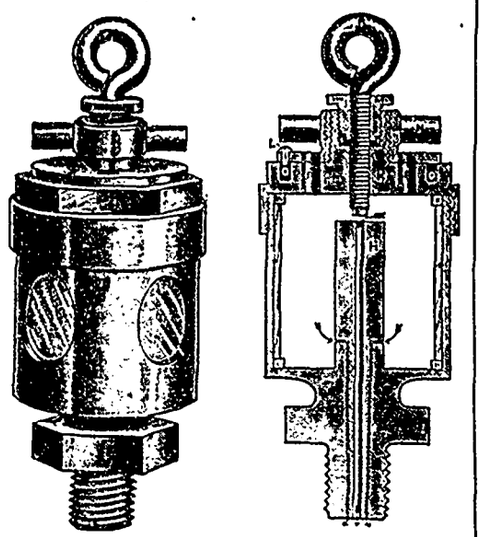
structing the journal to carry the cutter bar drill at an angle of about 80 degs., with the rails in the direction in which the machine is moving, thus causing the machine to hold itself well up to its work. To take out the cuttings made by the cutter bar drill a clearing bar is used, preferably U shaped in section, set at an acute angle to and behind the cutter bar drill, and fixed to the machine by suitable means when at work. The cuttings are caused by the forward motion of the machine to slide along the face of the cleaning bar, and are deposited between or at the side of the rails as the machine proceeds. Irregularities are removed from the face of the mineral and from the floor by means of a fixed cutter attached to the journal casting of the cutter bar drill, and forming at the same time a cover for the thrust lock gear. This fixed cutter has a cutting edge to clear the bottom, and an inclined cutting edge to remove projections on the face of the mineral, sufficiently high to clear the cutter bar bearing. The fixed cutter is also formed with an inclined groove, so arranged as to carry the cuttings back over the cutter bar front journal to the rear of the machine. The machine is thus enabled to proceed with its work without stoppages. In using the machine for tunnelling or sinking a slight modification is necessary.

The danger of working an electric motor in an explosive atmosphere has been overcome in the novel manner which has given the machine the name of pneumatic electric. The motor and all the moving parts of the machine, except the drill, are enclosed in a neat insulated casing, both air and water tight. The wires conveying the electric current are enclosed in a flexible tube, which also carries a supply of compressed air, which enters the machine along with them. The motor is thus immersed in a bath of cool, dry, compressed air, which is kept constantly passing through every part, and is discharged into the atmosphere of the mine at the pressure of 15 pounds to the inch, which effectually prevents anything from the mine getting into the machine, and also helps to cool and purify the air. The coal cutting mechanism can be detached, and the motor used as a locomotive for hauling the coal along the main roads. At collieries where electric and air compressing plant are already at work the motor power can be taken from them; but Mr. Hurd has also patented a direct-activity engine for driving the dynamo, and an air pump for the compressed air is worked from the same shaft, so that the whole of the power for the machine can be derived from the same self-contained engine. Mr. Hurd has also designed special rails for the machine, made of malleable cast steel in one yard lengths, and with steel sleepers. The machine as a whole has a strong, neat, workmanlike appearance, and gives one the impression that it will stand the rough and tumble of the mine, from ironstone modules in the coal, to falls of roof on the face, without much damage. Among its advantages are the following: It not only undercuts the coal, but nicks on end, and will cut either right or left hand, while the drill can be instantaneously withdrawn to sharpen the cutters and another as quickly inserted; the self-acting scoop fills the holings into bags straight from the face; the exhaust air helps to ventilate the mine; electric lamps can be attached to it for lighting the working place; and it can be used as a locomotive.

Mr. C. Cookson said he should not like the impression which seemed to be conveyed by the opening portion of the paper read by Mr. Crankshaw, to the effect that colliery owners had not done all in their power to provide the best appliances for the safe working of their mines, to go forth without some remark. The reason why coal cutting machinery had not been more largely adopted in the collieries throughout Lancashire was not because of any prejudice against them, or unwillingness on the part of the coalowners to adopt them, but simply because inventive engineers had not produced machines that would work successfully with the bad roofs they had in most of the mines. He had worked with several of the machines, and had not found them suitable for working the mines in the district. The machine described, however, seemed to him to be an effective one, and, subject to the question of satisfactory arrangements, he should be disposed to try a machine of that description in one of their mines. It was not so much a question of diffidence on the part of the coalowners to the introduction of these machines as of obtaining a machine which would satisfactorily and efficiently do its work.

A New Crank Pin Oil Cup.

There has always been a demand among engineers and engine builders for a Crank Pin Oil Cup, which will give a steady flow of oil in just the right quantity to keep the crank pin from heating, while not allowing sufficient oil to pass to it so as to cause a waste. Many schemes have been devised for effecting this result, but up to the time the Penberthy Injector Co. placed their Safety Crank Pin Oiler on the market, about two years ago, there has been nothing devised that was entirely satisfactory. Cups have been made which would insure a steady flow of oil, but many of them were so constructed that when in use the oil would be thrown out of the top of the cup, and others were very easily clogged by dirt. The Safety Cup met with a very rapid sale, owing to its simplicity of construction, and its very satisfactory operation. The Penberthy Co., however, is noted for never being satisfied until the articles which it manufactures are as perfect as skill and ingenuity can make them. Recognizing the fact that their cup, as originally made, had one or two weak points about it, they set to work to remedy these defects, and have recently produced their improved Double-Feed Crank Pin Oiler, which we illustrate herewith. The



improvements have lessened the number of parts of which the cover is composed and have also simplified the construction of the cup, while at the same time allowing of a much finer regulation than any other cup made. A careful reading of the following description will show the points wherein the cup is superior to others.

H is the plunger, which rises and falls with the motion of the engine, forcing part of the desired amount of oil to the crank pin, while at the same time the oil is flashed on top of the plunger and passes down through its hollow center, thus giving two distinct and separate feeds, so that in using this cup there are two chances against its feed becoming clogged. K is the cover of the cup, containing two passageways P, P. One of these is to allow the oil to enter the cup, and the other is the vent hole by which the air in the cup passes out. On top of the cover is an escutcheon S, operated by means of a handle N passing through it. When the cup is in operation, this handle is turned hard to the right, bringing the holes in the escutcheon out of line with the holes in the cover of the cup, and the escutcheon being threaded and turning on a corresponding thread on the cup cover, allows of an absolutely tight seat being made between the escutcheon and the cover, so that it is impossible for the oil to spill out while the cup is working. To fill the cup, the handle N is turned to the left until the holes in the escutcheon and the cover are in line, when the oil can be quickly poured in from a spring bottom can, and as the air is allowed free vent through the vent hole, there is no spilling of oil possible with ordinary care. In this manner the cup is filled without changing the regulation in the least. The screw L, passing through the escutcheon allows it to turn to the left just a sufficient distance to bring the holes in line. The feed is regulated by the regulating screw R, which admits of a regulation as fine as $\frac{1}{128}$ of an inch or less. This regulating screw passes through the stuffing nut M and through the packing I, in the same manner that the stem of a globe valve passes through its stuffing nut, and the tension on the regulating screw is altered by turning this stuffing nut M same as the packing is tightened or loosened on a globe valve.

As will be seen, the cup is simplicity itself, and it is impossible to get it out of order. The plunger H having a square shoulder against the bottom of the cup, the oil stops feeding as soon as the engine stops running, and there is therefore no waste. Owing to its fine regulation, it can be set to feed just the desired amount of oil, and with the proper size cup it can be so regulated as to run for a half day or a full day as desired, so that the engine need never be stopped to refill the cup, and the only attention required from the engineer is to fill it at the proper time, as it does its work automatically. This cup has been adopted by several of the largest manufacturers of threshing engines in the United States, and also by several large engine builders, and wherever introduced is meeting with a rapid sale.

The manufacturers, the Penberthy Injector Co., of Detroit, Mich., will be pleased to send descriptive circulars and quote prices on application.

Disputed Mica Ownership Settled: The Court of Review, Montreal, on 30th ulto, gave judgment in the cases of A. W. Stevenson vs. Wallingford, and Gilman and Hatch, et al, defendents en garantie, confirming, with costs, the decision of Judge Gill at Alymer by which Mr. Stevenson was declared the owner of the mining rights in dispute and was awarded the sum of $3,300 for the value in the ground of mineral extracted by the defendents without his permisssson. The cases were of especial interest, both to mining men and to the legal fraternity, as they involved several intricate questions in regard to the mining law of the Province of Quebec, as well as on account of the value of the property. The property was purchased, prior to the suit, from Mr. A. W. Stevenson, Montreal, by the Lake Girard Mica System, Ottawa. It is situated in the Templeton district and contains valuable deposits of large sheet mica.

The Copper Trade.

In their fortnightly "Statistics of Copper," Messrs. Henry R. Merton and Co., of London, Manchester, and Birmingham, gave the visible supply for England and France, including copper afloat from Chili and Australia, as 49,153 tons on June 15th. These figures show an increase of 1,573 tons in the available stock during the fortnight, and the quoted price of Chili bars and G.M.B's, £38 per ton, shows a further fall of 17s. 6d. per ton within the same period. The continual decline of the price of copper, regardless of the statistical position will, however, be best seen from the following table, showing the visible stocks and the prices at various dates:

	Visible Supply Tons.	Price. £ s. d.
May 31, 1891	58,258	55 5 0
May 31, 1892	53,965	46 7 6
May 31, 1893	49,951	43 2 6
May 15, 1894	46,259	39 10 0
May 31, 1894	47,580	38 17 6
June 15, 1894	49,153	38 0 0

It is true that the decline during the past four weeks has been coincident with some increase of stocks, but a glance at the figures for previous years shows that with falling stocks prices have also fallen. Thus with the stock now nearly 16 per cent. less than at the end of May, 1891, the price is about 31 per cent. less. The latest mail advices from the United States intimate that orders had meanwhile, that is since the beginning of this month, been placed for quite a large quantity of Lake Superior ingot copper for delivery several months ahead, the amount thus contracted for being estimated at about 10,000,000 pounds, and the price 9 cents per pound, or, say, about £41 5s. per ton. These transactions, it is stated, have served to unsettle the market. There have been exceptionally large exports of ingot copper from the United States to this country and the Continent during the past year, as will be seen from the following table showing the figures for the first 10 months, July to April inclusive, of the fiscal years 1893-4 and 1892-3 respectively:

	1893-4. lb.	1892-3. lb.
To United Kingdom	61,069,038	2,308,259
" Germany	21,164,702	2,863,142
" France	26,619,864	9,769,766
" Other Europe	59,427,139	9,261,520
" Other countries	617,311	209,252
Total	168,838,054	24,411,939

The American Nickel Market in 1893.

The nickel trade in 1893 differed considerably from preceding years, as consumers found no difficulty in getting what they needed, while before they had often been hard put to secure supplies, the question of price not considered. Then it was the custom to make contracts calling for deliveries a long time ahead, the terms of such contracts not being allowed to become generally known. This year it has not been so, as what was left over from the supplies contracted for 1892, together with what was readily obtainable, was amply sufficient to enable the manufacturers to fill all demands for German silver, while the nickel plating business, like many another, has been almost at a stand still.

In previous years almost all the nickel came from abroad, although there was one producer at home, in the interior, who now produces chiefly from Canadian ores, selling under the old time brand. The new factor in the market has been the Canadian Copper Company, whose product being placed upon the market, to compete with any and all others, caused the foreign makers to reduce their prices, which, at the opening of the year, were about 60 to 62 cents, while at the close they are but 52 to 53 cents, American refined nickel being quoted at 45 to 47 cents.

Most of the nickel produced in this country from Canadian ores has been exported to Europe in the form of oxide of nickel, for which a ready market, notably among the iron and steel industries, has been found. *The Mineral Industry*, 1893, vol. II.

Repairing a Broken Pipe in a Mine.

An interesting expedient was adopted in replacing a broken length of pipe at the Claycross Colliery, described as follows in a mining journal: The pipe in question was the discharge pipe from a set of pumps, and was carried vertically up the shaft, its length being about 420 feet and its diameter 6½". The break took place in the lower portion of the pipe; and to make the repair it was necessary to raise the column slightly. To this end a couple of balks were put across the shaft at a height of 70 feet above the pumps. These timbers formed a support for a sleeve which could be clamped to the pipe. By turning steam in the pipe the latter was warmed and expanded, and it was then clamped by the sleeve. The bolts being loosed at the broken length; the pipe as it cooled contracted upward, leaving a 1" space at the broken joint, thus giving room for the insertion of a new section.