IMPROVED RAILWAY RAIL JOINT.

We illustrate herewith a new mode of forming the extremities of railway rails, so as to produce a joint which obviates the use of fishplates and offers the advantages of a practically continuous rail. The joint closed is shown in Fig. 1, and in Fig. 2 the parts are shown detached. The end of one rail, A, is made in the shape of a tenon to enter the mortice formed in the extremity of rail, B. The latter is made thicker at the parts through which the division is made,and also perforated with two slots,through which, and through similar slots in the tenon, the fastening bolts pass. In order to strengthen the rail, A, at the points where the tenon begins, the angles are curved,and fit against similar curved surfaces at the extremity of rail, B, as shown at C, in Fig. 1. The length of th slots is such as to afford abundant play for the rails to compensate for contraction and expansion, without disturbing the bolts.

By the use of this joint, it will be evident that the wheels of the vehicles never leave iron except when crossing switches, since, while passing over the joint, the tread of the wheel is on the tenon. This is made sufficiently strong to sustain any weight which may come upon it, even if no tie support it. The advantages of a continuous rail are found in the saving of wear to the rolling stock ordinarily due to jumping joints, as well as in the prevention of deterioration of the rails,which are rendered unserviceable through the battering down of their ends alone. It is claimed that the joint here illustrated is as strong as any other part of the rail, that rails made with it may be laid more easily and more rapidly than others connected only by fishplates, that it is as strong and as durable as the last mentioned mode of fastening while requiring two nuts less, and that it can be used wherever fishplates can be.

The rails, we are informed, are pressed or otherwise made into the necessary form by simple special machinery, at a low cost.

Patented through the Scientific American Patent Agency, November 9, 1875. For further information address the inventor, Mr. Geo. A. Mead, North Salem, N. Y.

Fig. 1

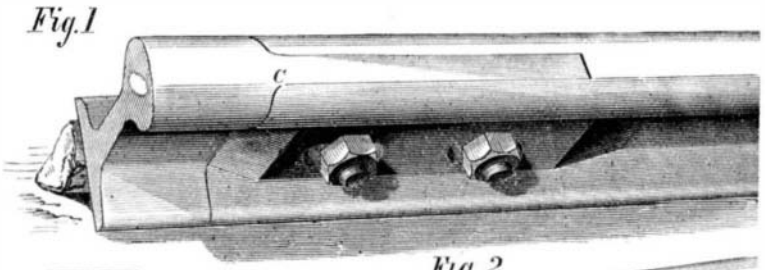
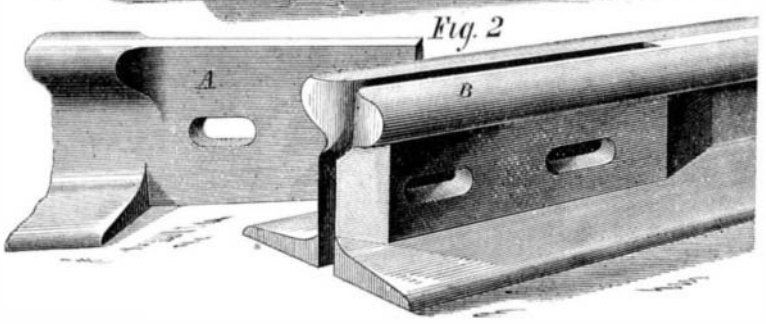


Fig. 2



MEAD'S RAILWAY RAIL JOINT.

IMPROVED FURNACE GRATE BAR.

A new grate bar is illustrated in the annexed engraving, which, it is claimed, may be manufactured at a low cost and with a smaller quantity of metal than is usually employed, and is of sufficient strength to meet all requirements,and will not warp, crack, or twist by heat. If all the inventor claims for it is maintained in practice, it is certainly a valuable improvement. The engraving shows the patterns for the three portions which constitute the device, separated in Fig. 2, and the complete bar in Fig. 1.

A is a series of long parallel bars, which are arranged in groups of three or four or more, and which may be made slightly convex on their upper face to insure a greater circulation of the air when the coal is heaped upon them. These bars are firmly held in place by transverse supports, B, each of which is provided with an opening, C, to allow an air circulation from one to the other. The scalloped bars, D, are arranged below the fire surface and connect with the transverse supports, B. They are formed with knife edges at E, to prevent accumulation of ashes upon them. The projecting flanges at the ends rest upon the ordinary wall of the furnace and furnish a substantial support for the whole.

Patented August 31, 1875. For further particulars regarding sale of State and county rights, address the inventor, Mr. Edward M. Erdman, Lykens, Dauphin county, Pa.

Fig. 1

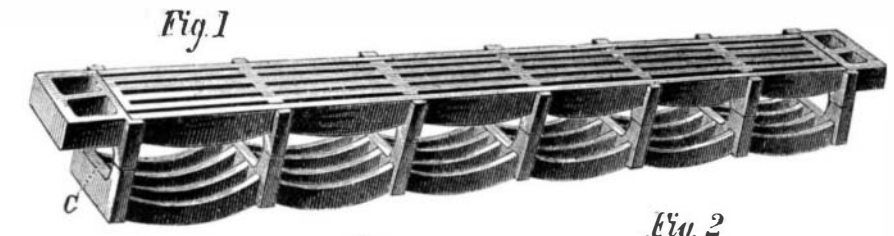
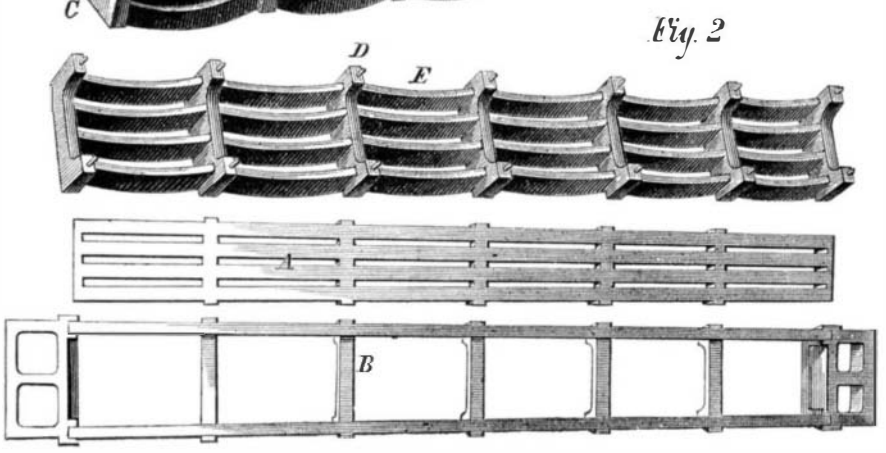


Fig. 2



ERDMAN'S FURNACE GRATE BAR.

Simple and Compound Engines.

At the ordinary meeting of the Glasgow Association of Engineering and Shipbuilding Draftsmen, November, 1875, Mr. David Halley presiding, Mr. Robert Thomson read an interesting paper on "Simple and Compound High Pressure Condensing Engines." The object of the paper was to show that a simple high pressure condensing engine, using a high grade of expansion, was superior to the present more or less complicated compound engines. The subject, being one of paramount importance, naturally elicited an interesting and instructive discussion, in which many of the members took part, most of them failing to be convinced of the advantages that would take place by a return to the high grade expansion condensing engine, with a higher pressure of steam.

We would call the attention of the above association to the fact that several steamers are now plying between this city and New Orleans that are fitted with single high pressure engines, that they work with much satisfaction, and equal, if they do not surpass, in economy the best compound marine engines now in use.

Exporting the Soil.

A correspondent of the Winstead (Conn.) *Press*, writing in regard to a trip which he has recently taken to the West, says:

"Through Pennsylvania and in the valley of the Allegheny the stranger is struck with the appearance of good husbandry and general air of thrift on all sides. In the mountain region, he sees a country of different aspect and the evidences of other industries. This is the mineral region, the home of the coal, oil, and iron which bring so large an annual income into this State from abroad.

"Through Ohio, on the line of the Pittsburgh, Fort Wayne, and Chicago road, there is more level and uncultivated land than I expected to see. The same remark is applicable to a portion of northern Indiana In Illinois, after leaving the flat prairies adjacent to Chicago, the Chicago, Burlington, and Quincy road runs through a seemingly continuous corn field. Corn at the right of us, corn at the left of us, corn in front of us, corn in the rear of us, in easy swells and apparently interminable reaches, cross the State till we strike the Mississippi at Quincy. There are fruit, other crops, and stock, of course; but corn is the great staple, and the query arises where so much finds a paying market; for it is also a leading crop in other States in the same latitude and south of Illinois.

"If the present price shall be maintained, the crops will be remunerative: but this ceaseless production of corn, whether shipped directly or fed to hogs and sent away in that form, is exhausting the soil, very surely and not very slowly.

"Five years ago the farmers of lower Indiana had made this discovery, and were changing from hogs to cattle. This shows the depletion of soil in some measure; but to export crude products, like the cereals and provisions, is a bankrupting process, robbing the soil and impoverishing the producers. If continued for two generations, the people will be forced to migrate to virgin lands, there to repeat their destructive husbandry and again leave behind them sterile plains like those of Asia.

"The abandoned cotton and tobacco plantations of the Eastern coast States are evidence of our infancy in economics. A varied industry and the export only of products having the last processes of labor largely incorporated into their substance are conditions of an enduring commonwealth."

The Zodiacal Light.

Those who are interested in the observation of this phenomenon will do well to be on the alert during dark evenings in the winter months. The most conspicuous exhibitions of the light in England during the last few years have occurred in the month of January, the long standing recommendation to expect the most notable displays in the evenings about the vernal equinox having thus been by no means justified in the result. The light was perceptible for a short time on the evening of November 21, without any yellowish tinge, and the position of axis somewhat doubtful from the indifferent state of the sky. Professor Heis's observations in December, from 1851 to 1870, place the mean position of the apex on the equator in R.A. 349°, or with about 82° elongation from the sun; this refers to the eastern arm of the phenomenon.—*Nature.*

Estimating the Horse Power of Steam Engines.

When steam engines were first introduced, they were largely used to take the place of the horses before employed for raising water from mines. Naturally, people ask, when buying an engine, how much work would it do, that is, how many horses did it represent. The early engine builders found themselves greatly at a loss when this question was first asked. They had at once, therefore, to determine how many horses an engine was equal to. The first thing was to find out how much a horse could do. The strongest English horses, the London brewers' horses, were far above the very best that could be found elsewhere. They were found to be able to travel at the rate of 2½ miles per hour, and work eight hours per day. The load was pulling a 100 lbs. weight up out of a shaft by means of a rope. When a horse moves 2½ miles per hour, he travels 220 feet per minute, and of course, at this speed, the 150 lbs. would be raised vertically that distance. That is equal to 300 lbs. lifted 110 feet per minute, or 3,000 lbs. 11 feet, or 33,000 lbs. 1 foot high, in 1 minute. The 33,000 lbs. lifted 1 foot high every minute is taken as a standard horse power. It is much more than any ordinary horse can do, and, therefore, the engine builders were always sure that their engines would take the place of fully as many horses as the horse power would indicate that they should. Of course, 33,000 lbs. lifted 1 foot per minute is much more convenient for calculation than 150 lbs. 220 feet, and therefore the former form has been adopted. The amount of work, or number of foot pounds, however, is just the same in either case. A foot pound represents the amount of power required to lift 1 lb. 1 foot high. It is comparatively easy to estimate the horse power of an engine with a reasonable degree of accuracy, provided we know certain things in regard to it. We must know the pressure in the boiler, the diameter of the cylinder, the length of stroke, the number of revolutions per minute which the engine is making, and lastly, the point at which steam is cut off.

When there is no cut off, steam is admitted into the cylinder during the whole stroke, and a cylinderful of steam at boiler pressure is used at each stroke, as the cut off, when there is one, takes place before the piston has reached the end of the cylinder. If steam is prevented from entering the cylinder after the piston has passed mid-stroke, the point of cut off is at half stroke. If the steam enters the cylinder during three fourths of the stroke and is then arrested, the point of cutting off is at three fourths of the stroke. It is necessary to know the point of cutting off, in order to find out what the average pressure is in the cylinder. In the commoner sorts of engines, not provided with independent cut-off valves, the point of cutting off may usually be taken at from one half to three fourths of the stroke, though sometimes more than this. It may, perhaps, be safe to take the average pressure in the cylinder at about eight tenths of that in the boiler; though where the steam pipe is long and the throttle valve is used to control the speed, the average pressure in the cylinder may be no more than three fourths of that in the boiler. The power will be the distance which the piston under this pressure travels during one minute. Therefore, we have the rule: Multiply the area of the piston by the average pressure per square inch upon the piston, multiply this result by the distance which the piston travels per minute in feet, and the result is the number of foot pounds per minute which that engine can raise. Divide by 33,000 and the result is the number of horse power. The number of feet per minute traveled by the piston is twice the number of strokes per minute multiplied by the length of stroke. This gives the number of horse power sufficiently nearly for all practical purposes.—*Saward's Coal Trade Journal.*

Pneumatic Street Cars.

A trial of a new tramway motor came off lately on the lines of the Vale of Clyde Tramways Company at Govan, Scotland. The car, having been charged with the necessary quantity of compressed air, was made to take its trip among the ordinary cars running from Govan to Paisley Road Toll. Experiments were made to test the power of the machine for slowing, stopping to take up passengers, etc., and it appeared to be under the most perfect control. The noise was scarcely perceptible, while horses alongside did not seem to recognize the car as anything unsightly, or to be feared. Mr. Moncrieff was accompanied by the chairman and directors of the Vale of Clyde Tramways Company. The result of the trial was to impress all present with the complete success of the invention, and its adaptability to tramway purposes.