUT-OFF VALVE.—CHARLES A. PETERSON, Hot Springs, S. D. A steam-engine valve has been patented by this inventor, which comprises a valve-body having openings leading into the steam-chest and having ports connected with the cylinder-ports. A hollow main valve is mounted to turn in the valve-body and has ports for registering with the openings and the ports in the valve-body. A cut-off valve is mounted to oscillate in the hollow main valve to cut off the ports therein from the steam supply. On the stem of the cut-off valve, a segmental gear-wheel is mounted, which meshes with a similar gear-wheel on the engine-frame. The latter gear-wheel is rocked by the governor to operate the cut-off valve.

Mechanical Devices.

TIDE-POWER.—WILLIAM REED, Manhattan, New York city. To provide a tide-power for forming a head of water for driving turbines or other motors is the purpose of the present invention. A float is arranged to rise and fall with the tide and carries a number of superimposed water-receptacles. Stationary reservoirs at different levels are each adapted to be filled from a corresponding float-receptacle at high tide, and are furthermore adapted to fill the next highest float-receptacle at low tide. Any number of water-receptacles may be used on the float, a corresponding number of stationary reservoirs being then employed in order successively to lift the water to different levels to obtain a head of water having suitable pressure.

HEMP-CLEANING MACHINE.—JOSÉ TORROELLA, Merida, Mex. This machine is so constructed that there will be a total absence of chains, pressure-bars, and springs employed in other existing machines to hold the hemp or other leaves while they are being led to the revolving knives in order to be cleaned. For the purpose of holding the leaves during the process of cleaning, revolving disks placed at angles to each other are used. The knives are so shaped upon the scutching-wheel that the quantity of cut fiber found in the bagasse will be reduced to a minimum.

CLUTCH.—THEODORE J. KOVEN, Jersey City, N. J. The present invention provides an improvement upon a clutch which has been patented by the same inventor, and which when used on a drive-shaft with a driving pulley will turn the shaft with a gradually increasing rapidity of revolution until the regular speed is reached. A disk having a recessed hub is mounted to slide on and turn with the drive-shaft, and an extension of the loosely mounted driving pulley extends over the hub. Pivoted on the disk is an angle lever, of which one member is adapted to enter the recess in the hub of the disk, and is located in the path of the extension from the driving pulley, the other member being curved and adapted to engage a pin which has a fixed relation to the lever. There is also a shifting mechanism whereby the clutch

may be carried out of the path of the driving pulley extension. The present invention seeks to store power when the machine is stopping, so as to make that power available when the machine is to be started again.

PAPER CUT-OFF FOR BOX-COVERING MACHINES.—ISIDOR DREYFUSS, Manhattan, New York city. The object of this invention is to provide an improved cut-off for paper-box-covering machines which will be automatic in its action and yet capable of being operated by hand. The attachment may be adjusted to boxes of various sizes. The knife-operating mechanism is constructed so that the knives will act with a shear cut. One of the knives has a rocking movement and the other a reciprocating movement. The rocking knife operates to meet the cutting edge of the reciprocating knife as the latter descends and leaves the reciprocating knife just before its ascent, so that on the ascent of the reciprocating knife the lower knife will offer no resistance.

BASKET-MAKING MACHINE.—WILLIAM JACKSON, Traverse, Mich. The base of the machine carries stamping-mechanism and has a reservoir adapted to contain compressed air. On the base a carriage slides on which a form is mounted. A cylinder is held by the base and communicates with the reservoir. A piston-rod is driven by the cylinder and moves the carriage. A second cylinder is mounted on the carriage and has communication with the reservoir. A rod is driven by the second cylinder; and a mold carried by the rod is movable toward and from the form and rotatable therewith. By reason of this construction the parts for pressing and clinching the elements of the basket may be guided with more effectiveness and certainty than heretofore.

COAL-LOADING APPARATUS.—JAMES L. LAMB, Trinidad, Col. This invention provides an apparatus for loading coal into cars, and embodies a trestle-way or support, on which a carriage is mounted to slide toward and from the car, the carriage supporting a conveyer mounted to turn and to be moved vertically, so that it may be adjusted in order properly to direct the coal.

APPARATUS FOR LOADING VESSELS.—SAMUEL H. BRADFORD, Sandusky, O. The main portion of the apparatus comprises a horizontal frame hinged on a base frame, and an endless traveling carrier arranged in the horizontal frame. The carrier transfers coal, ore, or grain into a hopper which delivers at any point on an arc or circle. The carrier-frame is hinged to vertical standards in turn adjustably hinged to the base frame. The delivery apparatus is mounted upon a rotatable base-frame, so that it may be swung horizontally at any angle to permit a convenient delivery of material. The rotatable base-frame is itself mounted upon a truck or wheeled frame adapted to run on rails along the edge of a wharf, so that the apparatus may be easily shifted from one point to another.

TYPE-WRITING MACHINE.—WILLIAM P. QUIMBY, Gettysburg, Pa. The improvements in the present machine relate particularly to the spacing mechanism; and by means of these improvements a single or double spacing may be effected by one movement, in order that an operator, in printing the last letter of a word, may simultaneously effect a double spacing to provide for the usual spacing between words. The invention provides a rocking escapement-lever, type-levers, a spacing-lever, and intermediate means including a variably movable connecting device whereby the rocking-lever may be positively moved by the independent movement either of the key or spacing-levers a given distance, and may be positively moved by the joint operation of such levers a distance in excess of the first distance. The extent of the movement of the key and spacing levers is the same in both instances.

FIRE-ESCAPE.—ROBERT WATSON and CHARLES E. STEVENSON, Nanaimo, Canada. The fire-escape is of that class in which a trolley rail is fixed and supported near the top of a building in a horizontal position, and is arranged to co-operate with a trolley hung thereupon and carrying a basket, which may be shifted sidewise on the trolley-rails and raised and lowered. This invention provides, chiefly, a detachable section for the trolley-rail, which section may be raised and lowered and adjusted to alignment with one or more fixed trolley-rails arranged at different levels. The adjustable section is

provided with a special brake-mechanism and may be raised and lowered, its ascent or descent being regulated either from below or by a person carried on the section.

Railway-Appliances.

SMOKE-CONVEYER AND SPARK-ARRESTER.—WILLIAM H. DANA, Dallas, Texas. It is the purpose of this invention to provide a device which shall convey the smoke and cinders of a locomotive to the rear end of a train, so that the passengers in the cars are not subjected to the annoyances of inhaling smoke and obnoxious gases. With this end in view the locomotive smokestack is curved rearwardly and merges into a horizontal conveying-tube. This tube extends over the locomotive, tender, and cars of the train, and is made in sections coupled together. In the sections of the tube screens are fitted, which arrest the sparks and cinders. Boxes in front of the screens collect the arrested cinders.

RAILROAD-CROSSING.—JOHN C. EASLEY, Van Buren, Ohio. In this railway-device a bed-plate is arranged in the crossing. In keepers on the bed-plate, track-sections are mounted to slide. Between the adjacent ends of the track-sections, track-blocks are movable, which slide in guides on elevated portions of the bed-plate. Link connections between the blocks and sections are provided. On the bed-plate, a shifting-plate is mounted, which is connected with the blocks by links, and which imparts a sliding motion to the blocks and to the rail-sections.

SWITCH-OPERATING MECHANISM.—WILBUR J. HARRIS, Mount Pleasant, Ohio. To provide a simple mechanism which may be operated by the flange of the car-wheel to throw the switch in the direction desired, and to provide a controlling apparatus therefor, are the purposes of this invention. The mechanism has a pivoted bar adapted to be moved by contact with the car-wheel flanges. The bar, by means of intermediate levers, links, and connecting rods, throws the switch-rail. The direction of the throw will depend upon the position of a connecting-rod, which position may be changed at will by the motorman.

SELF-CLOSING RAILROAD-SWITCH.—RUFUS F. CARNES, Eldridge, Ala. Not infrequently it happens that a train-crew or trackman forgets to close a switch after a train has passed. As a result accidents occur which cause not only considerable damage to property, but sometimes loss of life. To prevent such accidents, the inventor of the present device makes the closing of the switch automatic by providing it with a motor set into action by the opening of the switch. At the end of a certain time, the motor is caused to act upon the switch. A device is arranged beside the roadbed of the siding, to be normally pressed upon by carson the switch, and is provided with a locking device to hold the escapement while the cars are on the switch.

AIR-BRAKE HOSE-COUPLING.—THADDEUS M. HALL, Bonham, Tex. This invention belongs to that class of couplings for air-brake pipes in which the valves between the joints are opened when the pipes are connected, and held open so long as the connection remains unbroken. The valves automatically seat themselves when the connection between the pipes is broken, thereby preventing the escape of air. When the hose is pulled apart, the valve is still left open to work automatically. In the present invention the two interlocking shells are formed with valve-seats for ball-valves mounted within the shells. Rotatable supports are connected with the balls whereby they are caused variably to rotate to and from the valve-seats when the couplings are joined to or disconnected from each other.

Miscellaneous Inventions.

CRUTCH.—RICHARD SCHWARTZ, Brooklyn, New York city. The foot of the crutch is provided with a serrated tip and with an ordinary spring-pressed tip. When the ground is covered with ice and snow, the serrated or spur tip is lowered into position, so that the crutch in resting upon the ground cannot slip. When the weather is fine and traveling good, the serrated tip is raised and the ordinary tip used.

MUSIC-HOLDER AND TURNER.—CHARLES YAGER, New York city. This music-leaf turner has a

series of leaf-carrying frames mounted to swing from one side to another. Each frame is adapted to hold a leaf of music so that the several frames may be manually thrown to turn the different leaves. The music-leaf turner may be manipulated with great ease, and may be folded very compactly.

SEWING-MACHINE ATTACHMENT.—CARL F. CAIN and HERMANN SANGINETTE, Brattleboro, Vt. This attachment consists of a gage especially adapted to insure the stitching of a seam of predetermined width, or to locate a line of stitching a predetermined distance from the edge or seam of a garment or from a line of stitching. The gage bears a scale in inches and fractions of an inch, and is so constructed that it may be accurately set before it is applied to the bed-plate of the machine. The attachment may be placed in position on the plate or removed therefrom without dislodging the scale-bar.

PNEUMATIC SHOE-STUFFER.—FRED G. WHITE, Aurora, Mo. The shoe-stuffer provided by the present invention is especially designed to give a shoe the desired shape to display it in a shop-window. The stuffer consists of an inflatable bag in the form of a shoe, which bag is provided at the toe with a hood which receives a rod whereby the toe can be pushed into the shoe.

ROTARY BRUSH.—NEIL CAMPBELL, Jersey City, N. J. In this invention a broom-head for rotary street-sweepers is provided, which comprises peripheral and radial webs having axially-extending and aligning perforations receiving connecting ribs. The ribs space the broom-material between them. Backing boards secured to the radial webs within the ribs support the inner ends of the broom-material and hold it in place. With this construction the broom may be made of sufficient strength to withstand hard usage. The broom-head is easily repaired and thus no considerable expense is saved.

TRAP-NET.—ABNER S. CHASE, Marshalltown, Iowa. The trap-net is composed of two sections, the upper of which has a line connected with its upper portion. This upper section has additional lines connected with its lower portion and reeved through the lower section. By drawing on the first-named line the upper section may be lifted from the lower section, and by drawing on the second-named lines the two sections may be drawn together.

ATTACHMENT FOR SPECTACLE-TEMPLES.—LEO F. C. GIEBERICH, Manhattan, New York city. It sometimes happens that the fine wire forming the hook of the spectacle temple embeds itself in the soft tissues of the skin and thus produces painful irritation. The inventor of this attachment overcomes the difficulty by providing the hook with a protector formed of cork rolled into tubular form with a plurality of layers, the outer one of which is secured to the preceding layer to give the protector a permanent form.

HINGE FOR COUCHES, BEDS, OR ADJUSTABLE CHAIRS.—AMBROSE HUTTINGER, Cleveland, Ohio. The present invention is an improvement upon a similar hinge patented by the same inventor and seeks to simplify the previous construction. The hinge-sections are connected with two frames. One of the sections is toothed. A locking-lever is pivoted to the frame of the other section and is arranged to engage the toothed section. A releasing-lever is pivoted to the locking-lever and is arranged to hold it out of engagement with the toothed, hinged section. The invention dispenses with the necessity of a foot-lever, and enables the head portion of a couch, bed, or chair to be adjusted to any inclination.

LABEL-CABINET.—CLARENCE A. KNAPPENBERGER and HENRY H. BARNES, JR., La Harpe, Ill. To construct a druggist's label-case for use in finding and applying the right labels to bottles and packages is the purpose of this invention. Druggists usually employ thread-cases or improvised sets of drawers for this purpose, with the result that it is not possible readily to determine which drawer contains the label sought. In this label-cabinet, an outer case, having trunnions on the inside and back of the front edge, and holders consisting of a front part having a glass panel, are provided. Grooves in two end pieces receive the trunnions within the case. Means are provided for separating and retaining the labels. When a label-holder is turned down or opened, the labels are made easily accessible; when the holder is turned up, it acts as a door to close up the opening in the front of the case.

ANIMAL-TRAP.—FRANK J. HEDA, Vesta, Neb. The trap is constructed of a length of wire coiled to form a casing, the wire having its resilient end extending longitudinally along the outer side of the casing. A trigger is attached to the casing and serves to hold the spring end of the wire in proximity to the casing. A loop is carried by the spring end of the wire and projects normally into the casing to impale the animal when the trigger is released.

Designs.

ADVERTISING-TABLE.—ELLA F. DOUGHERTY, Staunton, Va. The table consists of a frame and legs supporting the top. On the top are supported two pockets, between which a hollowed block containing an ink-well is placed. In front of each pocket a smaller pocket is secured.

SPOON.—AUGUST MILLER, Taunton, Mass. The chief feature of this design is to be found in the peculiar ornaments of the spoon, ornaments which consist principally of scrolls and fleurs-de-lis.

HEATER.—JAMES S. MACKENZIE, North Bend, O. The design provides a heater which is adapted to fit between the stove and stove-pipe. Through the heater, pipes run, which conduct air from the atmosphere through the heater and to the room in which the stove is placed. Heated air is thus constantly supplied with no additional expense in fuel.

SAFETY-PIN.—SILAS P. TOMKINS, Tilly Foeter, N. Y. The safety-pin is provided with a hook adjacent to a longitudinal member of the pin. The safety-pin is primarily designed for use on horse-blankets, the hook being slipped over a part of the harness to prevent the blanket's blowing about.

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(7598) C. M. D. answers T. E.'s query No. 7551, as to whether a dynamo works well in a low temperature, as follows: A dynamo will work better at a low temperature than at a high one. The lower temperature keeps the iron cores and especially the copper conducting wires cool, securing greater conductivity. The same applies to the outside wiring. A Thomson-Houston arc generator shows the difference very markedly by the position of its regulator armature on hot or cold nights. On warm nights full load would bring armature nearly flat on stop, while at zero the same machine would have a surplus good for one or sometimes two 45 volt lamps—arcs. [The above statement is of course true, though, in answering the original query, it was not necessary to go into this matter at all, since the only point raised was whether cold weather would prevent a dynamo and storage battery from working. The temperature coefficient of copper is about 0.002 per degree Fah., that is, copper improves two-tenths per cent for each degree it is cooled. The night temperature in this city between the hottest and coldest nights is about 90 degrees. For 100 degrees the conductivity of the copper is about twenty per cent higher in the coldest night of winter than in the hottest night of summer. This is the whole difference in capacity of a series wound machine, such as is the Thomson-Houston; but in a shunt wound machine the difference is still greater.]

(7599) H. W. C. asks: 1. What substance, if any, is opaque to the lines of force coming from a permanent magnet? A. An iron screen surrounding a magnet furnishes so easy a path for the lines of force that few or none leave it to pass through the air. 2. How is the compass on a modern steamship protected from the magnetic influence of the steel and the dynamos? A. For the protection of ships' compasses against the iron about them, see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 527, 534, 709, 760, price 10 cents each. 3. What is the best shaped burner for a Trouve acetylene lamp and where can I get a burner of that kind? A. A two-pronged burner with the jets directed against each other, and the acetylene burning in the air between the jets, is found to work satisfactorily. 4. How can I take off and use the electricity that is found on the belts in a machine shop when the machinery is running? A. A comb such as is used in all static machines will draw the electricity from a belt.

(7600) H. P. G. writes: Please inform me how to make a simple electric friction machine? A. You will find full instructions for making a Holtz machine, which gives the same kind of electricity in far greater power than the friction machine, in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 278, 279, 282, price 10 cents each, with many experiments which may be performed with it.

(7601) J. S. C. asks: How is it we can speak any word at any rate of vibration in the musical scale? For instance, I can say boy or any other word in f, a very slow rate of vibration, or in e, a much more rapid rate; in fact, from the very lowest to the highest rate of vibration per second, showing that it is not the number of vibrations per second. A. You do not speak a word at any rate of vibration in the musical scale. The tone is formed by the vocal cords in the larynx at any rate of vibration which their tension allows. This tone is formed into words by the mouth, nose, tongue, teeth, lips, and palate, and in this form it issues from the mouth. If the mouth is held motionless, any tone

can be sung, but no words can be formed so long as the vocal organs are not allowed to move.

(7602) R. G. asks: What sizes wire by B. & S. gage correspond to No. 20 and No. 18 American gage? A. No. 20 American wire gage corresponds to No. 21 B. & S. gage. No. 18 A. W. G. corresponds to No. 19 B. & S.

NEW BOOKS, ETC.

We have just received from the United Correspondence Schools of 154-158 Fifth Avenue, New York city, some of their instruction papers. We have examined them carefully and we certainly approve of both systems which are used and the matter which is taught. They are eminently practical, and are particularly valuable to the student from the fact that all the material which is not germane to the subject is entirely eliminated. Of course, a correspondence school can never take the place of a scientific school or university, but at the same time there is a very large class of people who have not the time nor money, nor possibly the inclination, to spend three or four years in a school where they are often obliged to study things which will be of no immediate value to them. This Correspondence School begins in the proper way in making students obtain a practical knowledge of arithmetic, algebra, logarithms, geometry, mensuration, etc., before proceeding to the study of principles and applications of the subject being taught. The Schools give instruction in electrical engineering, mechanical engineering, civil engineering, sanitary engineering, architecture, art, sheet metal working, pattern making, etc. The method of teaching is entirely without text books, all of the instruction papers being furnished by the School, and they are accompanied by the question papers which contain inquiries on the subject contained in the instruction papers. As soon as the answers are received by the School they are examined with the utmost care. All answers are corrected in red ink, and the work is returned to the student with such suggestions and criticisms as will enable him to better understand the subject. In this way mistakes are pointed out and the material furnished is explained to the satisfaction of every individual student. Experience has shown that written comments on a man's work are more valuable and lasting than verbal ones, and the students will have the satisfaction of knowing that the criticisms are made by competent men.

TO INVENTORS.

An experience of fifty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business, Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

FEBRUARY 14, 1899,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with patent numbers, including: Accordion, J. Galleazzi; Advertis. apparatus, T. Hansen; Agricultural boiler, H. M. Crippen; Air brake, vehicle, R. E. Wynn; Air heating apparatus, J. Higginbottom; Alarm, burglar, J. H. Hall; Animal trap, T. I. Hall; Armor plate, C. F. Flood; Balance and ready reckoner, combined spring, W. S. Andrews; Bale wire, R. S. Lenox; Baling press, G. G. Overmyer; Barrel, R. T. Harroves; Baton, police, W. N. Bean; Battery, see Faradic battery; Secondary battery, R. Macrae; Bating machine, P. Kubica; Beading or cording machine, E. & R. Corneley; Bearing adjustment, ball, H. H. Thompson; Bearings, device for inserting balls in, M. Hogue; Bed bracket, J. C. Woodward; Beer, manufacturing, P. Kropf; Belt fastening device, G. W. Southwick; Belt slide, O. A. Lehman; Bicycle brake, W. H. Crossley; Bicycle crank shaft, W. H. Penney; Bicycle driving mechanism, G. Johnson; Bicycle driving mechanism, A. F. A. Roxendorff; Bicycle frame, T. J. Lindsay; Bicycle handle bar, adjustable, A. S. Vose; Bicycle intercal crank hanger and rear fork, W. H. Hubert; Bicycle parcel carrier, W. H. White; Bicycle pump, W. M. McKown; Bicycle support, F. J. Ward; Bicycle support or rest, H. W. Roby; Boiler, see Agricultural boiler; Boiler lubricator, steam, E. E. Gordon; Boilers, gas fuel burner for steam, E. L. Bush; Book, manufacturing, P. W. Paulson; Book, mileage, H. E. Bateman; Boring bar, W. H. Turton; Boring machine, multiple, J. C. Neville; Bottle, E. B. Phillips; Bottle filling machine, W. M. Fowler; Bottle, non-refillable, J. L. Jackson; Box, see Display box, Paper box; Bracket, see Bed bracket, Swinging bracket; Brake, see Air brake, Bicycle brake, Car brake, Carriage brake, Fluid pressure brake, Wagon brake; Brakes, device for actuating fluid pressure, M. W. Hibbard; Brakes, operating fluid pressure, M. W. Hibbard; Branding device, electric, Fellows & Van Hoes; Branding device, electric, H. Van Hoes; Bug gathering and destroying machine, J. N. Moran; Burglar alarm, electric, J. Tomney; Burial casket face plate, W. Hamilton; Burner, see Gas burner, Hydrocarbon lighting burner; Rutton, G. J. Capewell; Camera, magazine, W. D. Robinson; Can, see Sheet metal can; Cans, bottle-neck, jars, etc., means for closing, J. P. Richmond; Car brake, W. V. George; Car coupling, W. L. B. & E. A. Carter; Car coupling, Garber & Beall; Car coupling, J. O. Stow; Car, freight, W. A. Caswell; Car heating apparatus, J. Fruveller;

Table listing inventions with patent numbers, including: Car truss rods, adjustable bearing for railway, J. J. Souder; Carbon clamp for electrical purposes, Bachmann & Vort; Carburetor, H. B. Cornish; Carpet sweeper, C. King; Carriage brake, J. G. Ecken; Carriage, musical, E. L. Cady; Cartridge implement, C. V. Burch; Case, see File case; Chain, sprocket, R. M. Keating; Chuck for press plungers, C. Gabriel; Churn and butter worker, combined, H. L. Ferris; Clamp, see Carbon clamp, Seat post clamp; Cock, automatic cylinder, S. M. Carlisle; Coffee, apparatus for cooling roasted, D. B. Fraser; Commutator retaining band, J. R. Grindrod; Compass, ship's or similar, L. Reilstab; Composition of matter, C. Rath; Conveyor and distributor, belt, Bartlett & Overstrom; Cork extractor, H. J. Williams; Corset, J. C. Mackey; Corset stiffener, F. Morrison; Cot, folding, A. R. Isaacs; Couch, A. G. Hofstatter; Coupling, see Car coupling, Shaft coupling, Thrill coupling, Train pipe coupling; Coupling and antirattle, combined, J. M. Bergold; Coupling for ropes, cords, etc., F. Pretzel; Cover for vessels, reservoir, B. T. Johnson, Jr.; Crates for desks, chairs, etc., W. Banker; Cream separator, centrifugal, W. Johnson; Cultivator, S. L. Allen; Cultivator, two-row, W. L. Caldwell; Cutter, B. A. De Costa; Cutting apparatus, Veitgaard & McDonald; Cycle, etc., C. W. Atkinson; Cycle, J. W. Burt; Cycle driving mechanism, J. T. Pedersen; Cycle framings, brazless joint for, W. Frazer; Cycle rack, J. M. Pyott, Jr.; Damper, H. M. Powers; Damper, automatic, E. V. Rice; Dental curing device, G. Lewis; Dish heater, M. Walsh; Display box, A. M. Hance; Display fastener, swivel, Chapman & Rubens; Distilling apparatus, petroleum, F. W. Mann; Door, J. Cronin; Door opening, closing, and locking device, E. B. Slonacher; Door operating mechanism, H. Rowntree; Door, storm, O. Cobb; Dredge winder, Maddix & Godman; Dredging and elevator, A. W. Crum; Dredging apparatus, McDougal; Dredging bucket, H. J. Kromann; Dress protecting edging, E. M. Scheid; Dye and making same, black trisazo, C. Ris; Dye, making yellow phosphin, Julius & Tkatech; Egg case maker, J. H. Robinson; Electric machine, dynamo, S. S. Foster; Electric meters, mechanical time switch for two-rate, J. H. Gerry; Electric motor, T. D. & F. W. Hollick; Electric motor, C. L. Rosenqvist; Electric motor, alternating current, C. L. Rosenqvist; Electric protective system, J. Tomney; Electrical heater, C. W. Jones; Electrical switch, A. Brier; Electrical transmission of sound, F. M. Bell; Elevator, C. E. Moore; Elevator gate, J. E. W. Foxall; Engine, see Rotary steam engine; Engine igniter, gas, W. I. Crouch; Engines, incandescent igniter for explosive, C. R. Bolling; Extractor, see Cork extractor, Spike extractor; Eyeglasses or spectacles, A. 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Gochnaur; Grater, M. D. Keefe; Grinding machine, J. M. Schutz; Grizzly or separator, rotary, R. H. Postelwaite; Halter fastener, G. Smith; Hammer, W. H. Penny; Hanger, see Harness hanger, Picture frame hanger; Harness hanger, U. Grignon; Harness hitching device, J. P. Field; Harrow, W. M. Digby; Harvester, corn, Whitney & Steward; Harvester reel, A. J. Bartlett et al.; Head rest, A. W. Browne; Heater, see Dish heater, Electrical heater, Feed water heater, Hot water heater, Water heater; Heating, drying, or airing apparatus, H. Hargreaves; Heel attaching machine, F. F. Raymond, 2d; Hinge, C. H. Shannon; Hinge, double acting spring, O. C. Moore; Hoe, C. Snyder; Hook and eye, I. H. Paul, Jr.; Horse detacher, A. Kupper; Horse detacher, P. A. Nolan; Horses from vehicles, automatic device for detaching, V. Wisniewski; Horseshoe, metallic rim rubber tread, D. B. Stephens; Hose holder, W. H. Trammel; Hot water heater, A. F. Buttrick; Hub and axle connection, wheel, F. E. 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