

**IMPROVED RAILWAY CAR.**

We give an engraving of an improved railway passenger car designed to avoid telescoping and the disastrous consequences that result from it in the event of a collision.

The invention consists in making each end of the car with a corner, which is wholly independent of the frame timbers of the main structure, but fastened to it so as to fill out the proper outline of a car. This detachable part, by being disconnected or displaced in the shock of a collision, allows the ends of the cars to wedge past each other, instead of telescoping into each other, thus avoiding the great loss of life and the injury which are the usual results of telescoping.

It also diminishes the liability to fire from the displacement of the stove or heater, as these will be placed in the solid part of the end of the car.

Referring to the engraving, it will be seen that the car structure is as usual, except that the obliquely opposite corners on opposite ends, as shown, are framed independently, and attached to the main frame in such manner as to fill all the usual requirements of a passenger coach; but so that in case of a collision and tendency to telescope the corners, by reason of their being weaker than the opposing side of the next car, will be broken off, and should they not have sufficient strength to destroy the momentum of the car, the oblique side or framework, coming in contact with the re-enforced guard or fender on the opposite car, will divert the car from its course and render telescoping impossible. The timbers forming the oblique side or end of the main frame are strongly fastened to the main frame, and the corresponding timbers, which are a part of the frame of the corner, are bolted to the timbers in such manner as to afford sufficient strength for common use, but of just such strength as will give way in the event of a collision. The corner of the car, attached as shown, is supported vertically by the superstructure and by rods. Iron guards or fenders made very heavy are strongly fastened into the bottom timbers of the car, and extend high enough above the platform to receive the force of the colliding cars. These guards may, however, be omitted. They are built in with the wooden framework to supplement its strength, but will not be seen, except where the flange extends a short distance inside of the doorway. These guards afford greater strength to the part of the car inclosing the stove.

In ordinary collisions the momentum of the cars would in a great measure be overcome in crushing off the corners, and in severe collisions the cars might be derailed, but with greatly reduced tendency to loss of life.

This invention has recently been patented by Mr. John Milton, of Hamilton, Va.

**MULTIPLE-SPINDLE SLOT DRILL.**

This machine, constructed by Beverley & Atkins, Sheffield, is capable of finishing a complete set of keyways, three in number, at one operation, and thus economizes both time and labor.

The machine has two movable heads, one of these—that to the right hand in our engraving—carrying two drill spindles, each 1½ inches in diameter, while the other head carries a single spindle. This arrangement is adopted, says *Engineering*, because one of the shafts of a wringing machine roller has a keyway at one end only, but it is of course capable of modification if the machine is intended for other purposes. The traverse of the heads, which is given by elliptical gearing so as to equalize the motion, is adjustable up to a range of 4 inches, while the position of each head between the frames can be modified independently of the other.

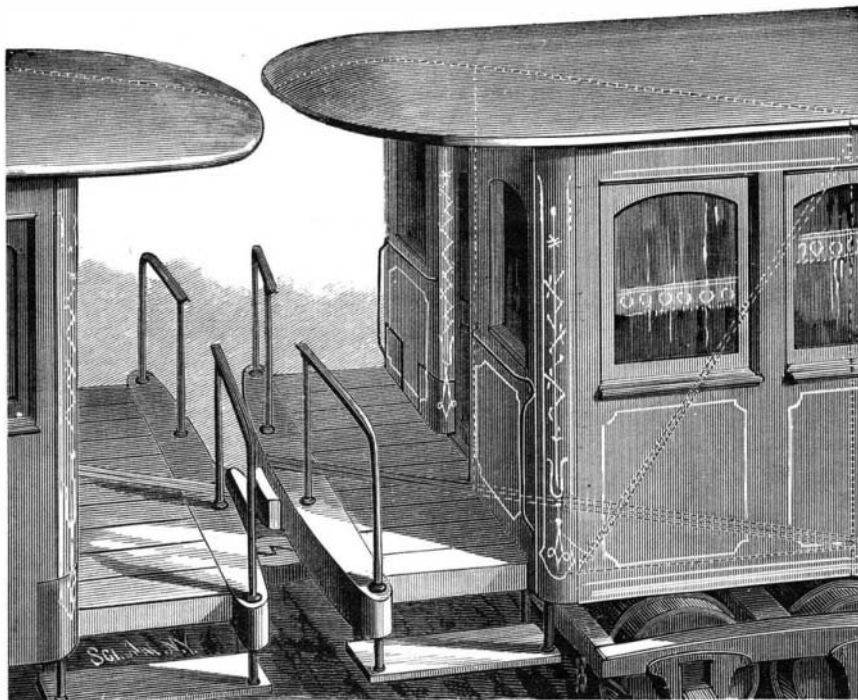
By throwing off the traverse driving belt the machine is converted into an ordinary drill with three spindles. The down feed in slot drilling is self-acting, and is given by ratchets and spiral wheels, there being two speeds. It will be noticed that the framing of the machine is open at each end so as to allow of a long shaft being operated upon. The whole machine is of a new type and one which can be very readily modified to suit the requirements of various manufacturers.

**Pure Hydrochloric Acid.**

The author adds to the sulphuric acid employed a small quantity of an oxidizing agent, such as potassium bichromate or permanganate, and causes the gas, before it is conducted into water, to pass over mercury in a Liebig's bulb tube. The oxidizing body prevents the formation of sulphurous anhydride in presence of organic matter, and liberates bromine and iodine if present. Arsenic chloride is decomposed in contact with the mercury, and free chlorine, bromine, and iodine are absorbed.—*Dr. Giudice.*

**Railways for Common Wagons.**

An experiment of more than ordinary significance is about to be tried in England. A number of leading ship owners and merchants of Liverpool have projected and raised a large guarantee fund for obtaining parliamentary sanction for a series of roadways, radiating from Liverpool to the great centers of manufacturing industry in South Lancashire, the roads to be laid with a double set of iron plates to serve as tracks for ordinary freight wagons, the wagons to be drawn by steam traction engines. It is expected that



**MILTON'S IMPROVEMENT IN RAILWAY CARS.**

goods can be transported in this way at a much lower rate than the present cost of railway transportation.

The chief saving will be in the handling of goods. The wagons, which will be similar to those in general use on ordinary roads, except that the axles will be of the same length, will be loaded directly from the steamer or the factory, drawn by horses to the nearest station of the "plateway," and there attached to a long line of similar vehicles with an engine at its head. Arrived at their destination, horses will draw them to the factory or steamer. The metal plates will be laid in two parallel rows, with low flanges on the outer edge to keep the wagons on the track. It is thought that \$175,000 a mile will construct and equip the plateway, and that the

other forms are all totally insoluble in sulphide of carbon. The best solvent for selenium is its own chloride, which dissolves large quantities of both modifications, but they separate from it as black selenium.

**OCCURRENCE.**

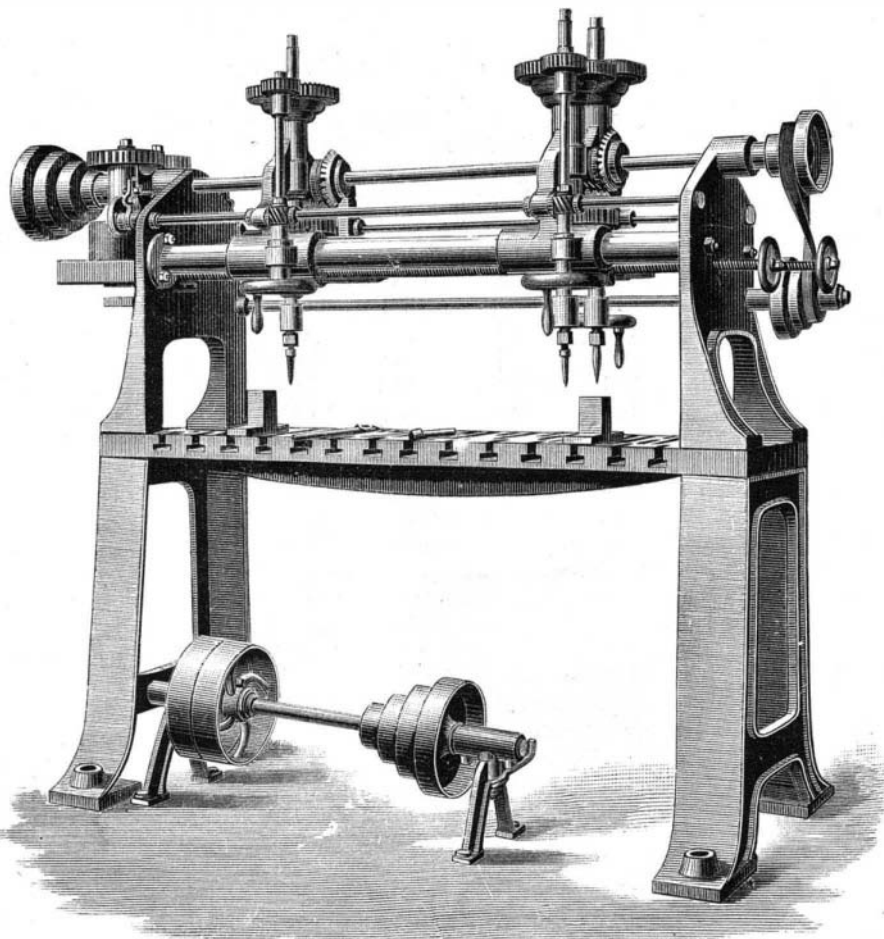
Selenium, we have said, is not an abundant article, and all now in the market is imported. It has been found in a free state at Culebras, in Mexico, and *Les Mondes* says that an ore containing 28 per cent of selenium has been found in the province of Mendoza, in the Argentine Republic. Clausthalite is as selenide or lead found in the Hartz Mountains. But none of these actually furnish the manufacturer with selenium. Many pyrites, both of iron and copper, contain traces of selenium, which becomes concentrated when the ore is used for other purposes, and may be utilized for making selenium. The soot that collects in the flues of the Mansfeld copper works in Saxony, and the slimy deposit that is found in the leaden chambers of sulphuric acid works where seleniferous pyrites are burned, are among the chief sources of selenium. The chamber deposits at Stockholm in Sweden, in which it was discovered by Berzelius, and at Tilkeroede in the Hartz, in which thallium was discovered by Crookes, are among the richest sources of selenium. According to Nilson the chamber deposits from Falun in Sweden contain 2½ per cent of selenium. In 1875 the total amount of selenium produced at Eisleben from Mansfeld soot was only 5¼ lb., valued there at \$90. Platinum ores sometimes contain selenium, and a slag containing a large percentage of selenium of sodium is made at the Frankfort assay office as an incidental product. When dissolved in water it yields a reddish brown solution, from which, on exposure to the air, a crust of metallic selenium separates. (*Dingler's Journal*, cccxiv., p. 414.) A portion of the selenium of commerce comes from this source.

**PREPARATION.**

The simplest method of preparing selenium from these deposits in the leaden chambers is to digest the slime with a rather strong solution of cyanide of potassium; about one-third of an ounce of the cyanide to a pound of the deposit. After filtering or decanting, the selenium solution is treated with excess of hydrochloric acid, which liberates a quantity of Prussic

acid, and throws down the selenium as a red powder or scales. ( $SeK_2Cy_2 + 2HCl = 2HCy + 2KCl + Se$ .) The gases given off must either be absorbed in water or alkali, or else conducted into a flue, as they are very deadly! If any sulphur is dissolved it remains in the solution in form of sulphocyanide, not being so readily decomposed as the selenio-cyanides are.

This method is also very convenient for testing for the presence of selenium in chamber deposits. Such deposits, of



**IMPROVED SLOT DRILL.**

cost of maintaining and operating it will be comparatively small.

**The Princeton College Scientific Expedition.**

The scientific expedition which left Princeton, June 26, secured twenty-two hundred pounds of valuable fossils, which have been classified and added to the college museum. The collections were made in Wyoming, Nebraska, and Dakota.