THE WATCH—ITS INVENTION AND HISTORY.

We propose, in this and following articles on the same subject, to give a sketch of the origin of the watch, and to do so shall refer slightly to its elder brother, the clock; but as the early history of clocks has often been given, we do not propose to go over the whole ground of time-keeping instruments, and shall therefore only hint at the successive steps in clockmaking that have led to the invention and introduction of watches.

The first artificial means of noting time was probably a rude species of sundial, to which succeeded the clepsydra and hour-glass. The clepsydra in its simplest form was merely an upright cylindrical vessel that was filled at sunrise with water, which escaped through an aperture in the bottom, its decrease in the cylinder noting the lapse of time. The water was afterwards made to turn a wheel which carried an index round a dial, and many curious automata were thus operated. About the eleventh century it is believed that weights were substituted for the falling water, and a "fly" similar to that still used on the "strike part" of a clock is supposed to have been the usual means of regulating their motion, until the introduction of the balance and escapement, the exact date of which is not known. The earliest balance and escapement of which the actual construction has been preserved is one that was built by Henry de Vick, or De Wick, a German, and set up in Paris, for Charles V., in 1379. It is supposed by some that Vick was the inventor of the escapement thereshown, but of this there is no evidence, and for aught we know it was invented and used long before his time. It consisted of a crown wheel, the teeth of which operated on pallets set in a vertical shaft, carrying at its top a cross bar having notches to receive hanging weights. The action of the crown wheel upon the pallets caused a vibrating motion to be given to the bars and weights, in a similar manner to what is known as the verge or vertical escapement, but it was without the hair spring, as this was not introduced until about 300 years afterwards. The rate of going was changed by hanging the weights in different notches in the horizontal bar; and this form of regulating was improved by subsequent makers, who cut threads on the end of the bar and tapped the weights, by which means the latter could be screwed nearer to or farther from the center, and very nice adjustment thus obtained.

The earliest clocks were large machines designed to be set up in monasteries, churches, etc., but succeeding generations saw them gradually made smaller and smaller, until sufficiently portable to be carried from room to room; and near the latter part of the fifteenth century were made so small as to be carried in the pocket, and hence were called by the Germans, who originated this form of timekeeper, "pocket clocks"—a name which they still retain in the German language. They were first made in the city of Nuremberg, and being of oval shape were sometimes called "Nuremberg Animated Eggs."

The first name that has come down to us in this connection is that of Peter Hele, who, it is claimed, some time between 1470 and 1490 (the authorities differ on this point), introduced the mainspring instead of the weight before used, without which it would seem impossible to make a watch, and he should therefore be considered as the first inventor of watches.

The early watches were made entirely of steel and iron. No glasses were used until about 1615, the cases being wholly of metal, and to admit of readily seeing the time, the cover of the face was sometimes perforated in elegant designs. Instead of the form now universally adopted, various styles of casing were employed, such as globular, octangular, cruciform, skull, coffin, acorn, pear, melon, tulip, bird, and, in fact, nearly every imaginable shape that ingenuity could invent, or caprice suggest; and, as a consequence of this and the fact that many of those watches were provided with striking movements, they were so bulky that it was inconvenient to carry them in the pocket, and they were hung at the girdle with swivels so that their faces could be readily turned for observation without being removed from their position. Most watches required winding twice a day, and from their very imperfect escapements could not be depended on as time-keepers—a fault from which it is believed that many modern watches are not wholly exempt. This irregularity of movement in the ancient watches did not depend entirely on the poor escapements, but was due partly to the varying power of the mainspring driving the balance at different speeds, owing to the absence of the hairspring and fusee. This last device was not introduced until about 1525, and was a very important improvement and a great necessity to the early watches before the invention of the balance or hairspring, about 1658. Instead of the chain used in modern watches as the medium between the spring and the fusee, catgut was employed, which was not superseded until about 1660, when the chain was introduced by Gunt, of Geneva.

Both clocks and watches were originally made without minute hands. Many such clocks may be seen in church towers and old houses in Europe, and some may yet be found in the possession of the descendants of the early settlers in this country. When the minute hand was first introduced, it was set on one side of the hour hand, as the second hand is now; and it was not until about 1687 that Quare placed the minute hand concentric with the other, in the manner now universally employed.

The first balance and escapement used in watches were substantially the same as that in Vick's clock, the only essential difference being that the weights were screwed on to the straight bar, instead of swinging in notches. This device retained its position as the only regulator for a watch movement for a long time; but about 1695, the cylinder escapement, in an imperfect form, was invented by Tompion, and was finally perfected by Graham in 1700.

The lever escapement has several claimants, but the earliest style of this device appears to have been invented by the Abbe Hautefeuille, in 1722, and has since been improved by various inventors—Mudge, Litherland, Brequet, Roskell and Savage—until it assumed its present form.

The duplex escapement, in a crude state, is said to have originated with Dr. Hooke about 1658, but its present construction is believed to have been invented by Tyrer, or Dyrer, in 1767.

None of these escapements, however, would have been of much use as isochronous regulators without the balance spring, introduced in 1658, which is claimed as Dr. Hooke's invention. His priority in this matter is disputed by some who claim it for Huyghens, but the weight of authority appears to be in favor of Hooke, who first showed that the vibrations of such a spring are nearly isochronous, although their lengths may be varied with the power of the mainspring. The adoption of this spring marked an era in watchmaking equivalent to that of the introduction of the pendulum into clocks, for without it an accurate-going watch would seem to be an impossibility. It was first made nearly straight, but in 1660, it was improved by making it in the form of a coil.

Shortly after this, in 1676, repeating watches were introduced. This invention, like many others relating to watches, was claimed by two inventors and is interesting to patent attorneys, if not to others, as forming the basis of the interference case of Barlow *vs.* Quare, heard by King James II. in person, March 2, 1687, who decided in favor of Quare. It seems, however, as if Barlow was really the first inventor and that Quare was merely an improver who had succeeded in doing with one push-pin what Barlow had previously accomplished by two. As an example of the ornamental work of that period, the following description of the identical watch made by Quare for the king, furnished by its present owner to the London *Chronicle*, December 11, 1833, may be interesting:

"The outer case, which is of very pure gold, is embossed with the king's head in a medallion, under which on the right is Fame, in the clouds, with a trumpet at her mouth, which is held in her left hand; in her right is a wreath she is raising, as if to crown him. On the left are winged boys supporting the royal crown; under them a tower and fortifications on which a flag is flying; under all is the sea running close up to a fort, and on the sea is a ship under full sail. This case is also beautifully engraved and pierced with scroll work, ornamented with cannon, mortars, shot, flags, etc. The face is of gold, with Roman letters for the hours and figures for the minutes. In the center is a piece of pierced work in gold upon blue steel, showing the letters J. R. R. J., combined so as to form an ornamental scroll, above which is the royal crown. The box is exquisitely pierced with scroll work intermixed with birds and flowers; about the hinge is engraved a landscape with a shepherd sitting under a tree, playing upon a pipe, with a dog at his feet, and houses, trees, etc., in the distance. On the back of the box is the following inscription: 'James II. *Gloria Deo in excelsis sine pretio redimi mini malâ lege ablatum bno. Regi restituitur.*' Within the inner circle is engraved a figure of Justice in the clouds, having in one hand scales and in the other a scepter with which she points to three bishops with an altar before them. On one side of the alter is the tower of London with a group of twenty-six men carrying bags (presumed to represent money): on the other side is a view of the city of London in perspective and a group of twenty-seven men carrying similar bags, of which there are several more lying in the foreground; under all a lion and a lamb lying together.

"The watch is considerably thicker than, but otherwise not much above the common size, and every part of the engraving is beautiful and distinct. It goes accurately, and is in a perfect state of preservation."

In this connection we may state that in 1764 Mr. John Arnold presented to George III. what is believed to be the smallest repeating watch ever made. It is said to have been smaller than an English silver two-penny piece (rather smaller than our silver half dime) and only weighed 5 dwts. $7\frac{3}{4}$ grains, case and all—the movement itself only weighing 2 dwts. $2\frac{1}{8}$ grs. It was necessary to make a set of minute tools on purpose for its construction. For this watch he received a present from the king of 500 guineas (about $2,500), and it is reported that he was afterwards offered a thousand guineas to duplicate it for the Emperor of Russia, but he refused it, so that his gift to the king might remain unique. A smaller watch than this, however, formed a part of the Swiss exhibit in the World's Fair of 1851, but this was not a repeater. It was only $\frac{3}{16}$ of an inch in diameter and was set in the end of a pencil case. It not only gave the hours, minutes, and seconds, but the days of the month also.

The next great improvement in the watch, after the invention of the hair or balance spring, was the compensation feature, and this is believed to have been first applied to watches by F. Berthoud, of Paris, who sold one with this improvement in 1776 through Pinchbeck the London watchmaker, to George III.; but the compensation effected by means of the combinations of bars of metals of different rates of expansion, as applied to timekeepers, was without doubt invented by John Harrison, of Foulby, England, who devoted himself for a long series of years—from 1728 to 1761—to the discovery of a mode of overcoming the change of rate due to the varying temperature changing the proportions of the pendulum in clocks, and the balance wheel, springs, etc., in chronometers.

The compensation pendulum requires but one adjustment to maintain the center of gravity at an equal distance at all times from the axis of oscillation, but the compensation balance is subject to two variations—one owing to the expansion and contraction of the balance itself, and the other due to the varying length of the balance spring, both caused by the changes of temperature. To overcome the change in the length of the ordinary pendulum rod, Harrison invented the gridiron pendulum, but a second invention was necessary to overcome the variation in the hair spring and balance of chronometers, and this he accomplished by combining with the curb which governs the acting length of the spring a compound bar, composed of two metals of varying degrees of expansion, so that the curving of the bar by heat would move the curb and so shorten the spring sufficient to compensate for its own increased length and the expansion of the balance. For these improvements Harrison received the award of £20,000, (nearly $100,000) offered by the British government.

The earliest compensation devices, of which there were several, were applied to increasing or diminishing the active length of the hair spring, but Arnold and Earnshaw invented compensation balance wheels about 1790, and the latter improved them to substantially their present form in 1802.

Jewelling of watches was patented in England May 11, 1704, by N. Facio, of Geneva, who invented a machine for drilling jewels, but it is claimed that Ignatius Huggerford of London had used jewels in one movement only as far back as 1660.

The above is believed to be as correct an account as can be given of the principal inventions that have brought watches to their present state of perfection, but it should be stated that the authorities differ as to the names of the inventors—the same invention being claimed for different men in several instances. We have not attempted to give any of the minor improvements, because a synopsis of these, however condensed, would fill a volume, as there are not less than 450 United States patents relating to watches, to say nothing of foreign inventions in the same line.

The introduction and manufacture of watches, with a description of some remarkable specimens, will form an interesting article, which we shall reserve for our next number.

The Formation of Fat.

It was pointed out by Liebig that the view, once generally held, that the fat of the herbivora was derived exclusively from ready formed fat in their vegetable food. was untenable; he attributed much of the fat of the animal body to the carbo-hydrates of the food. His explanation was combated by Dumas, Boussingault and others, but subsequently adopted by them; and the very numerous feeding experiments of Lawes and Gilbert, commenced about thirty years ago, have afforded strong confirmation of the accuracy of Liebig's conclusions. Voit, in 1865, and still more recently in 1869, and conjointly with Pettenkofer, have maintained that fat is the result of the transformation of nitrogenous substances. They state that they never found fat to be formed from starch or sugar, nor was the carbon stored up more than that in the fat of the food, *plus* that which could be derived from the breaking-up of the albumen. Their experiments, made on the body of the dog, led them to believe that the same must occur with the herbivora; and they contend that, to establish the formation of fat from carbohydrates, experiments must be brought forward in which the fat deposited is in excess of that supplied by the food, *plus* that which could be derived from the transformed albumen. Lawes and Gilbert, in a recent paper, refer to the results of feeding experiments with pigs which they published eleven years ago, which experiments clearly show such to be the case. Voit, however, cannot allow himself to consider a transformation of carbo-hydrates into fat to have been conclusively proved by the English experimenters, and suggests several possible sources of error, his reference to some of which, as these gentlemen have found, showing that he has in fact misunderstood them. A careful review, instituted by Lawes and Gilbert, of their feeding experiments with oxen, sheep, and pigs, in order to satisfy themselves whether any doubt could be entertained of the views they had previously advocated, has shown that, as regards the ruminant animals, no absolute proof of the derivation of fat from carbo-hydrates can be obtained; it was quite otherwise, however, in the case of their experiments with pigs, in many of which much more fat was produced than could possibly have been derived from transformed albumen of the food. Instead. therefore, of experimenting further in this field, they have decided, says the *Academy*, to again direct attention to the results given in the paper on the subject, which appeared in the *Philosophical Magazine* in 1866. In the cases to which they refer, where the nitrogenous substance was not so very excessive, but still more than is the most appropriate, there was a considerable proportion of the total fat produced which could not possibly have been derived from the nitrogenous substance of the food. When the proportion of the nitrogenous to the non-nitrogenous substance in the food was the most appropriate for fattening, there was a much larger proportion (about 40 per cent) of the total fat produced which could not possibly have had its source in the nitrogenous substance consumed.

Inventions Patented in England by Americans.

June 22 to July 6, 1877, inclusive.

ARCHITECTURAL COLUMNS.—W. H. Drake *et al.*, Chicago, Ill.
BARRELS, ETC.—G. W. Zaraway, Hartford, Conn.
BOOT CRIMPER —J. Smith *et al.*, Boston, Mass.
BOTTLE STOPPERS.—N. Thompson (of Brooklyn, N. Y.), London, England.
BOX DRAWERS.—C. C. Chamberlain, New York city.
BRUSHES AND CURRYCOMBS.—C. E. Holmes *et al.*, New York city.
CAKE MACHINERY.—D. J. Holmes (of New York city), London, England.
ENGRAVING MACHINERY.—H. K. Floger, Boston, Mass.
FIRE ARMS.—H. C. Bull *et al.*, New York city.
FIRE ARMS.—D. C. Holloway, Washington, D. C.
FURNACE.—J. J. Stores (of New York city), London, England.
HARVESTERS.—D. M. Osborn, Auburn, N. Y.
HARVESTERS.—W. A. Wood, Hoosic Falls, N. Y.
LAMP SHADES.—J. J. West, Chicago, Ill.
LETTER FILES.—B. Brower *et al.*, Irvington, N. Y.
MATCH.—W. H. Bracy, Boston, Mass.
MATCH SPLINTS.—E. B. Beecher, Westville, Conn.
METALLIC CAMS.—A. S. Lyman, New York city.
PENCILS.—R. Duncan, New York city.
PRINTING.—H. D. Dupel, Boston. Mass.
PROPELLING STREET CARS.—J. Amboderg, Richmond, Va.
PUMPS.—J. Robertson, New York city.
RAILWAY RAILS.—J. E. Atword, Stonington, Conn.
RAILROAD BRAKE.—H. J. Haddan, Mt Stevens, New York city.
STEAM CARS, ETC.—L. Ransom, Stratford, N. Y.
TELEGRAPH APPARATUS.—E. Gray, Chicago, Ill.

Recent American and Foreign Patents.

Notice to Patentees.

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NEW MISCELLANEOUS INVENTIONS.

IMPROVED CARBURETER.

Oliver P. Drake, Boston, Mass.—The object of this invention is to produce a more equal and reliable density of rich illuminating gas when manufactured by the admixture of common atmospheric air and the vapor of hydrocarbons. The invention consists in an improved construction of valve case and valve, and in the arrangement of the valve directly above the float in the partition separating the reservoir and carbureting chamber; also in a device located in the reservoir and resting on its bottom partition, for separating any excess of hydrocarbon vapor from the air passing through the carbureter; also in arranging two or more carbureting chambers, one above the other, in the same case in such a manner that each chamber shall be automatically supplied by means of a float and feed valve.

IMPROVED ICE CREAM FREEZER.

Oliver Dexter, Jr., Troy, N. Y.—This invention consists in means which will forcibly inject currents of air into the freezing can during the process of agitating the contents thereof by dasher blades.

IMPROVED SHOW CASE.

William Shockley, Allerton, Iowa.—This is a case or box for storing screws, screw eyes, or other articles of hardware, of different sizes, for the purpose of preventing any intermixing of different sizes of screws, which forms a source of annoyance in the present open boxes. The invention consists of a case having a number of boxes for the different sizes of screws, each box, except one, being covered by a separate sliding lid, that is guided by side grooves along T rails of one set of partitions. The T rails extend over the greater part of the partitions, with the exception of one end tier of boxes, along which the lids slide laterally, so as to remove the lid from any one of the boxes by sliding first the lateral lids, and then those at right angles to the open box.

IMPROVED POCKETBOOK.

Daniel M. Read, New York, N. Y.—In the construction of this pocketbook the coins are put one at a time upon disks until as many as desired have been put in, or until spring nuts with which it is provided have been fully compressed. The coins are slipped out one at a time, as they are required for use. To the lower part of the case is attached a cover of leather or other material, which is provided with pockets in the manner of an ordinary pocketbook. The cover folds together around the case, and its overlapped ends are secured by a fastener.

IMPROVED BUNG EXTRACTOR.

William J. Wademan, Bay City, Mich.—This invention consists in an extracting rod having a flat arrow-head formed on one end for penetrating and giving a hold on a bung, in combination with a tubular hammer stock for driving the arrow-head of the extractor through a bung. When the head has passed through the bung, it is turned one quarter round, taking a firm hold and allowing the bung to be extracted.

IMPROVED STABLE SCUTTLE AND TRAP.

William M. Watkins, Worcester, Mass.—The scuttle lid rests on sides and ends, so that the whole forms a box. Hinged to the side is the bottom or trapdoor, having the catch that receives a pivoted and right-angled latch. To the latch is pivoted the lower end of a rod, which passes through keepers attached to the side and is used to trip the latch, which is held forward to engage with a catch when the trapdoor is raised into place. A spring is attached to the side and bears against the latch, which is covered by a dust case. The trapdoor is raised by a cord passing over the pulleys pivoted to the forward corners of the free edge of the trapdoor, a lever cam being employed to hold the free end of cord detachably.

IMPROVED TOY BOOTBLACK.

Adolph Gartner, New York city, assignor to himself and Louis Gompper, of same place.—This invention is a toy in which figures perform certain movements by the action of a clock train. The figures are worked by the train, so that the arm of one is operated by a horizontally reciprocating slide piece, and the head of the other by a vertically reciprocating slide piece, forming contact with the pivoted and spring-acted portion of the figure.

IMPROVED SELF-RAISING LARD.

Thomas H. Rosser, Selma, Ala.—This invention relates to an improved compound used for culinary purposes; and it consists in a composition formed by mixing lard, tartaric acid, bicarbonate of soda, alum, and starch.

IMPROVED VENTILATING BUNG.

Simon H. Lesser, New York city.—This invention consists of a hinged and spring-acted bung that is fitted tightly into a seat of the cask and locked by a spring catch or bolt, the bung being provided with a ventilating device for admitting or shutting off the air. It is intended to furnish a bung for the water casks of sea-going vessels, for beer kegs, and other purposes, by which a hermetical sealing of the bunghole is obtained, and air admitted for giving vent at any moment without opening the bunghole.

IMPROVED PROCESS FOR ORNAMENTING GLASS.

Chas. J. Cartisser, New York city.—This invention consists mainly in dispensing with the frosting of the glass by mechanical means, as emery, sand, etc., and producing, first, a prepared surface or ground in clear or whitish color by etching the surface with hydrofluoric acid alone, or by a mixture of carbonate of ammonia and hydrofluoric acid, and laying then on this ground any desired ornamentation by means of a varnished transfer pattern or sheet of lace, or other perforated or cut material, and finally etching this and larger ornaments by one or more baths of carbonate of ammonia and hydrofluoric acid.

IMPROVED CLASP FOR HOLDING NECKTIES.

Alvin H. Dodd, New York city.—This necktie or bow fastener consists of a spring clasp formed from a single piece of wire, bent into loop shape, to receive an attaching plate, having an eye for the reception of the collar button, and provided with outwardly branching ends, to facilitate the entrance and removal of said button.

IMPROVED SADIRON HEATER.

William H. Haylock, Jonesville, New York city.—This invention relates to improvement in sad iron heaters, so that the same may be used at will for heating sadirons, a tailor's goose, or for boiling starch in a convenient manner; and the invention consists of a sad iron heater having a chimney of inverted conical shape, supporting on an angular seat a top for sadirons, or a box top, or a flat pan top, the escape of heat being arranged at the seat and the top parts.

IMPROVED BRUSH.

John Waddell, Elora, Ontario, Canada.—In this invention the brush handle is connected by means of bevel dovetail tenons at the ends of the handle to the brush head, said tenons running in one direction, so as to enter simultaneously corresponding mortises of the bevel dovetail shape of the brush head, into which the tenons are secured by glue.

IMPROVED TOBACCO PIPE.

Samuel H. Thurston, Whitestone, N. Y.—This invention relates to improvements in pipes for smoking tobacco; and it consists in making the entire pipe or portions thereof, or a cigar holder or portions thereof, of pumicestone.

IMPROVED LABELS FOR PLUG TOBACCO AND CIGARS.

George W. Yerby, New York city.—In this invention a plug of tobacco has a portion of a leaf of tobacco, of lighter color than the plug, in which apertures, having the form of letters or characters, are cut, which, when the label is attached to the plug, permit the darker covering of the plug to show, thus making the letters or characters prominent and easily distinguished. Where the label is applied to a light-colored plug it is made from a dark leaf.

NEW HOUSEHOLD INVENTIONS.

IMPROVED VENTILATOR.

Thomas M. Foster, of Union City, Penn.—This invention consists of a number of apertures arranged in the wall and opened or closed by single and double covers, that fit snugly over the apertures, and are operated by a pivoted lever and cords and pulleys. The apertures are provided with thimbles and other weather caps.

IMPROVED SASH BALANCE.

William Cashner, Pleasant Hill, Mo.—This invention consists of the sashes of a window hung by cords to double spring pulleys, turning in opposite directions, and being retained in any position by sliding spring bolts and pins acting on recesses of the sashes. It dispenses with boxes, weights, cords, and pulleys, and is easily adjusted for the weight of the sash.

IMPROVED WINDOW BRACKET.

John F. Zimmerman, Crestline, O.—This invention is designed to furnish a shelf for attachment to window frames to receive flower pots, and is supported by means of arms or bars, which are so connected with it as to admit of adjustment according to the width of different window casings.

IMPROVED BROOM.

James Roney, Scotland, Mo., and Thomas Roney, Hyde Park, Ill.—This invention consists in the combination of a seamless stock, ribbed upon its inner surface, and provided with a screw collar and movable clamps ribbed upon their outer surfaces, and a handle made with a conical forward end, having a screw thread formed upon it. When the handle is screwed down it enters between plates and presses them apart, clamping the filling between their ribbed outer surfaces and the ribbed inner surface of the stock, holding the filling securely.

IMPROVED DEVICE FOR COATING CAKES WITH COCOANUT, ETC.

Daniel M. Holmes, New York city.—The object of this invention is to furnish an improved device for coating cakes made of soft dough, such as jumbles, etc., with grated cocoanut, sugar, currents, and other substances, which will enable all the cakes to be coated evenly, and will prevent any of the cakes from being flattened. The invention consists in the water-tight box provided with a flexible waterproof sheet, a water pipe, and air passages, to adapt it to be used for coating soft cakes with cocoanut, sugar, etc.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED AXLE BOX.

Isaac Newton Camp, Deerfield, Mich.—The axle is inclosed at the hub-section with a revolving box provided with outer spiral grooves or channels, and, if desired, an inner returning groove for oil. The groove or grooves are provided at suitable distances with perforations through which the oil passes to the axle to lubricate the bearing of box and axle.

IMPROVED COMBINED CUT-OFF AND FILTER.

John Hoover, Crawfordsville, Ind.—This invention relates to a cut-off and filter combined, which may be used so as to conduct first the dirty water from the roof out through the waste pipe, and passing then the water through the filtering chamber, in which the filtering material can be readily replaced, as required. The invention consists of a cut-off combined with a filtering device, the partition between the cut-off having vent holes to pass any surplus water.

NEW AGRICULTURAL INVENTIONS.

IMPROVED CORN PLANTER.

Charles McGee, Elwood, Kan.—This improvement is in that class of cultivators which are constructed in duplicate form with shovels upon separate beams arranged to cultivate upon both sides of a row at once, which beams are connected by a loosely jointed elevated coupling high enough to permit one set of shovels to be advanced or retracted independently of the others. The improvement consists in arranging upon each beam a nicked shovel combined with centrally arranged cutting blade, which arrangement more perfectly cuts the grass and clears the shovel.

IMPROVED ROCKING DEVICE FOR HARVESTERS.

Edward Cheney, Geneva Lake, Wis.—This invention relates to means for tilting the cutting apparatus of reaping and mowing machines; and consists in combining, with the drawbar and slotted shoe of the finger bar, an adjustable cam or slotted wedge and a hand lever, whereby the attendant can tilt the cutting apparatus, and give it any desired angle of inclination.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED SPIRAL CAR SPRING.

James Ludlum, Pompton, N. J.—This invention is a spiral spring made from a metallic bar, whose cross section in its exterior surface is convex, and the two interior ones more or less concave, while the upper and lower edges of each spiral are rounded off. The spring thus formed is capable of resisting a great amount of pressure, while it is also capable of yielding laterally, and as the coils overlap each other they are mutually supported.

IMPROVED FEED REGULATOR FOR MILLSTONES.

James W. Moir and James H. Ellis, Halifax, Nova Scotia.—This invention consists in the combination of a valve connected with the end of the grain conduit, a spring for holding the valve open, and a hopper that is suspended from the valve, through which the grain passes to the hopper of the millstone. The grain, by weighing down the hopper, moves the valve so as to control the amount of grain passing through it.

IMPROVED SPINDLE FOR LOOM SHUTTLE.

James Hamilton, Salmon Falls, N. H.—This invention consists in a spindle which is made of two parts, and applied in the shuttle by means of independent pivots, arranged in such manner that when these parts are raised to introduce the cop they will be contracted, and when they are adjusted in position for weaving they will expand and firmly hold the cop.

IMPROVED ROAD SCRAPER.

Ahira Thompson, Harmony, Ill.—This invention consists in the combination of bar, perforated plates, and draft bars, with scrapers and running gearing of a wagon; and in the combination of loops or keepers, chains, levers, crossbar, and the standards, provided with hooks, with scrapers, and with bars, attached to the running gearing of a wagon. It is so constructed that it may be attached to an ordinary wagon, which will work upon even or uneven ground, and can be adjusted to scrape wide or narrow, light or heavy, light upon one side and heavy upon the other, and light or heavy upon the inside, and heavy or light upon the outside.

IMPROVED ROPE OR LINE CARRYING PROJECTILE.

Thomas C. Backus, Brooklyn, N. Y.—The object of this invention is to furnish, for the purpose of establishing connection with the upper stories of burning buildings, an improved line or rope projectile or conveying device, that is shot, in the nature of the line-carrying balls or rockets in coast wrecking apparatus, from a gun or other implement, to carry a line to the endangered persons, and admit the hoisting of a hose, rope ladder, or other fire-escape. The device may also be employed as a safety device on board of vessels to convey the line ashore.

IMPROVED WINDMILL.

William G. Alexander, Winnemucca, Nev.—This invention consists in a windwheel in which the fans are divided longitudinally into two equal parts or sections, hinged to each other at their adjacent edges, and having one section rigidly attached to the arms of a wheel; in the combination of spiral springs with the hinged parts or sections of the fans; and in the combination of rods, a small sliding wheel, a sliding rod, and a cord with the hinged sections of the fans, and with a wheel shaft and turn table.

IMPROVED SAW GUIDE.

William Collins, Perham, Minn.—This saw guide is extended to the end of its frame, and is provided with a screw at the long end of a lever, whereby the sawyer need not let go his feed lever, and may adjust with more facility.

IMPROVED CAR MOVER.

Daniel Pierce, Brownington, Vt.—This invention is a device for moving freight and street cars on railroad tracks, and may be also used for hoisting and other purposes. It consists of two cogwheels, arranged in fixed position, but with teeth at opposite direction to each other, on the car axle or shaft, the cogwheels having circumferentially grooved side disks for a detachable yoke frame carrying lever sockets and pawl. The cogwheels are intended to be attached to the axles of each car, forming a stationary fixture of the same.

IMPROVED SCROLL SAWING MACHINE.

Franz Eisendick, New York city.—This invention consists of a lateral saw frame that is guided on top and bottom rails, and made adjustable to different lengths of stroke by a radially slotted and adjustably weighted crank disk. The upper saw clamp is raised or lowered by a screwrod and set nut for the length of the saw, and the tension adjusted by a sliding wedge key. A pan below the saw serves as receiver for the sawdust.

IMPROVED MACHINE FOR MAKING PICKER TEETH.

Robert Aldrich, Millville, Mass.—This invention produces shoddy picker teeth from metal rods by a process of swaging; and the nature of the invention consists in rotating swaging dies adapted to give the desired shape to the picker teeth in combination with a punch which is applied to a horizontal reciprocating stock.

IMPROVED RAILROAD GATE.

Elias W. Moyer, Bernville, Pa.—This invention is to furnish railroad gates which shall be so constructed that they will be opened by the wheels of the approaching train, and will close automatically as soon as the train has passed. The gate is formed by attaching parallel bars to a shaft, which rocks in bearings in bars attached to the ties. The wheel of the advancing car strikes either end of a spring, and the effect is to push the spring and bar before it, bringing the levers and gate into an inclined position, so that as the wheels advance upon the spring and bar they force them downward, bringing the levers and gate into a horizontal position. As the wheels pass off the spring and bar, other springs draw the levers into a vertical position, raising the gates.

IMPROVED SPINDLE.

Gilbert P. Whitman, Rockport, Mass.—This spindle is intended to steady the bobbin without driving the same, so that high speed without vibration is obtained. The invention consists of a fixed standard supporting a small spindle loosely at the top, revolved by a combined cup, whir, and sleeve, and lubricated by an oil cup at the base of the post, provided with a dished cap or drip cup. A bulging collar is fastened to the post above the whir to prevent raising of oil, facilitating seating of bobbin, and prevent whir from rising.

IMPROVED RAILWAY AXLE BOX LID.

Francis C. L. G. Susemihl and Herbert H. Hewitt, Detroit, Mich.—This invention relates to the covers of journal oil boxes for railway cars; and it consists in a cover or lid having projections formed on its edges that are received by grooves formed in flanges that project from the sides of oil box. The cover cannot be lost, as can only be removed from the box by removing the box from the truck; and it cannot easily be broken or disarranged.

IMPROVED COMPOUND STEAM BOILER.

Robert R. Hine, Kohala, Hawaii, Hawaiian Islands.—This invention is a compound boiler, designed to use cane trash or other light fuel. It consists in the combination of a single flue boiler and a many flue boiler, placed end to end, with a space between them, and connected together by a steam drum and circulating pipe, with each other and with the furnace and chimney.