and the air is ultimately sent out into the open at such a speed that practically no resistance is experienced and no inrush of air is possible.

Fan Construction.—Simplicity should never be lost sight of, and strength should always constitute a first consideration. These two virtues ensure what is so desirable in colliery appliance—continuity of work, and non-liability to get out of order. There has always been an objection, which has increased as time went on, to "mammoth" slow-running fans. They are cumbersome in themselves. They absorb power by the movement of themselves. They are costly to make. They occupy much space, and necessitate extensive and expensive foundations and houses. The entry of the air to the fan should be easy, which means large inlets having a clear course, not baffled by projecting arms or cones, or even blades "veed" towards the centre. The inlet should be on each side of the fan, with a central diaphragm to prevent the two currents conflicting. The passage of the air through the fan should be easy, which means that there should be sufficient and not excessive fan-capacity. In open-running fans the blades should be so formed that the air may pass through as nearly in a straight line as possible and leave the circumference with as little circumferential velocity as may be, because all velocity of discharge in open-running fans represents a loss of energy. This means that in open-running fans the blades should have considerable backward curvature, and the number of blades should not be too great, producing by their surface excessive friction and drag upon the air. The conclusion to be arrived at is that the inlets and the outlets, and the circumference of the inlets, multiplied by the width, and the total blade-surface, should represent equal quantities, and that the circumference of the fan at any point, measured by its width at that point, should be an equal quantity, In a closed-running fan the cirumstances are somewhat different, because the energy of discharging air can be utilised after leaving the fan in diminishing the pressure outside the fan, and thus expediting the delivery from the fan. The curvature backward of the blades need not, in consequence, be so great as for an open-running fan. The air should be free to leave the fan at any point of the circumference, and the spiral casing all round should be continued into the chimney. But the quality in proporion of the inlets to the fan, the passage into the body of the fan, the passage through the fan, and the discharge from the fan, should be equal, as in the open running. The sides of the revolving parts should be enclosed, preventing leakage, and only allowing discharge at the circumference. The journals and bearings of the fan should be so perfectly constructed that 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 have been sketched, we are likely to 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.—*Colliery Guardian.*

IMPROVEMENTS IN THE METHOD OF PRODUCING CRUDE ANTIMONY.

The question of making antimony mining in New Zealand a successful venture hinges greatly on the expense of smelting the ore and refining it so as to make it into star metal fit for the Home market. This has to be done in three stages—first, converting it into crude antimony; second, into bowl metal; and third, into star metal. The first process has hitherto been the greatest source of expense. The crude antimony has hitherto been made in crucibles, and several methods have been tried to produce the crude metal in a furnace, but without success. Some years ago the Endeavour Inlet Antimony Company constructed a description of reverberatory furnace to smelt the ore into crude metal: this proved a failure. They afterwards erected a large furnace with retorts, but had no better success. Since the present company has owned the property a water-jacket furnace was erected to smelt the ore; but this also proved a failure. At last, Mr. Seager, an ironfounder at Wellington, has devised a means of producing crude antimony by a cheap process.

The method adopted by Mr. Seager consists of a series of cast-iron pipes set vertically into a furnace. These pipes are 12in. in diameter and 4ft. in length, made of very hard white metal, about 1½in. in thickness, and are open at the top and bottom; but, in order that the ore may not fall out until it is melted, each of the pipes has a false bottom, and when charged with ore they have also a tight-fitting cover placed on top. The false bottom does not fit close inside the lower part of the pipe; a small space is left, so that the ore as it melts drops into a mould or trough which is placed underneath the furnace; and when the whole of the ore is melted the false bottom is allowed to drop out, and the whole of the charge is taken out of the pipe, which is again filled with another charge of ore. Mr. Seager informed me that the pipes have been used for about ten weeks in the furnace, and seem to stand very well; also, that with one cord of firewood for fuel he can produce one ton of crude antimony.

Hitherto, the action of the sulphur in the antimony has been the means of destroying all the substances used in retorts and furnaces, and if retorts of hard white cast-iron can be made to stand for a reasonable time it will effect a revolution in antimony-mining, as the crude antimony can be produced by Mr. Seager's method at a much less cost than formerly, and possibly other mines which are at the present time standing idle will be again taken up and be made remunerative for working.