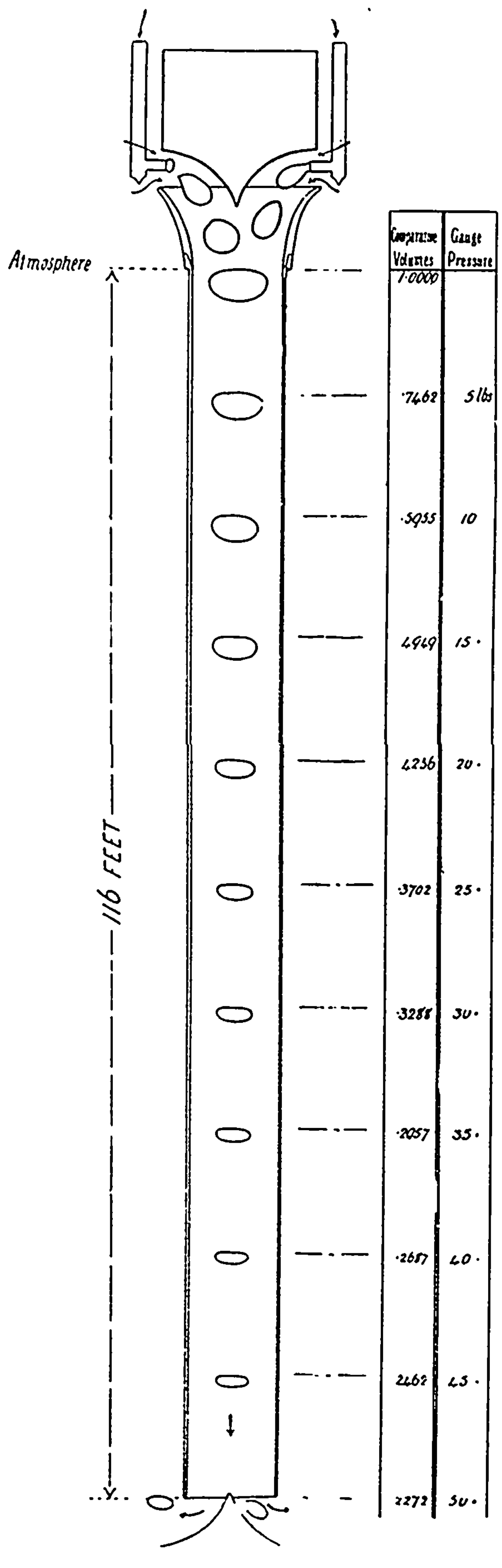
cent. in efficiency. So that it is safe to guarantee an efficiency of 75 per cent. as easily attainable in future installations.

The annexed table takes the results of a series of tests made on the Magog Compressor by Prof. C. H.



McLeod of McGill University. The first three tests were made on the 7th August and the last three were made on the 13th of August, 1896. Column (2) gives the quantity of water in cubic feet per minute flowing through the compressor; column (3) the available head in feet during the trial. Column (4) gives the gross horse power in the fall under these conditions of flow. The fifth column gives the measured quantity of air discharged at atmospheric pressure, the actual pressure being given in the sixth column. The horse power required to compress this quantity of air to the pressure in column (6) is given in the seventh column. The ratio of the horse power in column (7) to that of column (4) is called the efficiency and is given in column (8). Columns (9), (10) and (11) give the temperatures of the air, water and compressed air.

RESULTS OF TRIALS OF THE TAYLOR HYDRAULIC AIR COMPRESSOR AT MAGOG, P.Q., ON AUGUST 7TH AND 13TH, 1896.

No of trial.	Quantity of water discharged in cubic feet per minute.	Available head in feet.	Available horse power.	Quantity of air delivered in cubic feet per minute at atmospheric pressure.	Pressure of air in compressor.	Actual horse power of compressor.	Efficiency of compressor.	Temperatures. External Air.	Temperatures. Water.	Temperatures. Compressed Air.
I	II	III	IV	V	VI	VII	VIII	'X	X	XI
1	6,122	21.4	247.7	1,377	52	132.5	53.5	79	75.2	75.2
2	5.504	21 9	228.0	1,363	52	131.0	57.5	83	75.5	75.5
3	4,005	22 3	168.9	1,095	52	105.3	62.4	80	75.6	75.6
4	7,662	21.1	305.9	1,616	52	155.4	50 .8	75	80.0	80.0
5	6,312	21.7	260.0	1,506	52	144.8	55.7	77	80.0	80.0
6	7.494	21.2	299.8	1,560	52	150.2	50.1	75	80.0	80.0

From observation made in glass tubes the rate of rise of the air bubbles due to their buoyancy is from five to seven inches per second. To illustrate the effect of this slip, take a 75 lb. pressure installation, requiring a depth of 173 feet from tail water to separating chamber. The velocity of the water in the compressing pipe would be about 12 feet per second, so that the compression would be effected in 14.4 seconds. During this time the bubbles would have risen but seven feet two inches, a comparatively unimportant loss, which is still more lessened when we bear in mind the fact that the volume of air is on the average one-fifth of that of the water descending with it. Regarding the freezing of the water by the entering air, it is only necessary to point out that the lowering of the temperature of one cubic foot of water from 34 degrees to 33 degrees would raise the temperature of 277 cubic feet of air at atmospheric pressure from 30 degrees below zero to 33 degrees Fah. above. As the proportion of air to water by volume is only one to five, it is manifest how small the actual cooling effect must be. This takes no account of the heat given off by the air while it is being compressed.

I have prepared a sketch, which may be of interest to those members who wish to look more closely into the matter of the air compression. The relative size of the bubbles as the air they contain is compressed, during their descent of 116 feet from atmospheric pressure to a pressure of 50 lbs. per square inch, is shown diagrammatically in this. The diminution in the size of the air bubbles is seen to be quite appreciable, and their diminished size produces less retardation of the flowing water. A large proportion of the whole power is spent in effecting the earlier part of the compression. It is well known that as much work must be done to compress the air to about 25 lbs. as is required to complete the compression up to 75 lbs. Hence the advantage of using high pressures.