successfully run from Buenos Ayres to Ferrari, a distance of 74 kilometres, in one hour and four minutes, petroleum being the only fuel employed.

The Broken Hills Mines, Australia, established a record last year by putting out in round numbers 12,500,000 oz. silver and 48,000 tons lead. In only five years 1873 to 1877 inclusive did the whole of the Comstock mines yield in the aggregate so much of the white metal. The Comstock silver record is 21,750,000 oz; that was in 1877, which was 18 years after the mines there were opened—a comforting reflection in these days when the notion is prevalent that silver mines are things of but three or four years! Carrying comparisons a little further, says the *Australian Mining Standard*, it is found that, notwithstanding the falling off in the value of silver and lead, the output of Broken Hill last year was worth £2,915,000, which is more than the gold output of the whole of Victoria has been for any single year since 1886.

An Australian miner in South Africa thus describes his experience in South Africa: "Johannesburg is a large place for its age. It has a population of about 40,000 whites. Everything in the way of necessaries is very dear; any sort of a shop will bring about £40 to £50 per month, and small at that. Most of the business people are Jews. There are more people out of work in Johannesburg than ever I saw in Sydney, and before long there must be a general reduction of wages. Many Australians have found their way here, and, for what reason I cannot learn, the South Africans have a terrible down on them. I certainly would not advise anyone to come here. As soon as the war is over I shall make my way to Matabeleland, where they say gold is to be found. I cannot hear of any alluvial in this country anywhere. As to the mines, there is a run of country being worked some 40 miles long. Coal mines are at each end, so that fuel is easily obtained. Very little timber is to be seen, and that used for mining purposes is nothing but saplings. The largest timber used is pine, and there is not much of that.

"All the mines are worked with Kaffir labor, and the wages are about £1 per week. A white man superintends some 35 Kaffirs. The Kaffirs can work as well as a white man, and I imagine if similar labor was introduced into Australia many reefs would pay to mine which are now lying idle. The reefs here are not worth more than 8dwt. or 9dwt. The "banket," as it is called here, reminds me very much of cemented wash, in fact it is nothing else. There is a large amount of machinery here. The batteries in almost every instance are large, varying from 40-head to 200-head of stamps; so that Johannesburg ought to turn out a large quantity of gold. No concentrating is done here; the cyanide treats the tailings, and the battery work, consequently, is not as careful as it is in Australia. Another feature of the mines here is the extensive use of rock drills. In some there are quite 30 in operation, one white man, with two negros, having charge of each machine. These men work 10 hours per day, and earn £1 per week, and there is plenty of demand for such work. As the result of my experience on this field, I certainly should not advise miners from Australia to come here."

At the monthly meeting of the Leeds Association of Engineers, Mr. W. D. Wansbrough, Lincoln, read a paper on the history and development of the portable engine. He said that as these engines were usually placed in the hands of unskilled attendants, an important object had been to simplify every detail. Further, the ever-increasing demand for them had led to the development of manufacturing appliances for the duplication of pieces of machinery, which had now reached such perfection that a working part could be taken out of one engine and used in another with equal facility. He estimated the number of portable engines annually produced in this country at not less than 10,000, some of which were sent out to the most obscure corners of the earth. In short, portable engines had become great pioneers of civilization, and were the hewers of wood and drawers of water for our colonists. Although the portable engine did not become a commercial success until recent times, yet so far back as 1775 Smeaton described a movable engine with boiler and condenser, of 6 feet stroke, self-contained, and internally fired. Mr. Wansbrough alluded to the inventions of Murdock, Murray and Trevethick, and that about the year 1839 several portable engines of improved design were patented, amongst which were the self-contained threshing engines of Tuxford & Ransome. The famous Cambridge boiler, brought out in 1847, in which the flue was carried the length of the boiler three times before entering the chimney, and which is still made, was a distinct improvement on the earlier types. In 1861 Messrs. Robey & Scott introduced a boiler for portable engines, the principle of which has been adopted by Mr. F. W. Webb for the London & Northwestern locomotives. The great fault in portable engines at this time was that the working parts were not sufficiently accessible for examination or repair, but Mr. Wansbrough showed, by a comparison with later types, that this defect had been completely eliminated, and a general appearance of neatness maintained. Link-motion expansion gear was introduced in 1869, but it was only recently that persons appreciated its advantages. An engine could now be governed so perfectly that it would not vary its speed whether the full load was put on or entirely removed.

A new invention for the pipe induction of coal claims is now being discussed in the United States. The system embodies the reduction of all coal at the mines to the form of impalpable dust, at a cost of 3 to 5 cents per ton; the separation from the coal by one of the present washing processes of all free sulphur, pyrites, slate, etc., at the cost of another 5 cents per ton; the mixture of the coal powder with about its own weight of water: thus converting it into a sort of black milk, and the pumping of it in that state to any desired distance to any desired market, as oil now is pumped.

When the mixture has arrived thus far, it is deprived of most of its water in great settling basins; but as much as 8 or 10 per cent. of the fluid is left in the mixture, which in that state is pumped short distances only to points of consumption where the remainder of the water may be dried out by the otherwise waste heat. The capacity per day of twenty-four hours of a twenty-four-inch pipe, with a mean speed of five miles per hour, is about 31,000 long tons, taking the coal conveyed at 351 pounds per cubic foot of mixture. At 1,200 pounds pressure for pumping stations thirty miles apart, a four inch pipe would carry 320 tons daily; an eight-inch pipe, 1,834; a twelve-inch pipe, 5,120. The total coal consumption of New York City averages considerably under 25,000 tons per day; the New England States burn about 50 per cent. more than this; the whole United States nearly twenty times as much, in round figures, so that comparatively few pipes would suffice to handle the whole coal supply of the country. The evaporation of the water from the coal dust presents no serious difficulty.

This system opens up again the question of the comparative value of coal dust for fuel. While in many cases coal dust is commercially valueless, in others it cannot be replaced by any other form of coal for real services: for instance, in the manufacture of fuel or other gas: the making of stiff coke: the mixing with iron ore dust before coking, to the great improvement of the product, both in quantity and quality: the remedying of the smoke nuisance, as the dust mixed with air is blown into the furnace, and the maximum combustion is secured: and generally, wherever coal is burned merely to generate heat in properly designed combustion chambers. The inventor of the pipe conduction of coal claims, and apparently with good reason, that it effects a great saving in cost of transmission.

At the New York meeting of the American Society of Mechanical Engineers, Mr. C. H. Manning read a paper in which he described a method of manufacturing large steam pipes he employed 11 years ago for several thousand feet of 20 inch pipe, with very satisfactory results. The pipe was made of mild steel ¼ inch thick, double riveted, and with die forged flangs ⅜ and ½ inch thick. The pipe was riveted with an Allen pneumatic riveter having 70 inch reach of arms which limited the length of the sections. The longitudinal seams were placed quartering 45° from top of pipe, with the laps pointing up so as to be readily accessible for calking. The quarter turns were made of two 5-16 inch sheets curved on a cast-iron former, and having a row of rivets along the back and another row along the throat. The tees were made of three sheets, shaped over similar formers, and the rivets were all on the sides. A serious difficulty had been previously experienced in keeping the round-about joints tight. Leaks had been caused by