them will, it is expected, be evaporated before it reaches the steam pipe. The whole boiler is enclosed in a cast-iron casing or smoke box, and the products of combustion pass down this casing — enveloping the boiler — on their way to the chimney. In the flues just behind the furnace, through which the gases pass after leaving by an inclined pipe Both of them communicate direct by vertical pipes with the boiler. The feed water is introduced into the bottom of one of them, and a circulation is expected to be kept up through the inclined tube, up into the boiler, and down again, so vigorously that all deposit is to be brought down into one of the boxes, from which it can be easily blown off. It is easy to see how the feed water will rise but how a downward current is to be induced from the hottest part of the boiler into these comparatively cool vessels (from which at the same time the feed must continually ascend), is not so comprehensible.

In spite of the ingenuity of this engine, and of some good points about the boiler, it has several obvious objections which will — we are afraid — be sufficient to prevent it coming into general use One advantage of a vertical boiler of the usual kind is that it is self-contained, and requires very little setting, while this one requires a large firebrick furnace and flues. The exhaust steam will not make a very efficient blast if it is only admitted into the base of the chimney at a considerable distance from the boiler, and there does not seem any way of using it sooner. It will, therefore, be necessary to have a higher and more expensive chimney than is generally the case with vertical boilers. In addition to this the defective distribution of the steam in the cylinders will make itself felt unless the engine runs at a higher speed than 525 ft. per minute, which although high, has been reached even by engines of the ordinary construction, and much exceeded by some constructed like this one, specially for driving fans, &c., direct. With 8 ft. of grate and 200 ft. of heating surface no doubt much more than the 10 effective horse power named by Mr. Morell would be obtained, and there is no reason why the boiler should not rather work at ten or twelve atmospheres than at six. We are indebted to *Engineering* for the above description and drawings.

According to the calculations of Professor Rogers, each acre a coal seam 4ft. in thickness, and yielding one yard net of pure coal, is equivalent to about 5000 tons, and possesses, therefore, a reserve of mechanical strength in its fuel equal to the life-labour of more than 1600 men. Each square mile of one such single coal bed contains 3,000,000 tons of fuel, equivalent to 1,000,000 men labouring through twenty years of their ripe strength. Assuming, for calculation, that 10,000,000 of tons out of the annual produce of British coal mines are applied to the production of mechanical power, then England annually summons to her aid the equivalent of 3,300,000 fresh men pledged to exert their fullest strength through twenty years. Reducing this to one year, we find that England's actual expenditure of power generated by coal is represented by that of 66,000,000 able-bodied labourers. This is a representation of what really exists in another form; but if we proceed so far as to convert the entire latent strength resident in the whole annual produce of our coal mines into its equivalent in human labour, then, by the same process of calculation, we shall find it to be more than the labour of 400,000,000 strong men, or more than double the number of adult males now upon the globe. In alluding to these facts Mr. Leifchild, in his excellent little work on *Coal at Home and Abroad*, observes that there is a most humiliating element in the calculation. Thus, if we estimate a lifetime of hard human work at twenty years, giving to each year 300 working days, then we have for a man's total dynamic efforts 6000 days In coal this is represented by three tons; so that a man may stand at his own door, while an ordinary quantity of coals is being delivered, and say to himself, "There, in that waggon, lies the mineral representative of my whole working life's strength."

An exchange says: "Why cannot our railroad cars be made of paper, instead of iron, as proposed, so as to prevent the danger of splinters and burning, in case of accident?" A pertinent inquiry.

It is commonly assumed that accidents on American railroads are far more common and more fatal than on those of Great Britain The following comparative statements do not appear to justify this opinion. Let us take Great Britain and Ireland first. The parliamentary return for 1872 has just been issued, from it we learn that the total number of passengers, servants of companies, or of contractors and other, killed by railway accidents in 1872, was 930 in England and Wales, 168 in Scotland, and 47 in Ireland; while the number injured was in England and Wales, 2617; in Scotland, 383, and in Ireland, 38. Total killed, 1145, injured, 3038. Of the passengers the number of killed throughout the year in the United Kingdom was 127; the number of injured, 1462; while the number of companies' and contractors' servants killed was 632; the number injured 1395. The third class included in the report consists of trespassers, suicides, persons passing over railways at level crossing, &c. Of these the number killed was 268: the number injured 181; 19 persons were killed, and 1233 injured from accidents to trains, &c, as collisions, trains leaving rails, &c., 48 persons killed and 53 injured from falling between carriages and platforms, 10 killed and 117 injured from falling on to the platform when getting into or out of trains; 39 killed and 16 injured while crossing the line at stations; and 6 killed and 20 injured from falling out of carriages during the travelling of trains. Among railway servants and workmen on the line 117 were killed and 378 injured during shunting operations; 100 were killed and 52 injured whilst working on the permanent way or in sidings, 118 were killed and 95 injured whilst crossing or standing on the lines; 54 were killed and 106 were injured whilst getting on or off trains, engines, &c.; 42 were killed and 214 injured from accidents to trains, collisions, &c.; 44 were killed and 84 injured from falling off engines, vans, wagons, &c.; 27 were killed and the same number injured whilst passing between vehicles; and 18 were killed and 33 injured from falling or being caught between vehicles and platforms. 132 railway accidents, involving the death of nine and the injury of 462 persons, arose from collisions between passenger trains and goods or mineral trains; 124 accidents from broken rails; 99 accidents for trains running over cattle or other obstructions on the line; 77 accidents from the giving way of axles; 75 accidents from passenger trains, or part of them, leaving the rails; 51 accidents from the giving way of tires; 47 accidents from collisions between passenger trains; 25 accidents from trains running through gates at level crossings; 24 accidents from slips in cuttings and embankments and 29 accidents from trains or engines travelling in the wrong direction shrough points being set improperly. The report on American accidents is not made up with the same elaborate care. The world is mainly indebted for it, indeed, to our able contemporary, the American *Railroad Gazette*—an enterprising and well managed journal, in which a record is kept of all railway accidents from year to year. From this we learn that in the year ending July 1st, 1873, the casualties were as follows:—In July 1872, there were 31 accidents, 35 persons were killed, and 66 injured; in August, 63 accidents, 15 killed, 49 injured; in September, 71 accidents, 24 killed, 104 injured; in October, 90 accidents, 29 killed, 102 injured; in November, 103 accidents, 37 killed, 114 injured; in December, 112 accidents, 42 killed, 133 injured; in January, 1873, 178 accidents, 40 killed, 199 injured; in February, 133 accidents, 25 killed, 126 injured; in March, 112 accidents, 18 killed, 92 injured; in April, 101 accidents, 23 killed, 88 injured; in May, 79 accidents, 10 killed, 113 injured; in June, 90 accidents, 12 killed, 104 injured. Total, 1163 accidents, 310 persons killed, and 1290 injured.

A Pacific Cable.—The United States war steamer "Tuscarora," which has been detailed to make surveys and soundings preparatory to the laying of a telegraph cable from San Francisco to Japan and the Asiatic Continent, has made an experimental trip for the purpose of testing different apparatus for the purpose of taking ocean soundings. The result was the adoption of some machinery invented by Lieutenant Brooks, with a recent improvement by Captain Belsnap Eleven attempts at sounding were made in all, two only being failures. The greatest depth reached was 1949 fathoms, in latitude 37 degrees, 24 minutes and 50 seconds north; longitude 123 degrees, 33 minutes and 25 seconds west. The "Tuscarora" is now awaiting orders to proceed in sounding the line of the cable to the coast of Japan.