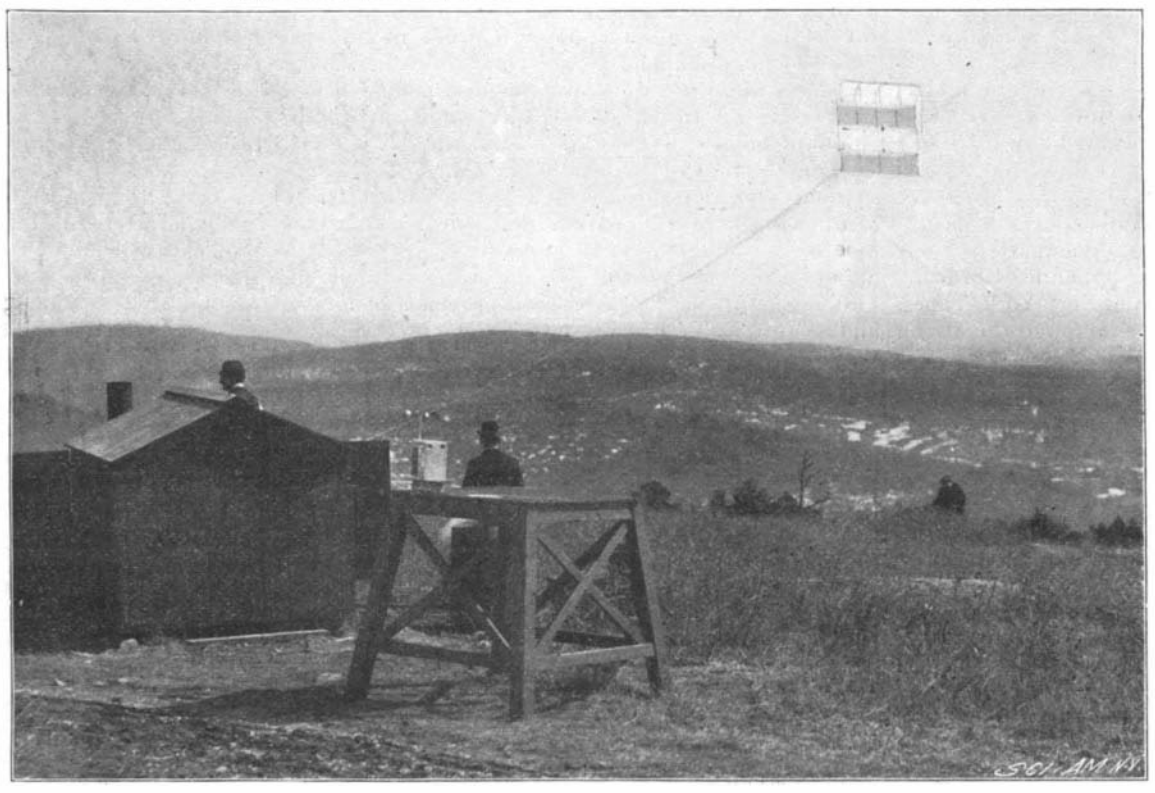
## RECENT KITE EXPERIMENTS AT THE BLUE HILL OBSERVATORY.

Kite flying has ceased to be monopolized by the small boy and is now used very largely for meteorological work. The government has established many stations equipped with apparatus for aerial work, and we have an important observatory entirely devoted to it. We have, from time to time, given some account of the remarkable experiments which have been made at the Blue Hill Observatory, near Boston, and we are now pleased to give our readers a more detailed description of the work.

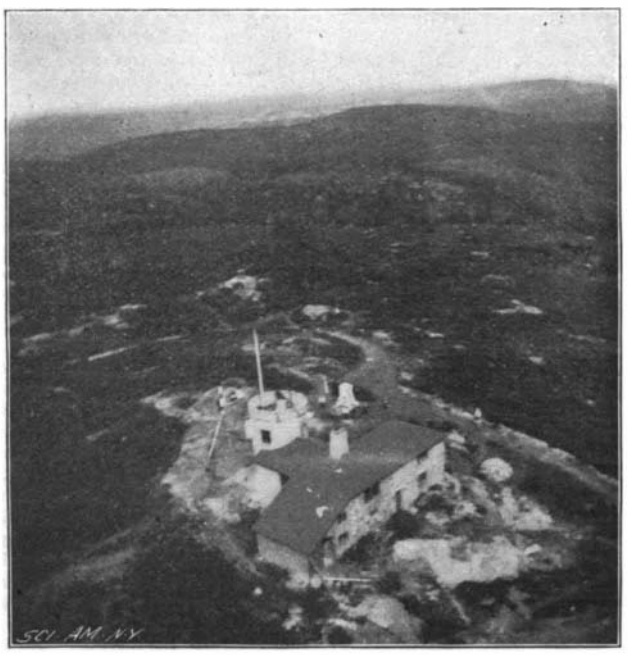


THE BLUE HILL OBSERVATORY—BEGINNING OF AN ASCENT.

The kites are flown singly or in tandem. The main line for flying the kites is made of steel music wire, No. 14 gage, which is 0·0325 inch in diameter. It weighs 15 pounds for each mile of length and breaks at 300 pounds strain. It is usually worked at less than half its breaking strength. Continuous lengths of 8,000 feet are obtainable, and as few splices as possible are used. For attaching tandem kites at any point along the main line a special aluminum cast clamp is used.

The windlass employed since February, 1897, is a modification of Sir William Thomson's apparatus for deep sea sounding, and is shown in our engraving. The wire is reeled upon a drum which is an ordinary flanged pulley 20 inches in diameter and 4 inches wide. The flanges are grooved for the reception of the driving rope and the brake rope. The drum will hold about 40,000 feet of wire, but the greatest amount used heretofore has been 32,000 feet. The wire passes from the drum under a pulley which is moved horizontally slowly backward and forward by means of a cam geared to the axle of the drum, and which distributes the wire uniformly over the face of the drum. A second pulley delivers the wire to the strain pulley, around which it passes four times, then it goes over small pulleys which form a part of the dynamograph. One of these pulleys is carried at the end of a rod and moves with it, freely, in a horizontal guide. The opposite end of the rod is held by a heavy spring. Any strain on the wire tends to stretch the spring. All motion is transmitted through suitable levers and cams to the pen lever, which marks the variations in intensity of strain on the chronograph drum, which is covered with suitably ruled paper. By this means a continuous record of the pull is obtained at all times. After leaving the dynamograph the wire passes over the swiveling pulley, which is shown in our photograph. This is supported on a ball-bearing sleeve and takes any horizontal direction assumed by the wire. This pulley registers upon a dial the length of wire passing over it. With the apparatus the speed of winding can be varied from seven miles an hour to three miles an hour, and by regulating the engine the speed can be further reduced to less than one mile an hour. By means of the distributing and regulating devices which we have described, the windlass is practically automatic in action, and, when set in motion for winding, it requires no attention except at times when tandem kites are to be removed from the line. When the strain is very light, a crank may be attached to the axis of the storage drum and the line wound up by hand if desired. Ordinarily, of course, the steam engine is used. The small house behind the engine is arranged to move forward on rollers and cover the entire apparatus when it is not in use.

The meteorograph is one of the group of recording instruments carried by the kites. The height attained in meters, the temperature, the relative humidity, and the velocity of the wind are all recorded on the same chronograph drum by mechanisms of the well known Richard type, the four registering pin levers being parallel.



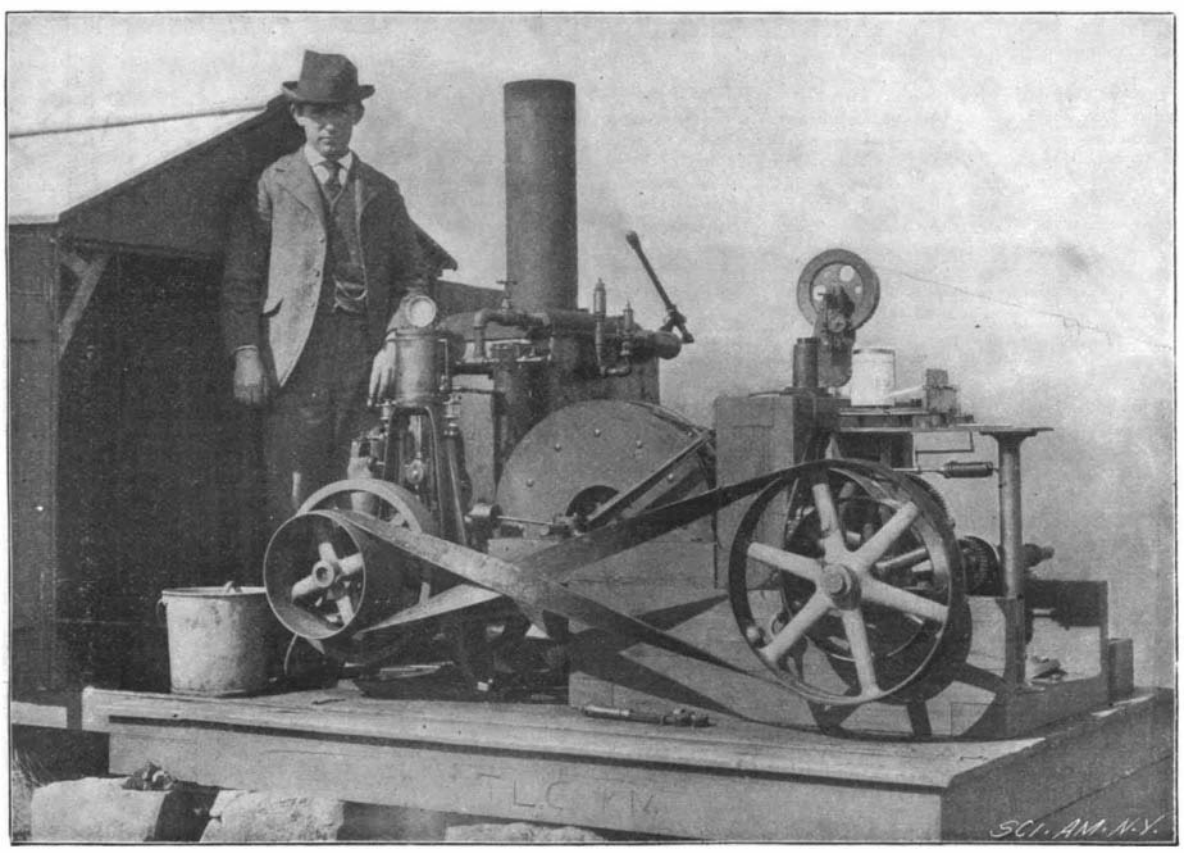
BIRD'S EYE VIEW OF BLUE HILL OBSERVATORY TAKEN FROM A KITE BY W. A. EDDY.

At the back of the instrument is secured a double rudder which keeps the end carrying the anemometer always facing the wind and in a horizontal position, so that the anemometer spindle is always vertical, irrespective of the blowing backward of the instrument by the wind.

The complete instrument, including the rudder, weighs a little less than three pounds. It is suspended from the kite by means of a ring and toggle at the end of a long cord. The meteorograph is carefully compared with standard instruments before and after its ascent. The first kite is not always flown directly from the windlass, owing to the irregular surface of the hill, the wire being sometimes passed over a pulley secured at any suitable distance from the windlass. Usually about 1,000 feet of wire is allowed to run directly from the windlass before the pulley is removed. The first kite is a large one, having at least 70 square feet of lifting surface, and when it has taken up 984 feet (300 meters) of wire, another of the same size is attached by means of a clamp. The bridles of the kites are adjustable, so that the pull just below the second kite will not exceed 160 pounds. Stops of three to ten minutes are made when 300, 600, 1,000, 1,500, and 2,000 meters of wire are out, another smaller kite being attached at the last point. After this, stops are made after each additional 2,000 meters of wire are out. Stops with the same length of wire out are made when the kites are being reeled back, in order to obtain a second set of records at each point. The interval between the ascent and descent serves to show any change in the meteorological phenomena. After it is brought back to the ground the meteorograph is again compared for at least ten minutes with the observatory instruments before the records are removed. The vertical height of the instrument above the hill is computed by a mathematical formula, the angular altitude above the horizon being obtained by observing the kite with a surveyor's transit. If the kite is not visible by reason of clouds or darkness, the heights are taken from the barograph record.

Since 1894 the work with kites at the Blue Hill Observatory has advanced until, within the past two years, the meteorograph has repeatedly been carried to heights exceeding 10,000 feet. The greatest height—11,224 feet above sea level—was reached on August 26, 1898, and the average height obtained during 1898 was about 8,000 feet.

Compared with balloons, kites are much less expensive, more easily handled, and the exposure of the instrument is probably equal to that of the instruments at the ground—something impossible to obtain with instruments carried by balloons. Another great advantage is that the kites are controllable and the records may be obtained at any desired point up to over 12,000 feet. While the heights reached heretofore do not equal the highest balloon ascension, the progress made so far warrants the belief that a height of three miles is possible.



BLUE HILL OBSERVATORY—STEAM POWER WINDLASS FOR KITES.

In addition to our views, which show the steam power windlass for kites and the beginning of an ascension, we are enabled to present, through the courtesy of Mr. William A. Eddy, of Bayonne, N. J., a bird's eye view of the Blue Hill Observatory, which he took in August, 1895, with a camera sustained by a kite.

The work carried on by the Blue Hill Observatory is watched with interest by meteorologists all over the world, and up to the present time there has not been published any adequate description of the apparatus which is

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.

### Contents.

(Illustrated articles are marked with an asterisk.)



## 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 so 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 swinging 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 coacting 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 friction 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 stapling-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 alinement 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 SCHWARTING, 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