

of Coalesburg, Mo. It consists in certain novel details of construction, arrangement, and combination of a base and standard, a legrest, a clamping device, and means for operating the paring knife, whereby the operation of trimming and paring the hoof is accomplished with economy of time and labor to the workman and more ease and comfort to the animal.

AMATEUR MECHANICS.

LENS MAKING.

To make an ordinary lens requires a certain degree of manipulative skill, but when compared with a fine job of filing, fitting, or even turning, it is easy, and there is a charm about making a nicely polished lens which is not found in metal working. The tyro should commence with small plano and double convex lenses, which he may mount singly or in pairs. After attaining a fair proficiency in making these he may proceed to larger work, and afterward by coupling study with practice he will be able to make fine work, such as the achromatic objectives of microscopes and telescopes, eye-pieces, lantern objectives, etc.

The first thing to be done in the way of the preparation of tools for lens grinding is to make gauges or patterns with which to gauge the convexity of the grinding tools. These may be made from pieces of sheet brass about one thirty-second inch in thickness, the plates for gauges for convex tools being chucked on a plane board secured to the face plate of the lathe, and the circular aperture turned out. The plate should be beveled each way from the aperture, forming a knife edge, and it should be separated by a saw into two or four parts, according to the size of the lenses to be ground, as shown in Fig. 1. The radius of the circle so formed will be approximately the focus of a double convex of this curvature, and the diameter of the circle is approximately the focus of a plano-convex lense of the same curvature.

Gauges for concave tools or concave lenses are made by turning disks of brass with V-shaped edges, as shown in Fig. 2, and an instrument for shaping small concave grinding tools is shown in Fig. 3. It consists of a sharpened steel disk attached to or formed upon the end of a bar, and used as a scraper for giving the final shape to the concave grinding tools.

For grinding convex lenses it is well to have two concave tools like that shown in Fig. 4. This as well as other grinding tools for small work should be made of brass. Drawn brass is preferable, as it is usually better metal, and more homogeneous than castings, and needs no external turning.

Having determined on the focus of the lens to be ground, the brass is chucked in the lathe, and hollowed out as nearly to the correct form as possible, the gauge shown in Fig. 2 being used from time to time to determine when the proper concavity is reached. The grinding tool is finally scraped with the cutter shown in Fig. 3. The counterpart of the concave tool shown in Fig. 5 is now turned as nearly to the gauge shown in Fig. 1 as possible, and is finally ground into the concave tool with washed flour emery and water.

A tool like that shown in Fig. 6 is necessary for finishing small lenses. It consists of a cylindrical piece of brass, having a chamber turned in the end for the reception of a mixture of pure hard beeswax and fine rouge. This mixture should contain sufficient rouge to make it rather hard, but not so hard as not to yield under strong pressure.

The glass for small lenses may be clipped from bits of plate (crown) glass and roughly shaped by means of an ordinary pair of pliers. It may then be cemented with pitch to the end of a round stick, as shown in Fig. 7. The glass is then ground on a common grindstone until it approximates the required shape. It is then polished with fine emery and water in one of the concave brass tools until a truly spherical surface is secured. It is then transferred to the other brass tool, and ground with fine washed flour emery until the surface is fine and entirely free from scratches. During the grinding as well as polishing the stick to which the glass is cemented must be turned axially, and at the same time its outer end must be moved about the prolongation of the axis of the grinding tool so as to present the glass to every portion of the grinding tool as nearly as possible.

The final polish is secured by pressing the smoothed glass into the wax in the end of the tool shown in Fig. 6 as the tool is revolved, and at the same time applying fine rouge and water from time to time. When the polish is nearly perfect the tool should be allowed to work nearly dry.

For a plano-convex lens the plane surface of the plate glass will answer very well for the plane surface of the lens, and the glass will be ground down as shown in Fig. 8. If the lens is to be double convex the finished spherical surface should be cemented to the end of the stick, and the opposite side proceeded with as before described. There are two methods of finishing the edges of plano-convex lenses: first, by holding the plane surface in a concave tool charged with emery and water until the edge is beveled to the required degree; and second, by chucking the lens on the end of a spindle projecting from the lathe mandrel, and centering it while the pitch or cement which holds it is still warm. Then a piece of brass, which

is concave to conform nearly to the periphery of the lens and charged with emery and water. This tool is held against the edge of the lens after the manner of turning. The lens will soon assume a perfectly circular shape, and may be readily reduced to any desired size.

In making concave lenses the convex tools will be used, and the final finish will be given by a piece of silk cemented to the tool with pitch and charged with rouge and water.

For grinding larger lenses of longer focus an attachment like that shown in Fig. 10 will be required. It consists of a wooden box supported by a curved arm inserted in the tool

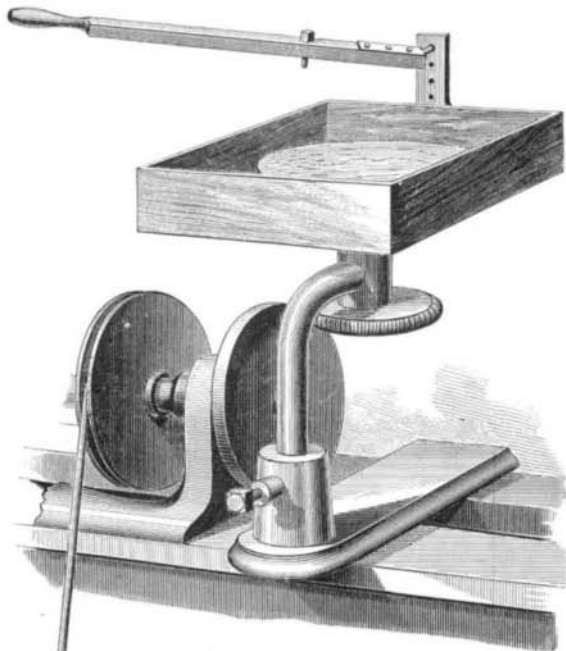
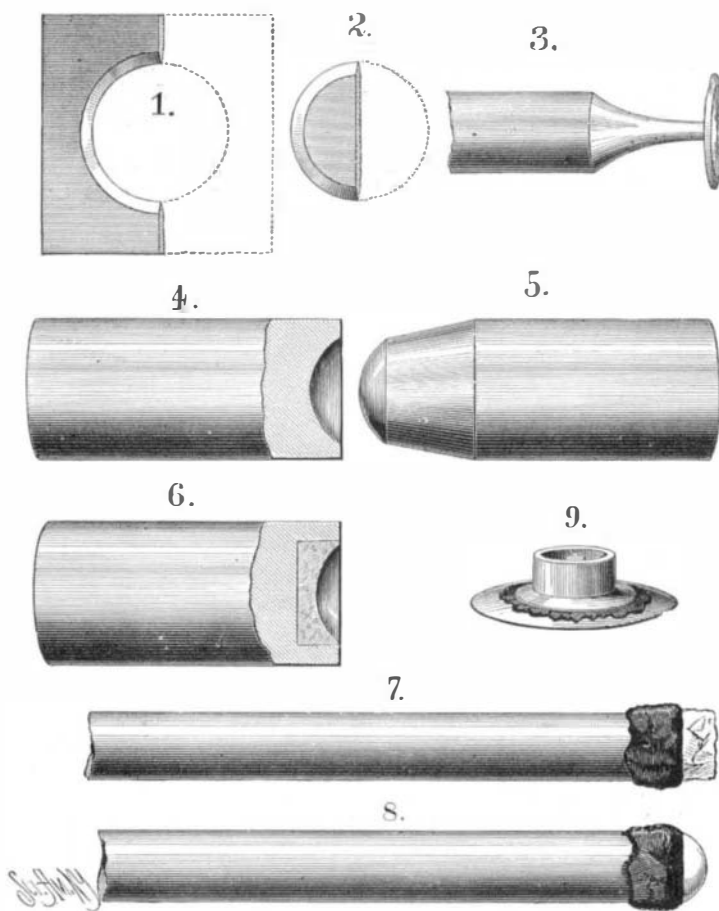


Fig. 10.—LENS GRINDING ATTACHMENT FOR FOOT LATHES.

rest support. A vertical journal box passes through the bottom of the box, and contains a shaft having upon its upper end a socket for receiving the grinding tool, and on the lower end a grooved wheel surrounded by a rubber friction band, which is revolved by contact with the face plate of the lathe. The speed of the wheel relatively to that of the lathe may be varied by raising or lowering the shaft by raising or lowering the box support in the tool port.

The glass to be ground is cemented to the face of a flanged casting as shown in Fig. 9, and is held down to the grinding tool by the lever attached to the box. The tool for large work may be made of cast iron. The center of the lens should be eccentric to the center of the grinding tool, so that the lens will be revolved on the face of the tool. The point



TOOLS FOR GRINDING SMALL LENSES.

projecting from the lever enters a small cavity in the center of the casting, to which the lens is attached and insures an equal distribution of pressure over the entire surface of the lens.

Grinding and finishing a large lens is substantially the same as in the case of the smaller ones, the only difference

being in the method of giving the final polish. In the case of a large lens, after the fine grinding, the tool is heated, covered with a thin coating of pitch, and a piece of thin broadcloth is pressed down on the pitch. This broadcloth surface is charged with fine rouge and water, and the lens is pressed down on it with considerable force as the tool is revolved. The cloth should be worked rather dry, and so much so at the end of the process as to offer considerable resistance to the rotation of the tool. M.

MISCELLANEOUS INVENTIONS.

An improvement in casting chilled mould boards, patented by Mr. Burnett B. Harris, of South Bend, Ind., consists in the combination, with the lower part of the flask having an opening in its bottom, of the chill having rabbeted edges and the buttons, so that the chill will be held securely in place and allowed to expand and contract freely; also, in the combination, with the chill and the mould board pattern, of core cups having tapering holes, so that the patterns can be removed without disturbing the bolt hole cores or dies. The lower parts of the flasks have openings in their sides, communicating with the connecting flues, so that the chills of a series of flasks can all be warmed at the same time and by the same furnace.

Mr. Samuel M. Wright, of Wagoner's Station, Ind., has invented an improved rein holder which is simple and convenient. It consists of a curved rod provided with a heart-shaped crutch at its upper end for receiving the reins. This rod is adjustably fastened in a frame attached to the dashboard of a vehicle.

Mr. Henry W. Fuller, of Seneca, Kan., has patented a reversible and double buckle having six bars, forming five loops, and provided with two tongues set opposite each other, but one pointing to the right, the other to the left, each tongue having its respective tongue bar and tongue rest bar.

An improved armature for electro-magnets has been patented by Mr. Peter Wagner, of New York city. The object of this invention is to increase the surface of attraction between the armature and the poles of the magnet, and thus augment the power of the electro-magnet and increase the length of the swing of the armature.

A combined forge and steam boiler has been patented by Mr. David E. Engle, of Jacksonville (Wind Ridge P. O.), Pa. The object of this invention is to utilize the heat developed in forge fires to generate steam for driving a fan blower and other machinery.

Mr. James A. Fancher, of West Granby, Conn., has invented a velocipede, whose movements, it is claimed, can be more easily and readily controlled than the movement of any of the velocipedes in common use. The invention consists in a peculiar combination of mechanical devices, which cannot be clearly described without engravings.

Mr. John L. Sippy, of Venice, Ill., has invented a simply constructed, light, and easily worked extension ladder, to be used by carpenters, builders, firemen, and others who often require a ready means of reaching an elevated position.

An improvement in dumping wagons has been patented by Mr. George B. Wiestling, of Mont Alto, Pa. The object of this invention is to furnish safety catches for dumping carts, wagons, and other vehicles, so constructed as to hold the loaded bodies of the vehicles from dropping back should the hoisting mechanism break.

A miner's lamp so constructed as to conduct the flame upward when moved forward, so that it will give more light and also protect the top of the lamp and the head of the miner from the flame and heat, has been patented by Mr. Louis Weihe, of Connellsville, Pa.

Mr. John Thompson, of Oakland, Md., has patented a compact and convenient machine adapted for the use of druggists in putting up prescriptions in pill form of any usual size.

Mr. Joseph S. Letourneau, of Tucker, Ill., has patented a device for use in raising the boxes of dumping wagons, whereby the power of the team can be used for raising a loaded box to dump it, and the labor and expense of shoveling thereby saved. The device is especially intended for use by farmers, and with four wheeled wagons the boxes of which are fitted for being raised at the forward end bodily. The invention consists in bars or rods recessed at one end for taking over the wheel spokes and formed with shoulders to take under the wagon box, so that when said rods are applied to the forward wheels and box and the wagon backed the rods will rise and lift the box. The inventor states that with this device it is an easy matter to unload a wagon load of fifty bushels of corn or sixty bushels of oats in three minutes.

An improved blinder for bridles has been patented by Messrs. George A. Gregerson, of Rochester, and Charles O. Weymouth, of Olmsted county, Minn. The invention consists in the combination with the blind plate, of metallic hinge plates for connecting the blind with the head piece and the bit strap.

An improved nut lock, patented by Mr. William S. Mitchell, of New Cumberland, Ohio, belongs to that class of

inventions that have for their object the securing of nuts on railroad tracks, bridges, machinery, etc. It consists of hinged lock plates provided with beveled sockets to fit over the nuts, the lock plates having their free ends locked together by lock and key.

Mr. Emery O. Bicknell, of Boston, Mass., has patented an envelope having bronze aniline lines arranged on the outside of the flaps and a little back of the edges, the lines being adapted to change color if the envelope is tampered with by the application of steam or moisture.

An improvement in churn powers has been patented by Mr. George W. Sampson, of Tecumseh, Kan. This invention relates to that class of churns that are provided with two dashers, set one above the other, and operating with a reciprocating vertical motion.

An improved separator for the distillation of whisky has been patented by Mr. Martin V. Monarch, of Owneborough, Ky. The inventor utilizes the heat of the low wines or vapors thereof as they pass to the condenser for heating the charge for the still to nearly the boiling point, and at the same time the escape of the alcoholic vapor arising from the charger is prevented, and mealy or improper substances are separated or eliminated from the low wines.

An improved thill coupling, patented by Mr. Frank P. Johnson, of Eyer's Grove, Pa., consists in a novel construction and arrangement of a spring and a locking lever, and the combination thereof with the thill iron and clip, whereby the coupling and uncoupling of the thill and holding the same securely in place are facilitated.

Mr. Sylvester W. Sheldon, of New York city, has patented a device applicable to barrels of different sizes, for supporting them so that they may be easily moved within fixed limits. It is designed for the use of grocers, housekeepers, and others, who are frequently obliged to remove barrels from under shelves and to replace them. The invention consists of two principal parts—a pivotal support for one side of the barrel and a jointed roller support for the other side. The pivotal support has a base plate containing a cavity for the reception of a pivot, carrying at its upper end a curved plate provided with two notched projections for receiving the chine of the barrel. The roller support is made in two parts hinged together to adapt it to barrels of different sizes, and supported on rollers, one roller being pivoted in each part.

Mr. Charles D. Hoffman, of Cairo, N. Y., has patented an improvement in the class of washing machines in which a suds box is mounted on rollers that run on horizontal rails and is reciprocated by means of a crank and pivoted connecting rod.

A combined clothes rack and mantel, which is simple and convenient, has been patented by Mr. Charles C. Field, of Crete, Neb. It consists in a hollow lintel having the front side pivoted at its lower edge and the upper part solid, and provided with a series of radiating recesses in front, in combination with bars.

An improvement in stock cars which will permit the loading of cars very rapidly, afford plenty of space for the animals, and permit their feeding conveniently, has been patented by Mr. Edgar G. Frisbie, of Monroe, Mich. The car is subdivided into several compartments by a longitudinal partition and several transverse hinged gates provided with spring latches. It is provided with troughs partitioned into two subdivisions, one for water, the other for feed.

An improvement in the class of mortise and rim locks having keyhole guards consisting of pivoted plates adapted to swing over the keyhole and prevent the insertion of picks on the outer side of the lock whenever a key is inserted on the inner side, has been patented by Mr. Josiah H. Browne, of Salem, Mass. The improvement consists in the construction and arrangement of sliding guards and the devices which co-operate with them, so that the movement of one guard causes the opposite movement of the other.

An improved headlight case, patented by Mr. Robert C. Greenland, of Connellsville, Pa., consists, principally, in a novel arrangement of oscillating valves for securing a uniform ventilation of the case; also in arranging the door so as to obtain an air-tight joint and a device for more securely fastening the door; and in connecting the top of the case with the dome by means of a double hinge, so as to permit the top to be opened in two directions.

Mr. Henry R. Robbins, Md., of Baltimore, has patented a novel form of press for forming a special construction of can-head, which head is made in one piece, with a skirt or flange at right angles to the main portion, and with a swell or bulge at the corner.

Mr. John T. Hodge, of Carter's depot, Tenn., has invented a convenient and simple device for containing and delivering groceries and other articles to scales to be weighed, thereby avoiding the necessity of keeping such articles in boxes and barrels under and about shop counters, and avoiding also the inconvenience and labor of frequently handling such boxes and barrels. The invention consists of a series of hoppers or equivalent receptacles placed on the floor of the room above the shop counter, and of pipes or tubes leading from each one of said hoppers or receptacles down to within a short distance of the counter, so that the scales can

be placed under the mouths of these pipes to receive the contents therefrom, the pipes being provided with gates or slides to regulate the delivery of articles from them.

FONVIELLE & LONTIN'S ELECTRICAL MOTOR.

This little apparatus, which was presented to the Academie des Sciences at its session of April 5, is composed of a galvanometric helix (Fig. 1) in which there is a small soft iron disk capable of revolving on its supporting pivot. If, on arranging a horseshoe magnet over this apparatus in such a way that its polar extremities are at the ends of the frame, an induction current from a small induction coil be sent into the wire of the helix, the disk begins to revolve rapidly

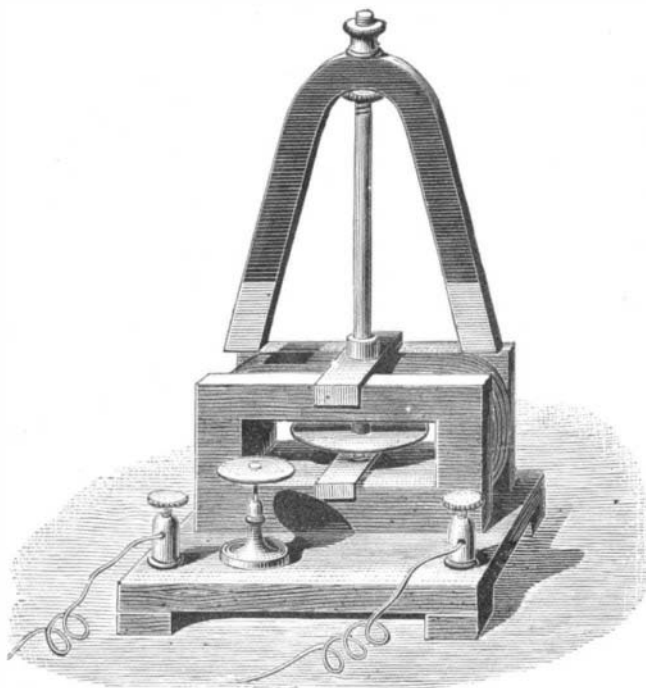


Fig. 1.—FONVIELLE & LONTIN'S ELECTRICAL ROTATOR.

and in a perfectly definite direction, which is dependent on the position of the poles of the magnet and on the direction of the currents induced in the wire of the galvanometric helix. When the magnet is crosswise, there is no longer any rotation. The phenomenon has been explained very simply by MM. Jamin and Du Moncel. As well known, the current induced by breaking is always more powerful than that induced by closing. The disk of soft iron polarized by the outer magnet behaves like a magnetized needle placed in a galvanometric helix, and assumes its motion under the action of a series of electrical impulses, the poles remaining fixed in space, while the disk displaces itself by its rotation. The current produced by closing the primary circuit of the induction coil acts in a direction opposite to that produced by opening, but as its intensity is much less, the disk moves under the differential action of the two. Each current induced by closing produces a new impulse on the disk, since the poles are always in the prolongation of the fixed magnet.

The same rotatory motion is produced with the *direct current of the battery interrupted with sufficient rapidity*. In this case the rotary speed is not so great, but this must be attributed to the fact that the electrical impulses are not produced with sufficient rapidity, and that, moreover, the resistance of the galvanometric helix is not so well adapted to

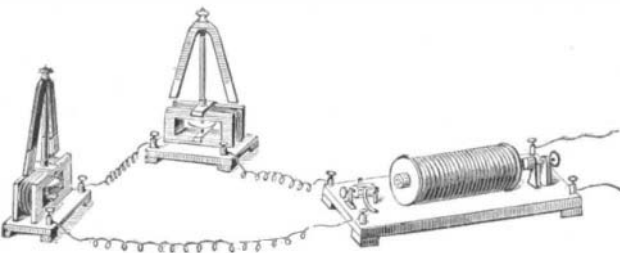


Fig. 2.—Arrangement of two rotators mounted in tension in the induced circuit of a Ruhmkorff coil.

the direct current. The motion is quite rapid when the current of the battery is sent and made to traverse the inductor of the coil and the vibrator, for there is then produced a series of impulses which are sufficiently rapid to communicate a certain rotary speed to the disk. On arranging two helices (Fig. 2) in the circuit of the secondary wire of the coil, a movable disk may be made to revolve in each helix; but on removing the disk from one of the helices the disk in the other takes an accelerated velocity. To explain this phenomenon, which appears to have somewhat astonished M. De Fonvielle, we have only to bear in mind the well-known reactions of magnets and currents. The rotatory motion is produced also with movable pieces of soft iron of various shapes—needles, stars, whole disks, split or annular, spiral bands, etc. On doing away with the fixed magnet the phenomenon takes place under the action of terrestrial magnetism, although to a less degree. The fact that there is no motion when the magnet is placed crosswise with the spirals of the galvanometer, proves the exactness of M. Jamin's

theory; for, in this case the disk in the interior of the galvanometric helix forms, under the influence of the external horseshoe magnet, a true magnetized bar placed crosswise with the current, and consequently cannot assume any motion under its action. MM. Lontin and De Fonvielle's apparatus constitutes a new and original form for demonstrating the laws which govern the action of magnets and currents, and, as such, will take its place in physical cabinets alongside of analogous apparatus of Ritchie, Barlow, Faraday, etc.

Curious Intermittent Spring in Guatemala.

M. De Thiersant, Chargé d'Affaires of France in Guatemala, gives, in *La Nature*, the following account of a phenomenon witnessed by him in the last named country. At about ten miles from the capital, near a town called Nejapa, on the lowest declivities of the volcano of San Salvador, there is a spring known in the country under the name of Rio Huido (fleeing river), which, for a period of seven consecutive years, furnishes enough water to form a true river. The waters of this spring are crystalline and wholesome, and, it is said, are excellent for certain diseases like leprosy, and for strengthening the system when debilitated by the climate. As soon as the seven years are completed, these same waters disappear at a certain definite hour, the spring ceases to flow, and the river bed, becoming completely dried, exhibits thereafter nothing but sand and dust. The intermittent periods have been as follows: From 1866 to 1873 the waters flowed; from 1873 to 1880 the spring ceased; and in the month of January of the present year, the spring began to flow again. This phenomenon is doubtless not a new one, and science has long ago explained it, but there do not perhaps exist many springs the intermittent period of which is so long and so regular as that of the one at Nejapa.

Hallucination of the Senses.

Professor Maudsley remarks, in a recent lecture, that one striking feature observed by medical men who have had cases of hallucination under their charge is that the patients cannot be convinced that the objects they see, the sounds they hear, and the sensations they perceive, have no real existence, and that the sensations they receive are the result of their excited nerves. It frequently happens, too, that a person who suffers from hallucination in respect of one sense has the others unaffected, and is, on all other matters, perfectly normal. Hallucination may arise either from an idea on which the mind has dwelt, appearing as something exterior, or from excitement of the sensory ganglia. It is said that Newton, Hunter, and some others of equal professional eminence, could, at will, picture forms to themselves till they appeared to be realities.

NEW INVENTIONS.

An improved wagon axle has been patented by Mr. John B. Herman, of Blair, Nebraska. The object of this invention is to furnish wagons so constructed as to run easier than when constructed in the usual way, and in which the bearings can be kept oiled and the brake can be readily applied.

An improvement in that class of vertically revolving wind-wheels having radial feathering sails or vanes, which are adjusted, according to the force of the wind acting on them, by means of a lever or governor vane, has been patented by Mr. Andrew D. Worman, of Frederick, Md.

An improved machine for packing meats into cans has been patented by Mr. William Steuerwald, of New York city. It is so constructed as to fill a can at one descent of the follower. It consists of a holder to receive the can, a top having a tapering tube to enter the hole in the can, a tapering hopper, and a contractible follower for forcing the meat into the can at a single movement.

Mr. John Law, of Lebanon, O., has patented a simple device to serve both to support the sides and back of the seat, and to hold the rails of a shifting-top buggy or other vehicle.

An improved clothes-pounder has been patented by John W. Troeger, of Naperville, Ill. This invention consists in an arrangement and combination of an outer cone and a series of inner cones provided with perforated concave diaphragms, whereby several advantages are obtained.

An improved bridle has been patented by Mr. John W. Aiken, of Tennessee, Illinois. The object of this invention is to lessen the amount of stock and labor required in making bridles, and at the same time furnish bridles that are neat in appearance, strong, and durable.

Mr. Robert E. Greenwell, of Osage Mission, Kan., has patented improvements in railway joints of that form in which a set of bolts project through the fish plates and have ends slotted lengthwise to receive a key which is driven in a plane parallel with the bolt. The invention consists in combining the fish plates, the slotted fish plate bolts, a key, and an elongated gib behind the key, which gib passes through two or more of the bolts and serves to tie them together and prevent them from being bent by the entrance of the key.