THE LECHNER MINING MACHINE.

A large number of manufacturers, and a still larger number of householders, are totally ignorant of the great amount of handling to which coal is subject before it reaches their furnaces or fireplaces, and especially of the very onerous labor in "getting" it—that is, to detach it from the body of solid coal, as found at varying depths below the surface of our earth. The heaviest operation in the getting of the coal is to undercut it, which the miner usually has to do with his pick, and in a stooping and frequently very cramped position. The amount of coal which is wasted, or, more correctly speaking, which is made into small pieces or dust, where undercutting is done by hand, is necessarily large, on account of the space required for the pick and the hands and arms of the miner. Because of this waste, and the expense of undercutting, as well as for humanitarian reasons, we are always pleased at seeing earnest attempts made to supersede this operation in coal mining by machinery. The latest form of machine brought out for this purpose is the invention of Mr. F. C. Lechner, and is shown by the accompanying engravings, Fig. 2 giving the machine in position for beginning operations, and Fig. 1 as having already undercut the coal close to the substratum of fireclay, and to the full depth to which the machine is capable of working.

The essential features of this machine are the cutter bar and the modes of driving it; for whereas, in most mining machines hitherto brought out, the cutter or cutters have been driven in a horizontal plane, the cutters in this case revolve in a vertical plane. The form of the axle is square, as shown, and to it are bolted the cutters, resembling in this respect very much the axles used in wood-cutting machinery. At two places upon the axle the narrow journals are formed, and are laid in suitable brass bearings in ends of the wrought iron framing to which the driving machinery is fixed. Motion is communicated to the axle by a couple of pitch chains, which not only drive by contact with the axle itself, but also by engaging a set of narrow cutters, which enter the open portions of the chain. In this manner only thin films of coal are left uncut where the chains work, and get broken off quite imperceptibly by coming in contact with the links of the chain. By keeping the bearings of the cutter bar as narrow as practicable, and arranging the cutters close to the framing, also the very little coal left uncut here gets similarly broken off by the advancing framing. The dust produced in cutting is carried away partially by the two driving chains already mentioned, and partly by another set of chains working at the two sides of the machine, as shown.

In addition to the wrought iron bars, which, as we have explained, form the framing to which the cutter bar and the driving gear are attached, another set of similar bars at the side of them form the stationary framing on which the whole machine slides. The forward motion is given by means of a stationary screw, round which a nut revolves, and this motion is arrested by moving a handle which separates the two halves of the nut in a similar way as the screw and nut are disconnected in most screw-cutting lathes. To bring the machine back again a bolt, attached to the stationary framing, is, by means of a handle, thrown into gear with one of the pitch chains, which are kept revolving to clear away the dust—although at a much slower pace than when the cutting takes place. Suitable means are provided for taking up the slack of the pitch chains when underwear takes place, but this is minimized by making them, as well as many other parts of the machine, of steel. Either steam or compressed air can be used for driving, but the means by which the motion is communicated from the pair of cylinders to the pitch chains and to the feed nut possess no especial interest, and we need, therefore, not describe them. The machine only weighs 750 lbs. complete, and can be handled by two men, so that it is unnecessary to lay down rails for it. It can either drive an entry, work in pockets, or on the long wall system. The over-all dimensions are 7 feet 6 inches long, 3 feet wide, and 2 feet 3 inches high, and the cut which it makes is 6 feet deep and 3 feet wide, and only 4 inches high, so that but little coal is wasted as compared with that lost in consequence of hand-cutting. It is stated that only six to eight minutes are required to make a cut of the above dimensions, and as but little time is found to be needed for shifting and refixing the machine, the saving effected by it should be considerable—over 60 per cent., we are informed. The agents in this country are Messrs. Frank Wheeler & Co., who are exhibiting one of these machines in the American section of the Paris Exhibition. We shall watch with interest the trials of it in the mines of this country.—*Iron.*

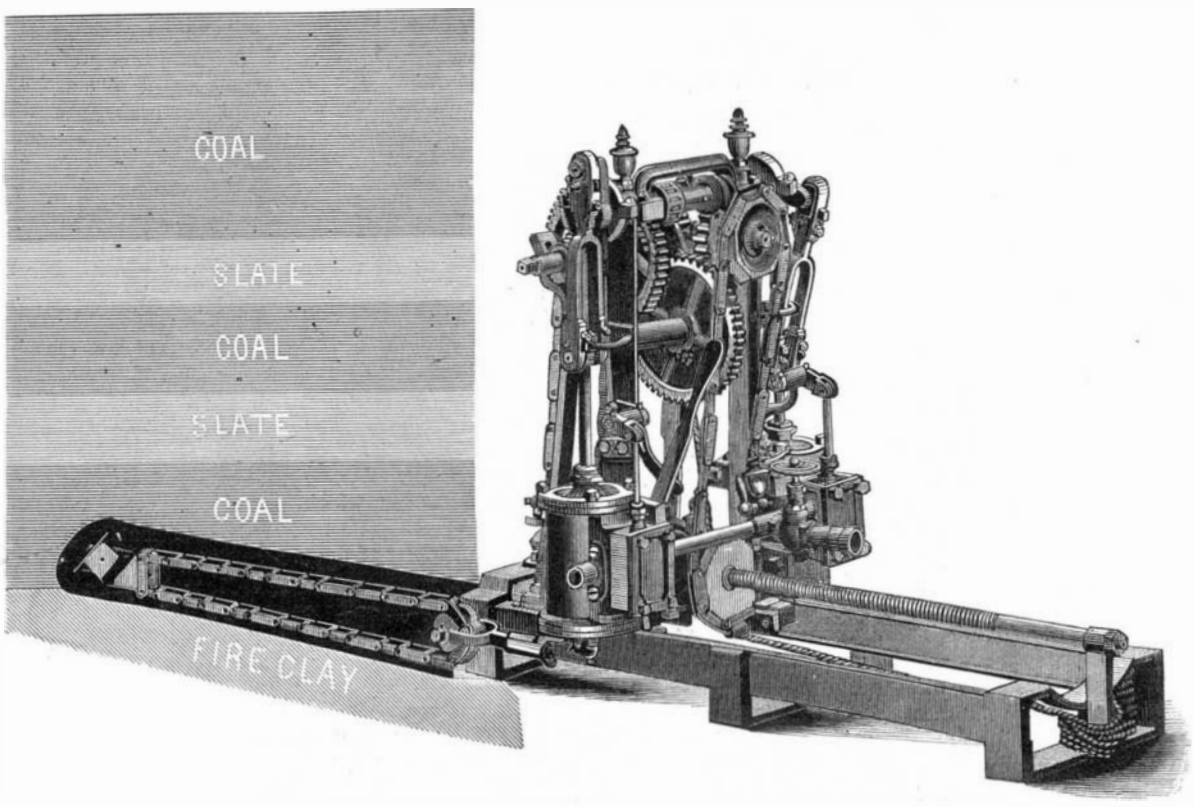

Fig. 1.—THE LECHNER MINING MACHINE.

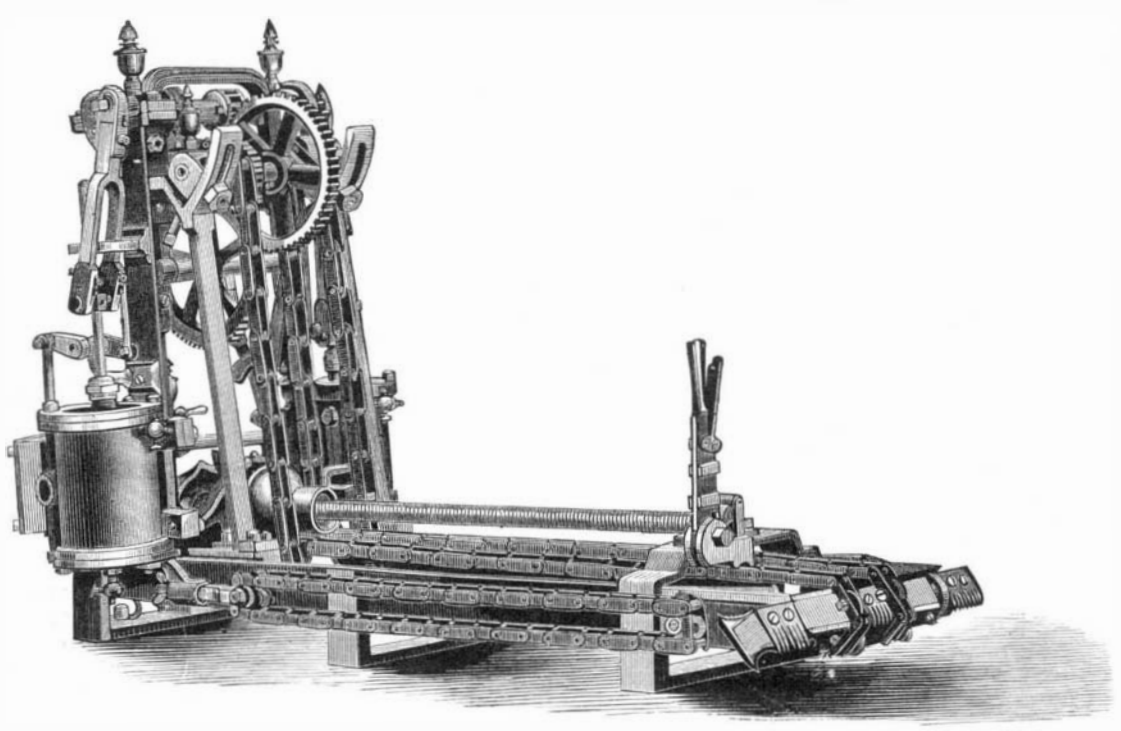

Fig. 2.—THE LECHNER MINING MACHINE.

Walking Under Water.

Mr. Robert J. Russell, a professional diver of this city, has proved his ability to walk long distances under water by a walk of eight miles on a submerged track, one sixth of a mile in length, at Riker's Island, near Hell Gate. Clad in the regular diver's dress, weighing 200 pounds, he lately walked the prescribed distance in 4 hours 37 minutes. The times for the successive miles were 35, 30, 47, 45, 30, 29, 31, and 30 minutes respectively.

THE seed farms of Messrs. Webb at Kinver, Stourbridge, England, were lately visited by the Midland Farmers' Club, on the invitation of the proprietors, who received the party with unstinted hospitality. They are the largest seed farms in the kingdom, being altogether 1,100 acres in extent.

The Industrial Prospect.

In a discussion of the brighter industrial and financial outlook, the *Tribune*, after noting the evidence of a larger contribution to the nation's wealth from agriculture this year than ever before, goes on to remark that "there are many indications that manufacturing establishments, in spite of low prices of products, are doing a large business with gradual improvement. We must remember, first, that many of the most important branches of manufacture have been going forward with undiminished volume during all these years of disaster. The milling interest is one of the first importance, but there has been no decrease in the quantity of flour made, and improvements in machinery have enabled the country to produce a better article at less cost than ever before. The lumber interest, and the many branches of manufacture which depend upon it, have been steadily growing. In the manufactures of leather, though the exports of boots and shoes formerly made have not yet been recovered, there has been a great improvement in quality and in price, and a consequent expansion of the domestic demand. American spinners are making but slender profits, and yet they are consuming great quantities of cotton, and have begun to recover the foreign markets lost during the war. The well known fact that American cotton goods at last find a regular and considerable sale in England will finally yield important results as to the supply of other markets. Probably there has never been a time when the people of this country were so largely supplied with woolen goods by American mills, or so cheaply supplied, and their independence of foreign industry in this regard, when once established, will bring, in better times, the handsome profits which few woolen mills have recently been able to realize.

"Depression in the iron and coal business has attracted much attention, because of the great importance of that interest. But it is well to observe that this depression has been largely due to a change in the quantity of steel employed. The later processes, permitting the production of steel at a cost really less than that of iron years ago, have been followed by a general substitution of steel for iron in many uses. Half a million tons of steel rails not only displace as large a quantity of iron, but, enduring much longer, save a large part of the former expense of relaying and repairs. This proves very trying to the iron manufacturers for a time, and it is probable that there may never be full employment for all the establishments once supposed to be needed in the production of iron; but the country is, nevertheless, saving many millions every year by the use of the more durable metal. In the end, it will be the richer for this great change, though many individuals suffer meanwhile. The best feature in the case is that the American iron and steel manufacture has at last been so developed that it practically excludes foreign products from the home market, and, with a revival of prosperity here, is in position to supply an enormously increased demand on profitable terms."

Water Gas.

PROFESSOR E. FRANKLAND, of the Royal College of Chemistry, London, has written to Mr. Francklyn, of New York, President of the Municipal Gaslight Co., stating that he has read the report of Professor Henry Würtz and Professor Henry Morton, concerning the qualities of water gas made here, and gives it as his (Professor Frankland's) opinion that it may be used with safety in public and private buildings. He would also be highly gratified if similar gas could be introduced in London.