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## Railroad Rail Straightener.

Our engraving illustrates what appears to be a useful invention for straightening railroad rails without taking them up or drawing the spikes. A is a truss bearing bound round with a metal band, through which passes a truss rod, the course of which is partly shown and partly indicated by dotted lines. The curved center of this truss rod bears against the rear end of the bearing, B, which is firmly secured to the truss bearing, A. C is a bearing made with a bulge to fit the rail. D D are clamps, which are placed the required distance apart, and wedged so as to hold the truss bearing to the rail. E is a lever with a cam shaped end. The whole operation will readily be understood from Fig. 2, which represents, in section, the relative positions of the working parts and the rail, just before the lever is depressed to straighten it. The inventor states that four or five men will take a crook out of a rail, with this machine, in one minute; to take it up, straighten, and replace it, would occupy them twenty-five or thirty minutes. Its efficiency was proved by straightening a portion of a rail on which rested the driving wheel of a thirty ton engine. Patented through the Scientific American Patent Agency, March 26, 1872. Further information may be obtained of the patentee, G. I. Kinzel, Knoxville, Tenn.

institutions of the United States and elsewhere, as it is now being disseminated in Canada; and he has no doubt that the tableau will also find its place in the studio of the engineer and architect, to whom the models will be suggestive of various forms and relative proportions which cannot fail to aid them in their pursuits. The rapid success attained by a school in Quebec, in mensuration of all kinds of surfaces and yet higher mathematics, including conic sections, was attributed to the use of this tableau. Every tableau is inscribed with

Dr. Wilkie, of Quebec, thinks "the government would confer a boon on schools of the middle and higher classes by affording access to so suggestive a collection;" and Professor Newton, of Yale College, considers the tableau "of great use for showing the variety and extent of applications of the prismoidal formula."

## Aniline Colors.

Professor C. F. Chandler recently delivered an interesting lecture on the above, before the Polytechnic Association of the American Institute, from which we take the following:

It is well understood that coal is an element of our national wealth, and that we derive from it our power. The combustion of 300 lbs. of coal under a steam boiler will produce a power equal to the mechanical force exerted by a man for a year. Another important application of bituminous coal is to the manufacture of illuminating gas. In this manufacture there are certain residual products, which were at first thrown away; and it is of these that I propose to speak to-night.

Coal tar is produced at the rate of about ten gallons to the ton of coal. Thousands of barrels of coal tar were at first thrown away; but the chemist turned his attention to this substance, and discovered so many products useful in the arts, which could be made from it, that coal tar now finds a ready market at \$1.50 per barrel. When coal tar is subjected to distillation, the liquid portion passes off, and there remains the heavy black pitch which is used for roofing and for pavements. The liquid portion, which comprises about one fourth of the original coal tar, produces first a light fluid called naphtha, and then a heavy liquid which is called dead oil. The light liquid is a mixture of carbon and hydrogen, of which benzole is the type. It is  $C_{12}H_6$ , that is, taking into account the difference of weight, 72 parts of carbon to 6 parts of hydrogen. Other substances are produced from this, differing by two atoms of each, making  $C_{14}H_8$ ,  $C_{16}H_{10}$ ,  $C_{18}H_{12}$ ,  $C_{20}H_{14}$ , etc.; but, until recently only the first two have had any practical importance in the arts. They were used simply as fuel, and as antiseptics, for preserving timber from decay. But lately one of them is claimed to be a specific for the small pox.

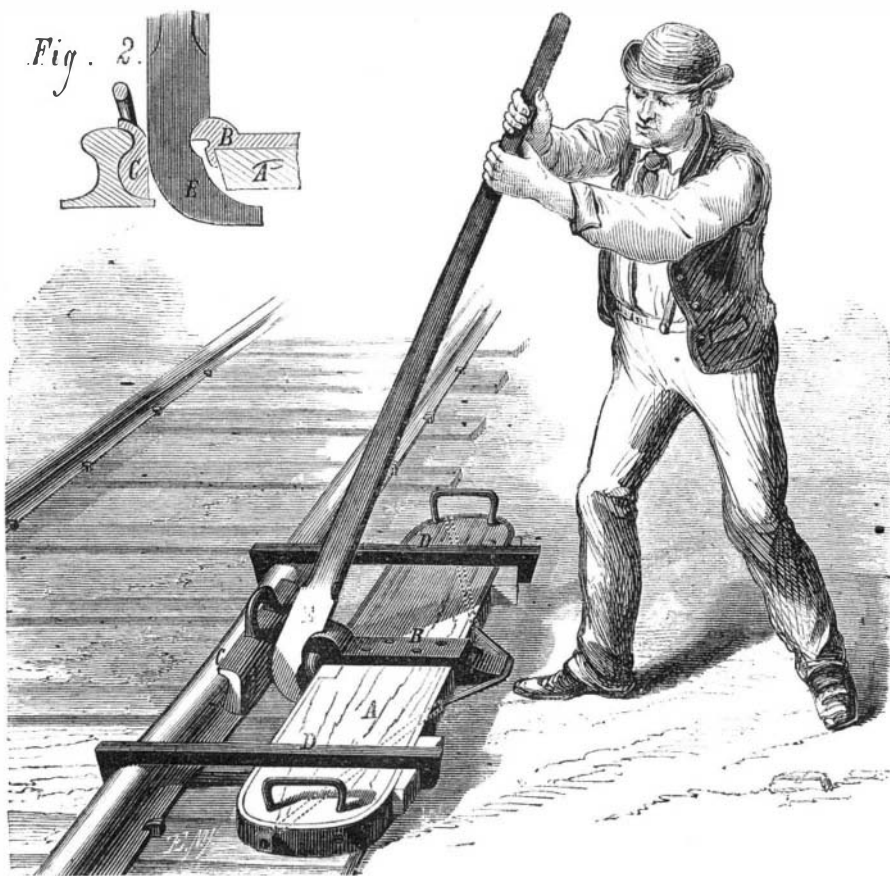
After the volatile portions have been removed, there remains this dead oil, which is heavier than water. This was for a long time used as a fuel in glass houses. It was then found that the carbolic acid it contains was a most powerful disinfectant and antiseptic. It was found that it would prevent the spread of the

cattle disease, that cattle having the disease in its worst form might be placed with others with safety, if they were protected by this acid. It was found, too, that the durability of timber was increased four or five fold by its application.

But I wish to-night to invite your special attention to the beautiful colors which have recently been obtained from refuse coal tar. They are naturally subdivided into three groups, the aniline colors, those derived from naphtha line, and the carbolic acid colors. I shall confine my attention wholly to the chemical phase of the subject.

Benzole is a hydrocarbon. Bringing that in contact with nitric acid, an atom of nitrogen carries off an atom of hydrogen; and we have

nitro-benzole, which is a very fragrant oil, an artificial oil of bitter almonds, used instead of that substance in the manufacture of soaps. When the nitro-benzole is made to give up



## KINZEL'S RAILROAD RAIL STRAIGHTENER.

a rule for finding the solid contents of any body, called "the prismoidal formula." This formula has been shown, by Mr. Baillaigé in his treatise on geometry and mensuration published in 1856, to be less restrictive than supposed, and he has added to the known solids, measurable thereby, a long list of others discovered by him, the whole of which are given in the tableau. Each tableau is also accompanied by a printed treatise, explanatory of every use to which the models can be put. Mr. Baillaigé is in possession of a mass of testimonials, from high officials and other distinguished

men, both in Canada and Europe, together with reports of various educational and other institutions, all highly complimentary to him and his invention.

## The Effect of Cold on Iron.

The effect of cold on iron, concerning which much diversity of opinion exists, is illustrated pretty forcibly by the experience of the Grand Trunk Railway of Canada, which is exposed to severe cold and a great deal of it. At the recent half yearly meeting of the company, in London, the President said that 3,500 to 4,000 rails on the line break every winter! But he found comfort in the fact that, in about 110 miles of steel track, only eight or ten rails have broken. It was feared when Bessemer rails were first introduced that their resistance to wear would be counterbalanced by unusual liability to break, and that they would be especially dangerous in severe climates, the impression being apparently that, having something of the hardness of cast iron, they had also something of its brittleness. This experience of the Grand Trunk, however, indicates that they are especially fitted for such climates.

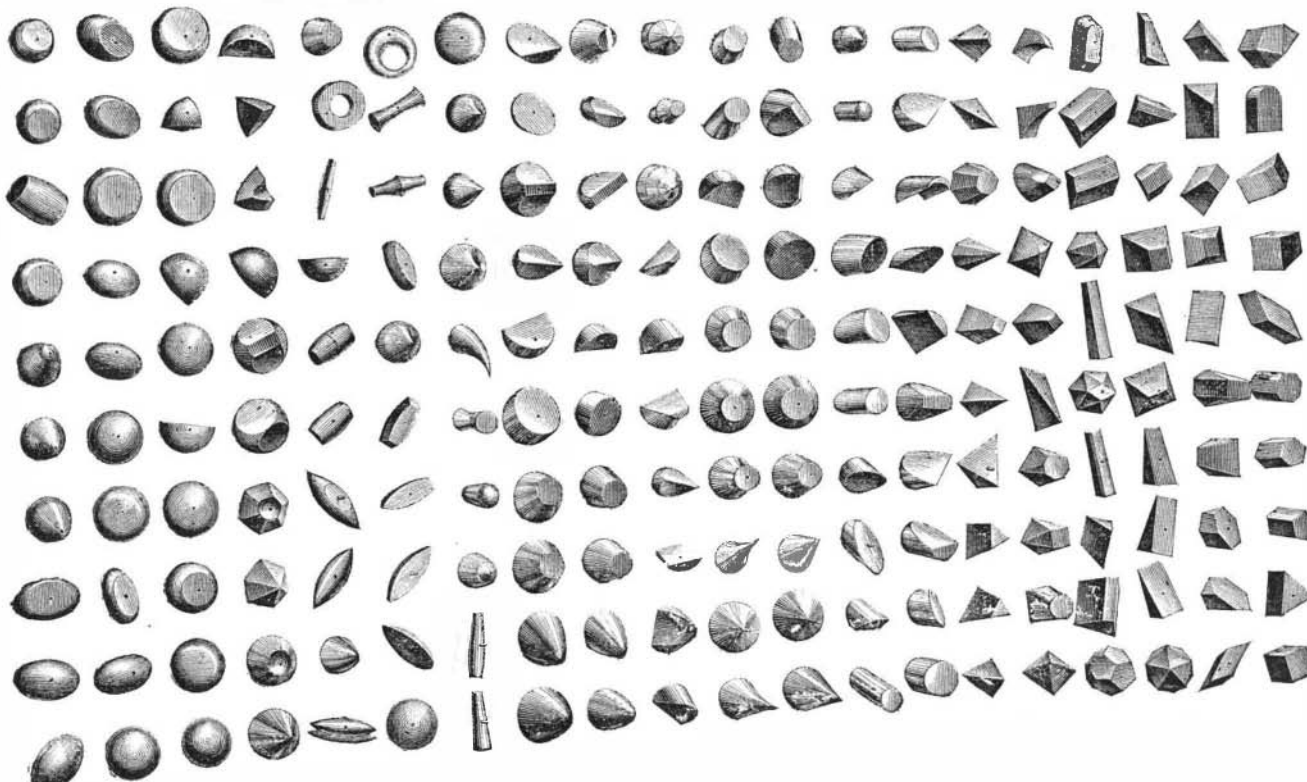
## BAILLAIRGÉ'S STEREOMETRICAL TABLEAU.

Our engraving is a perspective view of the above named educational device, which has been patented for its inventor, Mr. C. Baillaigé, of Quebec, in the United States, Canada

and Europe. It consists of a board, about six feet long and four feet wide, with some two hundred wooden models, comprising, so to say, all the elementary forms, their segments, and sections, and numerous other solids, simple and compound.

The tableau is set in an appropriate frame, with glass covering, so as to exhibit the models while excluding the dust. The front can be opened at pleasure so as to afford access to the models, each of which is merely supported on the board by a round nail or wire, which admits of its easy removal and replacement by teacher or pupil. The instruction conveyed by this tableau, appealing, as it does, to the uneducated eye

and mind, is, the inventor thinks, destined to be of great use in developing the intelligence of the untaught masses of mankind. He expects to introduce it into all the educational



## BAILLAIRGÉ'S STEREOMETRICAL TABLEAU.

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