they fit exactly, and can revolve without heating, at practically any speed. The engine which drives the fan should be designed on lines by which the highest economy in the use of steam can be obtained. The engine should work with a high pressure of steam, because it is only with high pressure steam that we can get the maximum economy. The engine should be compound, to admit of the highest range of expansion, and discharge the exhaust into the condenser at the lowest possible pressure. Excessive speed in the engine is undesirable, and to enable a moderate speed of the engine and a high speed of the fan, the power should be transmitted by rope gearing. An approximately perfect ventilating arrangement would be two fans, each with its own engine, but, in any case, there should be duplicate engines. On such lines as I have sketched, I believe we have at our command the highest type of ventilating fan. For further improvements in the production of great volumes of air, with a comparatively small expenditure of coal and power, we shall have to look, not so much to improvements upon our present fans, as improvements in the arrangements of the mine itself.

The value of the mining machinery imported free of duty into Canada since the special provisions were enacted in the Custom's Tariff has been:

1890 (to 30th June)	$ 9,950
1891	78,432
1892	61,848
1893	87,208

The American liner "Paris" has had constructed for her a spare length of shafting of nickel steel. This is believed to be about the first application of this alloy in a merchant steamer, notwithstanding that it is five years since Mr. Riley, of the Steel Company of Scotland, first demonstrated in this country its greater elasticity and tensile strength. The "Paris's" new shaft has tensile strength of about 90,000 lbs., probably 25,000 lbs. more than any British or German steel shaft. It has been established by tests that nickel steel has a higher elasticity than ordinary steel to the extent of 31 per cent., and that the tensile strength is 20 per cent. greater. Moreover, ductility is not adversely affected. Although, therefore, the size and weight of the "Paris's" shaft might have been reduced with maintenance of strength, it has been kept the same as those first fitted at Clydebank.

In a recent discussion of a paper on the result of an experimental research into choke-damp poisoning, before the Mining Institute of Scotland, the writer, Dr. Thomson, as the result of special investigation arrived at the following conclusions. 1. That in some explosions men could have been rescued had an apparatus been at hand to enable some of the rescue party to penetrate the after-damp, and that in some cases the distance to be traversed was short. 2. That the Fleuss apparatus was too much after the fashion of a diving dress, closing up the ears and covering the whole face, to commend itself to the practical miner. It was also somewhat costly. 3. That there was a want of a simple apparatus for use by those of the rescue party to enable them to penetrate the after-damp, and perhaps of a means of supplying air to the victims whilst removing them. 4. That it would be a great advantage for the mason putting in a stopping in the face of a fire, to have a simple apparatus which would enable him to work and breathe in a bad atmosphere without considerable restraint of his movements and without interfering with his speech and hearing. He had accordingly designed an apparatus on the principle that carbonic acid gas in fairly large amount may surround the head and face provided a stream of respirable gas be kept upon the mouth and nose. His apparatus, which was exhibited, is intended to serve two purposes. 1. Where pure air was obtainable at no great distance, such as was the case in building off a fire. 2. Where pure air was not obtainable, as when penetrating after-damp. Speaking generally, the apparatus consisted of an arrangement by which, in whatever position the workman places his head, there is constantly coming to his mouth and nose from a face-piece (the distance of which can be regulated), a supply of fresh air in a diverging stream, the intention being not necessarily to supply the whole 30 cubic inches of air which is taken in at each inspiration, but to dilute to a greater or less extent the heavy atmosphere existing about the head, and to add also to the percentage of oxygen present. The conclusions he had come to were as follows. 1. His apparatus would, he believed, be useful and effectual for breathing in a poisonous atmosphere in those cases of building off where good air is accessible at no great distance. In such cases the air would be supplied by a hand pump or bellows. 2. When the distance to be traversed was not very great through a region of after-damp, or when, carbonic oxide being absent, the percentage of carbonic acid gas was not great, the apparatus might be used in connection with a cylinder of air strapped to the back, which would last the longer, the smaller the amount of carbonic acid gas present. Oxygen should be compared with air too see if it has any advantages, for the reason above adduced, namely, that a smaller bulk of it than of air will bring the percentage of oxygen up to the normal. A working model of the apparatus, with bellows, could be made for about £2 10s., or perhaps even less. A 20 cubic feet cylinder with regulator costs about £3 5s. 0d., but for experimental purposes these might be hired. It was only by trial that the question could be settled, and the best way to try it would be to use it when putting in a stopping. He thought the question of resuscitation of victims must wait till it had been determined whether they could get to them.

Mr. John S. Kennedy, of Chambersburg, Pa., has invented and patented an apparatus for breaking pig iron, which may be briefly described as follows: The method consists in lifting the beds of iron, when cold, by means of an overhead crane and traversing same to a breaking table, which may be located at the end of the cast house for a single blast furnace or centrally located for a plant of two or more. The beds of pig iron are lowered on a breaking table, where, by a series of vertical hammers, striking a cushioned blow, the sow is broken from the pigs, broken to length and the pigs are broken at their centres. In case of strong iron, the sows are first broken and then the pigs, but when the iron is weak the sow and pig hammers strike the bed simultaneously breaking it at one operation. No movement of the bed is necessary after it is placed on the breaking table. The sow is cast thin and wide, giving an easily broken section as well as a minimum of sow-iron, and the necks of the pigs at the junction with the sow are cut down to a small section, which allows their being readily detached. It is claimed that this method of carrying out and breaking iron, will be found much cheaper and quicker than the present practice. It will reduce the labor cost per ton of iron, lighten the work of the furnacemen, effect a saving in scrap and "sandage," as well as giving a cleaner fracture to the iron.

According to the report of Mr. A. H. Stokes, inspector of mines for the Midland district, Great Britain, there appears to be a growing demand for a safe, effective, and economical explosive, but at the present we are far from having reached the maximum of either safety, efficiency, or economy, or restricted their use to the minimum required for the working of the mine. Great strides have been made within the last few years in the attempts to produce a safe explosive, but at the present moment he is not aware that we have an absolutely flameless explosive, or one by which infallible security may be attained during blasting in a mine. The chief element of danger in connection with blasting operations is the production of a flame of high temperature, which may ignite inflammable gases in the vicinity of a shot, or by the concussion of the shot in dusty places raise sufficient dust to convert an atmosphere only slightly charged with gas into an inflammable mixture. Recent experience leads him to think that gunpowder should be prohibited from use in all fiery and dusty mines, and although we have high explosives which, with care and under stringent regulations might be used, yet all such shots should be fired by an official of the mine who has been taught the nature and power of such explosives, for miners are liable to use a high explosive for a given amount of work in the same proportion as they would use gunpowder, and with the frequent result that explosives are wasted and the element of danger from a blown-out shot, or exposure of flame of intense heat, which would result from an overcharge shot is intensified. Miners accustomed to gunpowder all their lives scarcely understand