charged, the operator closes the door by turning an air valve, and then immediately opens the two valves which admit the air to the mixer. Two gauges show, respectively, the pressure of the supply and the pressure in the mixer during the discharge. When the valves are opened, the pressure in the mixer rises to about 40 lbs. per sq. in. and then steadily drops as the charge passes to the forms. The air valve controlling the mixing air-jet, is closed when the gauge indicates a pressure in the mixer of 15 to 25 lbs., the charge by that time being well out of the pipe. The air jets in the upper part of the mixer, above the charge, are solely for the purpose of creating a pressure so that there will be no tendency for the charge to remain in the machine when the mixing jet is turned on, and the valve controlling this pressure is closed first. The whole operation of charging and discharging requires from 15 to 60 seconds, and two laborers should be able to take care of the operation of all air and material valves. The mixer is located in the most convenient place for handling the unmixed materials and the conveying piping run to the forms from the set-up, under tracks and around obstructions, in a way not to interfere with other plant.

The mixing process takes place both in the mixer and in the conveyer pipe. The mixing air-jet is located in the elbow at the bottom of the mixer, the air stream being directed along the horizontal axis of the pipe. The air-jet strikes the material which, by dropping through the cone-shaped mixer, has become an intermingled mass of stone, sand, cement and water, and scatters the lighter particles through the mass with great force. This portion in front of the air-jet begins to move off, the inertia of the heavier particles having been overcome, and other material drops down from above, to go through the process just described. As it moves away, the material in the centre tends to precede that next the sides of the pipe, on account of the friction with the pipe, and thus there is a constant shifting from side to centre, which continues the mixing process. Bends in the pipe also assist in stirring the mass but they are not needed for that unless the pipe is very short. Even then a little care in charging the mixer, allowing the materials to drop in together, will overcome any trouble due to a short pipe line. A straight conveyer pipe line should be at least 50 feet long to insure proper mixing.

It is not important in what order the materials are dropped into the mixer but, when bins and measuring hoppers are used in charging, it is convenient to allow them to flow into the mixer together. The cement, if put in the measuring hopper, should be introduced with the stone to prevent its sticking in corners and pockets.

The operations of mixing and placing are performed by simply opening the two air valves, hence there is no variation in the mixing power, and each batch is identical with all the others when it has left the pipe. This is of advantage in night work or at other times when inspection is difficult.

The time for discharging a batch varies with the horizontal distance it is conveyed and the vertical distance it is lifted in its course to the forms. There should be enough air available so that, at the average length of shot, the desired speed of pouring can be maintained. If the air capacity is too small, there will be such a wait after each shot for the air pressure to pick up that the desired number of shots per minute cannot be obtained. The time of discharge is the length of time that the air valves are open. A great saving of air is made when the operator closes the valves at the right instant.

Two time-studies on one job are given herein which will serve to show, for two different distances, the speed at which the concrete was delivered. The air supply was about 600 cu. ft. per minute and the mixer was charged from overhead bins by hand-operated sliding gates immediately over the measuring hopper. Two laborers controlled the gates of the sand and stone bins, one laborer dumped the measuring hopper and operated the air valves, and one laborer operated the water valve and assisted the mixer operator. This is the result of operation by unskilled labor and does not seem to be an extraordinary performance, for the pneumatic mixer, as the time-studies were taken during the course of a regular day's run.

Time-study No. 1.—Operation of ½-yard MacMichael Pneumatic Mixer and Conveyer.

Consec. No. of shot.	Charging mixer, seconds.	Closing door, seconds,	Discharging mixer, seconds,	Wait for rise in air pressure, seconds.
1	10	4	13	23
2	10	2	13	11
3	9	3	17	15
4	8	5	14	16
5	10	5	17	20
6	11	2	20	14
7	11	6	19	20
8	9	6	15	19
9	10	5	18	..
Average	9.8	4.2	16.2	17.2

Average time per shot, 47.4 seconds.
Length of conveyer pipe line, 315 feet.
Vertical rise of pipe, 15 feet.
Bends in pipe, 270 degrees.

Time-study No. 2.—Operation of ½-yard MacMichael Pneumatic Mixer and Conveyer.

Consec. No. of shot.	Charging mixer, seconds.	Closing door, seconds.	Discharging mixer, seconds.
1	8	3	7
2	5	3	11
3	9	1	9
4	7	4	8
5	6	4	9
6	7	5	9
7	5	5	12
8	7	9	11
9	6	3	10
10	5	5	11
11	7	5	10
12	5	4	13
Average	8.7	4.4	10.0

Average time per shot, 23.1 seconds.
Length of conveyer pipe, 102 feet.
Vertical rise of pipe, 37 feet.
Bends in pipe line, 205 degrees.
Note: No wait for rise in air pressure.

The compressed air method was adopted by the contractors, Laurin & Leitch, for the work of pouring the heavy concrete dam and retaining walls in a new reservoir for the Montreal Water and Power Co. at Montreal. A ½-cu. yd. mixer was used, supplied with air from a compressor of 706 c.f.m., rated capacity, which was located in a central power plant about 1,100 feet from the mixer.