

of Coalesburg, Mo. It consists in certain novel details of construction, arrangement, and combination of a base and standard, a leg rest, 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

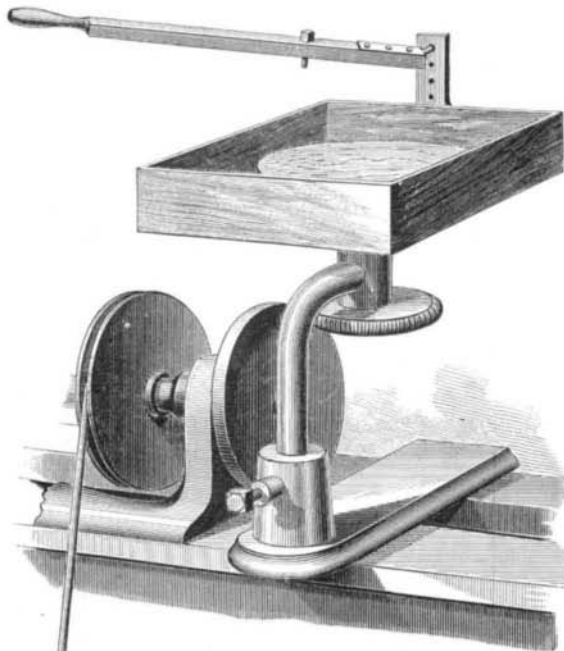
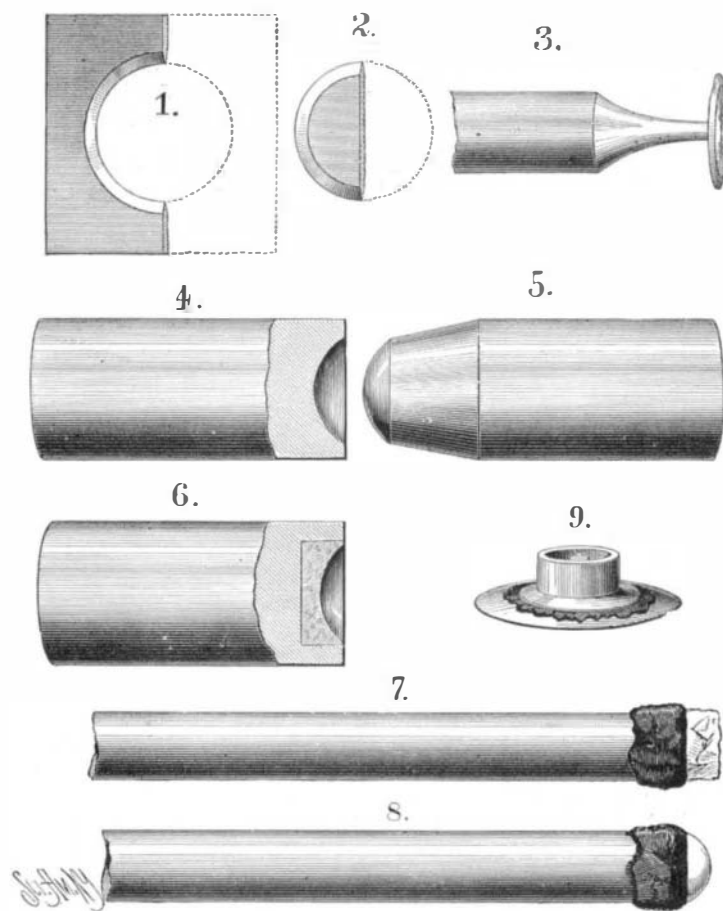


Fig. 10.—LENS GRINDING ATTACHMENT FOR FOOT LATHES.

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