these articles ripen in a pure, clear atmosphere, as they absorb very freely the ill savors and unwholesome ingredients of the air around them.

[From our Foreign Correspondent.]

ROLLING STOCK OF ENGLISH RAILWAYS.

LONDON, Nov. 15, 1866.

Having, in my last letter, noticed the principal features of English railways in respect to "works of line" and permanent way, I now proceed to give some description of the rolling stock. Owing to the excellence of the permanent way, some arrangements, which on our roads are necessities, have not been as generally introduced in English locomotives; and while with us makers have settled on one or two types of engine exclusively, the variety of arrangement here is much greater. There are many lines, however, which of late have adopted several American ideas, such as the Bissell truck, the equalizing bar between coupled drivers, and placing the steam chest on the top of outside cylinders; and it is probable that the use of most of these will ere long become general. The English locomotive, however, though unfit for American roads, is nevertheless, for the roads on which it has to run, an excellent machine, and presents some points which we would do well to copy. For good engines the type most generally adopted is six coupled driving wheels, about five feet diameter, without other wheels. For an engine of twenty-seven tuns' weight, the amount on each pair of wheels would be about nine tuns on the forward pair, eleven and a half on the center or driving axle, and six and a half tuns on the after pair. Such an engine would have cylinders eighteen inches diameter by twenty-four-inch stroke, with a thousand square feet of heating surface in the boiler, and carry one hundred and twenty lbs. steam. For passenger engines there is greater variety. The majority have inside cylinders, though a respectable proportion have outside. A favorite plan has been to give but a single pair of driving wheels, of from six feet six inches to seven feet six inches diameter, with one pair of leading and one pair of trailing wheels, of three feet six inches diameter; cylinders sixteen inches or seventeen inches diameter by twenty-four-inch stroke. The driving wheels in these carry eleven or twelve tuns, but, as we should suppose, they are often deficient in adhesion. Four coupled wheels are now more in favor, either with a single pair of leading wheels, or with a four-wheel bogie. The largest diameter of coupled wheels is seven feet. There is hardly any arrangement of wheels that may not be found in quite general use, two pair of driving wheels alone, four drivers, and a pair of trailing wheels, four drivers and two pair of leading wheels, or a single pair of driving wheels and a bogie, but the first mentioned forms are perhaps the most usual. The boilers are made of seven-sixteenths-inch plates in the shell, five-eighths or three-fourths for the forward tube sheet, and copper fire-boxes half inch thick, except the tube sheet, which is three-fourths inch thick reduced to five-eighths inch below the tubes. The water spaces around the fire-box are two and a half inches to three inches wide. The circular seams of boilers, as a general thing, are single riveted, while the longitudinal ones are double riveted, three-fourths inch being the usual diameter for the rivets. As this plan is not generally followed with us, it is worth while to call attention to the reason why it is done here, and why it certainly is the right way to build boilers. The strain on any joint or section of a boiler is proportioned to the area acted upon by the steam divided by the amount of length of section of metal to resist the pressure. Now the pressure tending to tear asunder the circular seams is due to the area of the ends of the boiler, and is resisted by a length of section equal to the circumference. The pressure tending to rupture the longitudinal seams is due to the diameter of the boiler multiplied by any unit of length, and the resisting section of metal is twice that unit of length or the amount on each side of the barrel in that length. Now as the area of the end is equal to half the circumference multiplied by half the diameter, the strain on the circular seams, which is as this amount divided by the circumference, will be as the diameter divided by four, while on the longitudinal seams it is as the diameter divided by two, or twice as great per unit of length. If, in addition to this, we consider that the area of the heads taken up by the tubes, on which there can be no pressure, is very great beside the proportion of the strain that they themselves bear, we see that the circular seams always have a great excess of strength over the longitudinal ones, and hence the propriety of double riveting the latter. Angle iron is used in the construction of boilers to a larger extent than we should think advisable, though the best builders only use it for fastening the forward tube sheet to the shell.

The tubes are always of brass, and are set with steel ferrules at one or both ends. Steel is coming largely into use for boilers, on account of its great strength and the facility with which it can be flanged to any desired form. It may reasonably be expected, also, that the reduction of the thickness of the plates, consequent on the substitution of steel for iron, will remove a difficulty which is always found with English locomotive boilers, but which is unknown in America, viz., the grooving of the plates just at the end of the lap of the circular joints in the submerged part of the joint. This has always been a most serious trouble, since the plates are reduced to an unsafe thickness just at this part long before the remainder of the boiler is at all impaired by use. This cannot be due to bad calking, for it occurs in places where no calking is done. It is attributed by some to the strain caused by expansion, tending to buckle the plates, especially where, as in some cases, no expansion joint on the frame is provided; and if this be the cause it would no doubt be less serious with comparatively flexible thin plates than with the thicker ones. The adaptation of the fire-boxes to the burning of bituminous coal is generally very simple and quite effectual. On the London and South-western perhaps the most complete combustion of the gases is obtained by the use of large quantities of fire brick in the form of tubes, arches, and gratings, to insure the requisite heat for ignition after the air for combustion has been admitted; but as this system is very heavy, and not readily applied to existing boilers, it has not come into as general use as other less expensive and scarcely less perfect means. The most usual plan is to have an arch of fire brick projecting from just below the tubes, about half way across the fire-box, and under this air is admitted through two openings in the front of the fire-box seven inches square, provided with dampers by which the quantity can be regulated. Or the air may be introduced at the door, and thrown down toward the arch by a deflector of old sheet iron, in either case the air being obliged to mingle with the gas and ignite before entering the tubes. Sometimes the deflector is used without the fire-brick arch, and in some cases there is no fire door at all, though, unless the firing be constant, this must, I should think, admit too much air. In all arrangements an ample supply of air is provided, and some means for preventing it from entering the tubes without having combined with the gas. As this is a matter which greatly affects the coal bill of a railway, it is well worth the careful attention of those in charge of such matters with us. The fire door is now always made sliding, and consists merely of two plates, connected by links in such a way that they open and shut together by a simple push with the foot on a suitable lever. Beside being much handier and more out of the way, they have the advantage of not being blown open in case of the failure of a tube. The usual size of blast pipe is four and a half inches or five inches, always single. English engineers deem it very important that the boiler should be subjected to no strain other than that arising from the pressure of the steam. Accordingly the cylinders are fastened to the frame alone, and all the working strains are sustained by the framing, the boiler being simply carried on it. The frames consist of deep plates, one inch thick, running the length of the engine, with jaws forged on, wide enough to receive the axle boxes, and in some cases made deep enough at the forward end to completely encircle the steam chest of an outside cylinder (which is at the side of the cylinder, and projects inward through the frame) and allow of a goodly number of bolts being put through the frame and casting. This form of frame is, no doubt, very rigid and good.

With inside cylinders the two steam chests are turned toward each other and bolted together, the cylinders being bolted to the two frames by flanges on their opposite sides. This is an exceedingly inconvenient arrangement for taking care of the valve seats, as there is but a narrow space for getting at them to scrape them if necessary, yet there is but one line, the London and South-western, that has adopted our plan of using a rock shaft, and placing the valve chest where it is accessible. In regard to valve motion there is much greater variety than with us, for while we have generally agreed upon the shifting link of the curved slotted form, with knuckle joints for the eccentric rods behind, here there is not only a division between the shifting and stationary links, but in regard to form and positions of the centers there is every possible variety. In addition to these there is a form of link which has been largely adopted of late, from the cheapness with which it can be made, which is a combination of the two systems, the link being straight, and therefore easy to fit up, and is suspended from a weigh shaft which also carries at its opposite extremity the valve-rod link, so that when one is raised the other is lowered, and both move in the operation of reversing. This gives as good a distribution of the steam as the other forms, and in addition to its simplicity has the advantage of dispensing with the counterbalance, as the link and valve rod link counterbalance each other.

The reciprocating parts are now mostly made of Bessemer metal, to insure strength with lightness. The pistons are made in a much simpler manner than ours, and are equally good as regards tightness and smoothness of the cylinder. They are generally packed on Ramsbottom's patent, in which the piston is a light solid disk, with a flange to give width of bearing on the cylinder. In this flange are turned three square grooves five-sixteenths inch wide, and into these are spring rings of square steel wire of that size, cut carefully to exactly the proper length, so that the ends shall just come together when in working condition, having first been bent to the proper curve so that they shall be pressed out by their own elasticity to a steam-tight bearing. Nothing could be simpler or more efficient than this for a piston packing.

All locomotive wheels are of wrought iron, generally with steel tires. As already stated, the size of both driving and carrying wheels is larger than with us, and the same applies to the carriage wheels also, which gives an advantage in regard to ease of traction, at least where the roads are good enough, as they are here, to admit of them without danger of riding the rails.

SLADE.

Patentees in France.

Commissioner General Beckwith, in a letter to the Secretary of State, says he addressed an inquiry to the Imperial Commission, some time since, concerning the legal right of foreigners holding French patents for their inventions, to exhibit and afterward sell the foreign-made products thus patented in France, without forfeiture of the French patent. The Imperial Commission referred the inquiry to the Minister of Commerce, and were informed that, in the opinion of the government, such exhibitions and sale, if duly authorized by the Minister of Commerce, would not operate a forfeiture of patent; but that the decision of questions touching such forfeiture belonged to the courts of law.

Just so, Mr. Beckwith. The reply of the Minister of Commerce decides nothing. That functionary refers the matter to the courts, where it properly belongs. He has no more power to upset the patent laws of France than Secretary Browning has to declare void the patent laws of the United States. The French law will invalidate a patent if the article is made abroad and sold there. To remedy this evil requires new legislation and not the *ipse dixit* of a Cabinet Minister, who is merely an executive officer.

TUNNEL UNDER THE ENGLISH CHANNEL.—Surveys are going forward in the bed of the English channel for the projected tunnel from Dover to Calais. The engineers have a steam tug especially fitted out with scientific apparatus and employed in this survey.