of the machine with a fresh gang of workmen, when the same series of operations is commenced, the work being continued day and night with but rare and short intervals of repose. The rock is a metamorphic schist of variable composition, but apparently all belonging to the carboniferous series, for the most part extremely hard, and especially difficult to work in parts where it is traversed by veins of quartz, that very quickly destroy the steel points of the jumpers. Fortunately, the rock is so close that it effectually prevents the entrance of water in excess; no more having been hitherto encountered, than just suffices to keep the jumpers properly wet; the water being introduced into the holes in extremely fine jets under the action of the compressed air. The machine at the Modane face of the working is supplied with air by a regular pumping apparatus put in motion by a large wheel driven by the waters of the Arc, the torrent which was at first employed to drive a machine similar to that at the Bardonnéche end, frequently failing in its supply. The air, after putting the pistons in motion, by escaping within the tunnel serves to ventilate it in the most perfect manner. Gas is introduced at the sides of the working; good light and ample ventilation securing the comfort of the labourers, and consequently the rapid advance of the works. The total estimated quantity of rock to be excavated is 600,000 cubic metres, or about 784,666 cubic yards. As the tunnel is 13,351 yards long, this will give for the lineal yard forward, and for the whole face of the tunnel to be removed, nearly 58 cubic yards. At the average advance of 1·17 metre per day, which the engineers calculate on from the progress already made, this will give a daily removal of 73½ yards cube; and if both faces are worked at the same progressive rate, it will yield 147 cubic yards of daily excavation for the joint work of all the boring machines in operation, and at this rate of working it will require about 14¾ years to complete the excavation. Many particulars respecting the tunnel have been laid before the Italian Parliament by General Menabrea, Minister of Public Works, from which we select the following, which will give at least a good idea of the importance of the undertaking and the progress already made:—"In 1862, in order to pierce 380 metres of the side of Bardonnéche, the men were employed 582 times, each time 7 hrs. 39 min., for boring, and 6 hrs. 2 min. for loading and exploding the mines and clearing away the rubbish. In these 582 operations, 45,751 holes were bored, from 75 to 80 centimetres in depth; 72,538 chisels were set to work; there were 54,785 blasts, 18,622 kilogrammes of gunpowder were fired, 76,000 metres of match line were burnt, and 1,334,000 cubic metres of compressed air were consumed, equal to 8,004,000 cubic metres of atmospheric air. The workmen on the 1st of January, 1863, were 720 at Modane, and 900 at Bardonnéche—altogether, 1,620. The grants for the work were as follows: For 1857, 1,000,000f.; for 1858, 3,500,000f.; for 1859, 500,000f.; for 1860, 2,500,000f.; for 1861, 3,000,000f.; for 1862, 2,000,000f.; for 1863, 2,000,000f.; altogether, up to this day, 14,500,000f. The expense, up to the end of February, has risen to 13,182,603f. 18c., and the Minister has in hand 1,317,396f. 82c. He, therefore, thought that it would be necessary to apply to the Chamber for an additional grant of 500,000f., to enable him to finish 600 to 700 metres of tunnel, which were to be completed before the end of the present year."

Miscellaneous.

The Supply of Petroleum.

The changes which have recently taken place in the use of fluids for artificial light have been rapid and astounding. Only a few years ago whale and lard oils were the common agents for this purpose; then these were superseded in a great measure by that dangerous compound of alcohol and turpentine, called "burning fluid;" and, again, this agent was displaced by oil, called "kerosene," distilled from cannel coal. To produce this oil large distilleries were erected in various sections of Europe and the United States; but now it too has been superseded by petroleum—the natural product of wells situated in the valley of the Alleghany, Pensylvania. How this fluid is produced in nature's laboratory is still a subject of speculation, but respecting its nature and uses we are well informed. In most respects it is similar to the oil obtained from coal, but it has been supplied so profusely and at such low prices as to have completely annihilated the manufacture of kerosene. In the course of two short years, the petroleum trade has attained to gigantic proportions. In 1861, only a few hundred thousand gallons of it were exported; in 1862, about five millions of gallons; while during the past seven months of this year, ending with September, twenty-one millions of gallons had been exported. If to this we add the same quantity for the home supply, the yield of the American oil wells is no less than two hundred thousand gallons daily. This is a prodigious quantity, and yet we do not overrate the amount, as we have been informed from very reliable sources. It has become an important article of manufacture owing to the great number of refineries required for its purification, and besides this, it has been the means of creating a new commerce in the numerous railway trains, boats and ships that are engaged in carrying it from the wells to distant places. American petroleum has therefore become an article of great interest, not only to the vast number of persons in most countries who now use it, but to the proprietors of the oil wells, the owners of refineries, and all who are connected with it commercially. In view of the vast quantity which the oil wells have yielded, the question naturally arises—"will they not soon cease to furnish such supplies, and may not the petroleum trade fall down as rapidly as it has risen up?" Undoubtedly, the petroleum is becoming less in quantity, just in proportion to the amount that is taken away from the wells; but the extent of the supply is as yet unknown. We understand that there are indications of the wells ceasing to furnish supplies for but a limited period, and this has caused some trepidation among those who are deeply interested in the business. Thus the Oil City *Register* says:—"A short six or eighteen months has, with few exceptions, been the average lifetime of the flowing wells. The latter portion of their time of running is also marked by a decrease of at least three-fourths of their original flow." This historic evidence of the past is in some measure useful to form a conclusion as to the future of the oil wells.