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rapidly." The paragraph on page 136, "Miners' Guide," headed "Friction in Ventilation," &c., says the "resistance is also according to the square of the velocity" [which is correct] "and in airways having the same perimeter, pressure, and area, but of different lengths, the quantities of air passing through will be in accordance with reciprocal of square root of the length into 1."

31

Formula No. 3.

Now, this latter portion would be much clearer and easier worked if it said: "In airways having the same perimeters, pressure, and area, but of different lengths, the quantities of air passing through will be inversely proportional to the square roots of the lengths." The square roots of the lengths given: $\sqrt{200} = 14.14$; $\sqrt{400} = 20.00$; $\sqrt{600} = 24.49$; and $\sqrt{800} = 28.28$; and inversely proportional will be—

The reciprocal of the square root of 800 into 1 $\left(\sqrt{\frac{1}{800}}\right)$ is 0.03535, but it is given in the "Miners' Guide" as 0.03224, and for the 800 ft. length the number of cubic feet passing through should be 3,535.

The calculations given vary slightly, as the decimals are not carried out far enough for more correct work.

At page 141 of the "Miners' Guide" ("Enlargement of Airways") an example is worked out, and the result is apparently wrong: "Suppose an airway 6,000 ft. long and 5 ft. square was circulating 10,000 cubic feet of air, to what size would it have to be enlarged to pass 20,000 cubic feet, the ventilating-pressure remaining the same?" Now, the first air-course, 5 ft. × 5 ft. = 25 square feet (according to the "Miners' Guide"), would have to be enlarged to 8.093 ft. square = 65.495 square feet to circulate 20,000 cubic feet, or double the quantity. But an air-course does not require to be enlarged to double the size to carry double the quantity (ventilating-pressure and length remaining the same). Yet the "Guide" makes it out that it requires more than two and a half times the sectional area.

Formula No. 4.

The following rule should be applicable:—

"In square air-courses having same length and same ventilating-pressure the air-carrying capacity is proportional to the square root of the fifth power of the sides of the respective squares."

Then, taking the above question,—

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Formula No. 5.

The following rule is applicable not only to square airways, but also to airways of any kind of sectional areas:—

The quantity of air passing through airways of any form (length and ventilating-pressure being the same) is proportional to the areas of the respective airways multiplied by the square roots of their respective pneumatic mean depths.

Taking the examples just given-

Area, 25 square feet \times $\sqrt{\text{mean depth}}$: area, 43.528 square feet \times $\sqrt{\text{mean depth}}$:: 10,000: x quantity.