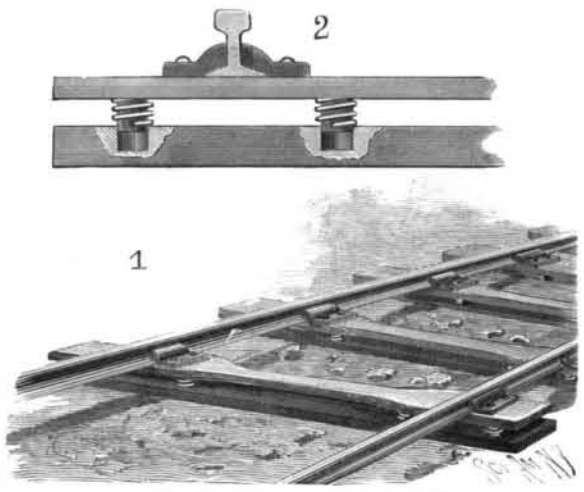
A SPRING-CUSHIONED METALLIC RAILROAD TIE.

A railroad tie designed to lessen the wear and tear of the rails and rolling stock is shown in the accompanying illustration, and has been patented by Stephen K. Miller, of Newtown, O., Fig. 1 representing the improvement as applied and Fig. 2 being a sectional view. The tie consists of a body and a top section, and in the top of the body of the tie, near each end, are grouped four holes or recesses, into which enter corresponding lugs or posts on the under face of the top section, a spring being coiled around each lug or post, and bearing upon the upper face of the body of the tie and the under face of the top section. The springs are normally strong enough to prevent the top section

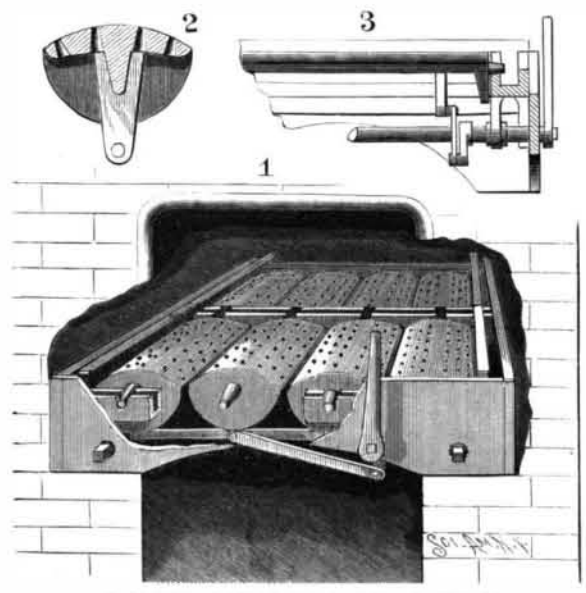


MILLER'S RAILROAD TIE.

being pressed downward by the weight of a moving train into contact with the bottom section, the track being thus practically spring-cushioned throughout its length. The rails are firmly held in place on these movable sections of the ties by the usual chairs or clamps.

A ROCKING GRATE BAR AND SHAKER.

In grate bars connected for rocking movement to agitate the bed of coals, the accompanying illustration represents an improvement recently patented by Abraham Stroh, of Freeland, Pa., the large view showing several connected grate bars, Fig. 2 being a sectional view of one grate bar and Fig. 3 a transverse sectional view of the grate-supporting frame. The bearing frame has inwardly extending ledges on which rest parallel carrier bars, in notches in which are supported journal studs at each end of the grate bars. The bodies of the grate bars are each stiffened by a longitudinal rib projecting from its lower surface, and at each side of the rib the grate bar is numerously perforated, the perforations being of the greatest diameter at their lower ends to facilitate the passage of ashes and prevent clogging. The pairs of carrier bars for each series of grate bars are held spaced apart by spacing bars, to prevent cramping contact, and on the lower side of each grate bar is a downwardly extending arm. All the arms in the grate bars of a series are pivotally attached to a



STROH'S GRATE BAR AND SHAKER.

connecting bar connected by a link with a rock arm on a shaft journaled in the bearing frame, the shaft being polygonal at its end to receive a handle lever, by which all the grate bars may be simultaneously rocked. By providing separate series of grate bars and independent shaking devices the fire may be cleaned in sections, and the disposition of material in the grate bars is designed to afford the greatest strength with the least weight.

IMPORTANT frescoes of the fourteenth and fifteenth centuries have been discovered under the plaster on the walls of the church San Domenico, at Riete, in Umbria. Among them is the coronation of St. Peter, martyr, Pinturicchio.

Rubber Substitutes.

Substitutes enter very largely into the compounding of rubber, because of certain distinct advantages which they possess, and which are not shared by coal tar or the simple mineral adulterants. They have not the vulcanizing effect of sulphur or the metallic oxides and sulphides. The chief value lies in cheapening the stock without disturbing its working qualities or impairing the texture, finish, or weight of the manufactured product. Their after effect on the life of the goods is, however, another matter.

The term "rubber substitute" may be broadly considered as including any substance possessing characteristics similar to those of unvulcanized rubber, and adapted to displace it in compounding. Ordinary reclaimed rubber, as well as the sulphurized oils, is included in this definition.

The reclaimed rubber of commerce is obtained by steaming or devulcanizing old rubber waste, generally shoes, freed more or less perfectly from fiber. Having originally contained some real caoutchouc, it is generally considered rubber of low grade rather than rubber substitute. Since its introduction its use has rapidly extended, until it is now a very essential factor in the ordinary and cheap lines of goods, and its presence is not entirely unknown even in the highest grades. As a substitute, it ranks first in merit and general use; the annual output in this country alone reaching thousands of tons.

As a substitute it is most available in goods where color or extreme lightness are not essentials. Being chemically inert, that is, free from any oxidizing tendency, it can be compounded with rubber in all proportions without injury to the new stock.

The sulphurized oil substitutes constitute a class by themselves, and are distinguished as brown or white, although chemically they are essentially very similar. Any of the readily oxidizable rejectable or drying oils combine freely, under proper conditions, with sulphur to form a more or less rubberlike mass. According to the selection of the oil and the mode of treatment, we get brown or white substitute. Such oils as linseed, rape, mustard and peanut are well adapted to make brown substitute. The process is a simple one, consisting in boiling any one of these oils or mixture of them in any proportion with flowers of sulphur. The operation may be carried on over a fire or by steam in a jacketed kettle. The proportions are generally about eighty per cent of oil and twenty per cent of sulphur. The reaction is complete in three or four hours at the heat of eighty pounds of steam (325° F.) It is well to boil the oil out of doors or in a strong draught of air, to carry off the noxious vapors. The mixture should be thoroughly stirred while cooking.

Mustard oil reacts quite promptly with sulphur, but gives a firmer product, and one that breaks rather shorter than that from the other oils named. It is best used in mixture with them. Linseed gives off the most disagreeable odor, and has no special advantage in point of quality of product.

The white variety of oil substitute is made by treating refined mustard, rape, castor, or cocoanut oils separately, or in mixture with sulphur chloride either in the cold or with moderate heat.

The light, porous variety may be made by mixing with the oils a small proportion of sodium bicarbonate, which, under the influence of the sulphur chloride, generates gas in sufficient quantity to render the whole mass very spongy.

The operation should take place in an earthen or lead-lined vessel, and the sulphur chloride be added slowly and stirred briskly into the oil.

The proportion of sulphur chloride to oil should be about one to eight and of soda to oil about one to twelve.

When the chemical action is over, the product is allowed to dry for a couple of days before use.

A solid, amber-colored substitute is made in the same way and proportions, omitting the sodium bicarbonate.

All operations involving the use of sulphur chloride should be conducted in a strong draught, and best in the open air, to avoid the evil effects of the vapors.

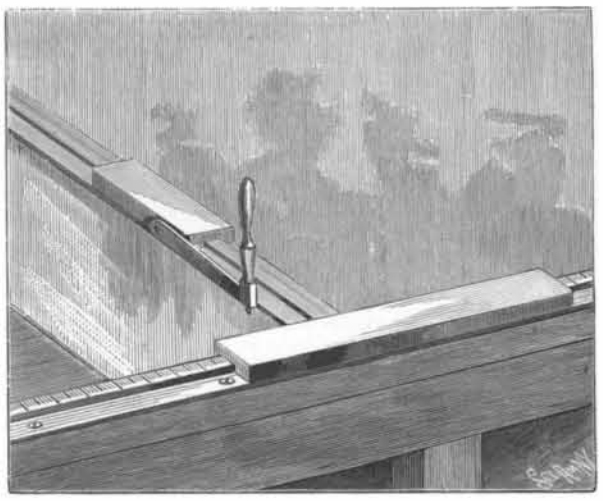
Chemically, the use of these sulphurized drying oils in rubber compounds is bad. They exert a marked influence in shortening the life of the goods, because by their active chemical nature they hasten the oxidation of the rubber present to the brittle resinous products which give evidence of their existence in the compound by its loss of elasticity, and by the hardening and cracking of the surface. There is little to be said for these oil substitutes from a chemical point of view. Their great practical value is entirely a matter of price, for they enable the manufacturer to cheapen the stock while maintaining the proper relative weight or specific gravity of the compound with reference to pure rubber.

The matter of specific gravity, or the ratio of the weight of any substance to that of an equal volume of some other substance taken as a standard, is a point of much importance. It governs the relation of pound price and piece price in rubber manufacture. Specific gravity and the percentage of ash in a rubber compound once gave an indication of the amount of rubber present, but since the extensive use of oil substitutes they have no value as specifications of quality.

The specific gravity of caoutchouc or pure unvulcanized rubber is 0·915. It will, therefore, float in water about like ice—that is, nearly submerged. The oil substitutes are slightly heavier; enough so to sink in water.—The India Rubber World, New York.

IMPROVED GLASS CUTTING APPLIANCES.

To facilitate the measuring and cutting of plate glass, the gage and appliances shown in the accompanying

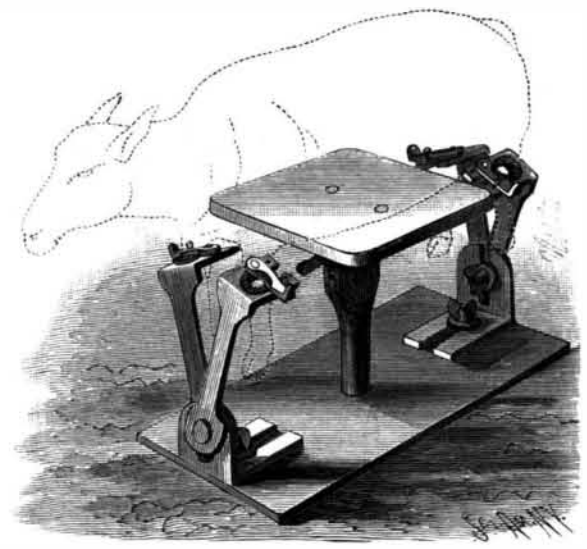


SEITER'S GLASS CUTTER.

illustration have been patented by John W. Seiter, of Harlan, Ia. A graduated rail is rigidly secured to a suitable bench, one side of the rail projecting upward to form a flange, and sliding on the rail is a carriage bar in whose under side is a rabbet groove in which the rail is received, the inner side portion of the carriage bar overhanging the inner side of the rail. The under side of the bar, which is flush with the bottom of the rail, has a dovetail recess in which the dovetail end of a guide bar is secured, the depth of the recess being such that the lower surface of the guide bar will be raised above the surface of the bench, and above the lower face of the overhanging portion of the carriage bar, so that the plate glass may be placed under the guide bar, to bear against the carriage bar. A rib on the upper side of the guide bar forms a rail on which slides a carriage block to which a glass-cutting blade of any desired form may be pivoted, the carriage bar being adjustable along the graduated rail, and taking with it the guide bar, which is adjusted on the glass plate to the desired size of glass to be cut.

AN ANIMAL HOLDING DEVICE.

To facilitate the proper and convenient holding of sheep while they are being sheared, the apparatus shown in the accompanying illustration has been devised and patented by John Ralston, of Slippery Rock, Pa. On its base plate stands a central stub shaft



RALSTON'S ANIMAL HOLDING DEVICE.

or post inclosed by a tubular column, to which is rigidly attached a vertical plate whose upper edge is ratcheted and curved in the arc of a circle, and two side plates are also pivotally connected with the central plate, and rigidly attached to the table. The table carries a spring pawl pressing against the ratchet teeth of the central plate, whereby the table may be turned to any axial position and given and retained in any desired inclination. At each end of the base plate are means for holding the front and hind legs of the sheep, consisting of angle plates which support fastening arms, each of which has a padded slot, in which the legs are locked in place by pivoted bars held in closed position by linch pins, the fastening arms being freely adjustable to regulate the position of the sheep.