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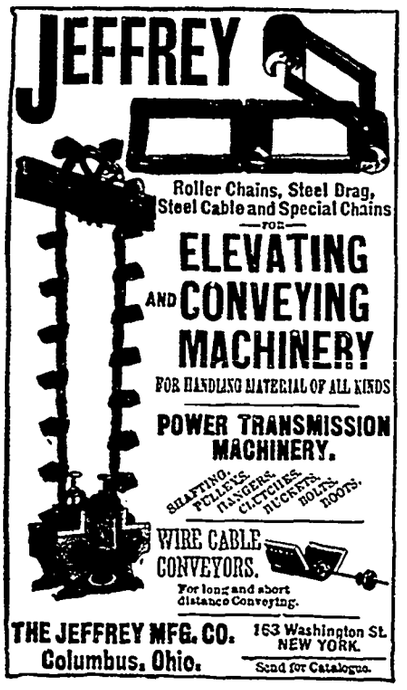


## Compressed Air at High Pressure for Tramways.

It is not much more than thirty years since street tramways were brought into use in this country. During this period their development has gone on rapidly until there is now a large capital invested in these properties. Compressed air is used as the motive power in driving locomotive cars on a few tramways, and the same power is applied for locomotive traction in coal mines. The experience gained in working tramways may possibly be applied to the more advantageous working of locomotives underground, where long distances and other circumstances give some scope for this system of haulage. Both above and below ground the competing systems are horse traction and ropes worked by stationary engines. Besides these there are locomotives on tramways driven by electric power and steam.

For tramway service, the engineer will be guided in his choice of a system by questions of economy, safety, and convenience. Horse traction may be convenient, but it is not generally economical, while steam locomotives are generally inconvenient and not adapted to circumstances inseparable from the traffic of towns, large and small, though it is principally in the latter where they have gained a footing. The getting rid of the exhaust and products of combustion is the chief difficulty in this form of traction.

For tramway locomotives driven by compressed air, several designs have been brought out in the past, of which the following are most noteworthy.

In Colonel Beaumont's locomotive the air was compressed to sixty eight atmospheres, equal to about 1,000 pounds per square inch. It was compressed in four stages, passing successfully from one air cylinder to another without difficulty, the heat being absorbed to a certain extent at each stage. The first compressing cylinder was 12 in., the fourth 2½ in. diameter. The engine itself worked on the compound principle, the storage at the above pressure consisting of seventy steel cylinders, 6 feet long, 4 inches diameter, two of the cylinders being 1½ in., two of 3 in. and two of 7 in. diameter. The engine worked over the ordinary 4 ft. 8½ in. gauge. Trials were made with it on the Metropolitan Railway, but the necessary plant to work the line on this system would have been great, and made it prohibitory.

Another engine of the same type was constructed by Colonel Beaumont to work on tramways, the gauge being 4 feet 8½ inches. The air was compressed in four stages, up to near 1,000 pounds per square inch. The locomotive had two cylinders, to work on the compound principle, the first or high pressure cylinder being 2¾ in., the low pressure cylinder 10 in. diameter. The consumption of air at 1,000 pounds pressure was 10 cubic feet per mile.

Mr. Scott-Moncrieff's compressed air locomotive consisted of a car for passengers, the compressed air reservoirs and engine being placed underneath. There were three reservoirs at each end of the car, placed horizontally, each 7 feet 9 inches long, 2 feet diameter. In the space of 8 feet between each set of three reservoirs the engine is placed. Each reservoir was made of wrought iron, welded at the seam, the hemispherical ends were also welded to the cylindrical part; they were tested to 750 pounds pressure. The working pressure of compressed air was twenty six atmospheres, equal to 382 pounds above the atmosphere; at this pressure there was storage for 140 cubic feet of air. As this force, at which the reservoirs were primarily charged, was continually decreasing so long as the engine continued to work, and the variation in gradients had to be dealt with, it became necessary to reduce the pressure by a throttle valve to about 100 pounds to an inch, but this meant loss of power. The plan adopted was by means of adjustable expansion valves, to be able to cut off at any part of the stroke, and thus assimilate the decrease of energy in the reservoirs to the work to be done. Expansion could be carried out to its full extent—that is, to ordinary atmospheric pressure under these circumstances, there would then be no trouble with the formation of ice, as does occur when the air escapes considerably above this pressure. In a locomotive car it is desirable to start with a maximum diameter of cylinder, affording energy to overcome the maximum resistance, as on uphill gradients, and yet to cut off early so as to have the exhaust terminate almost at atmospheric pressure. This car is stated to have performed a journey of three miles with one charge of compressed air.

M. Mekarski's pneumatic locomotive has worked well on tramways in Paris. The gauge is the ordinary one on railways in France, 4 feet 8½ inches. The air reservoirs are thirteen in number and cylindrical. At the biginning of each journey they are charged at 25 atmospheres, equal to 367 pounds per square inch. The pressure is reduced by throttling to 5 atmospheres, equal 73½ pounds. This is the constant initial pressure in the first cylinder of the motor, but reduced by variable expansion gear to atmospheric pressure at the exhaust of the second cylinder. Before passing the throttle valve the air is heated by steam, which increases its elasticity. This tramcar is stated to have carried forty-five persons over a distance of 4⅝ miles with one charge of compressed air.

The Ryhope compressors are two 33 in. cylinders, 5 ft. stroke; the steam cylinders are 32 in. diameter. The receiver at surface is 30 ft. by 6 ft. The air is conveyed down the shaft, 518 yards in depth, through 9 in. wrought iron pipes, ⅜ in. thick, to the second receiver; from thence underground to a third and fourth receiver and to the first hauling engine, which is placed 1,505 yards from the receiver at bank. This engine has two 14 in. cylinders by 22 in., geared 1 to 3. The drum is 4 ft. diameter, and a train of thirty-six tubs is brought up a steep gradient in ten minutes; each tub carries one ton of coal.

## MINING NOTES.

The last clean up of the Kootenay Hydraulic Placer Mining Company, on Pend d'Oreille River, B. C., netted 22 cents. per cubic yard.

Burleigh Rock Drills are being put in at the LeRoi mine, Trail Creek, B.C.

Fifteen new claims were recorded at New Denver during the first half of the month of June.

Mr. H. E. P. Haultain, M.E., has been appointed assayer to the Alpha group of mines at New Denver, B.C. This section of the district is, and in all probability will continue to be, the busiest portion of the Slocan. The number of men employed at the Alpha group, is increased, work being carried on at the "Silverton," "Fisher Maiden," "Kazabazua" and "Wakefield," while work will shortly be resumed on the "Vancouver," "Mountain Boomer," "Read" and "Robertson," in addition to numerous assessment work.

Alex. McKenzie, manager of the Grady group, reports nearly 4,000 tons of ore in sight on the Grady and is well satisfied with the property. As soon as the railway reaches Rosebery 1,000 tons of supplies will be shipped in and an equal amount of ore sent out. Mr. McKenzie will try the experiment of shipping ore in bulk and expects to effect a saving of $6 per ton in this way.

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