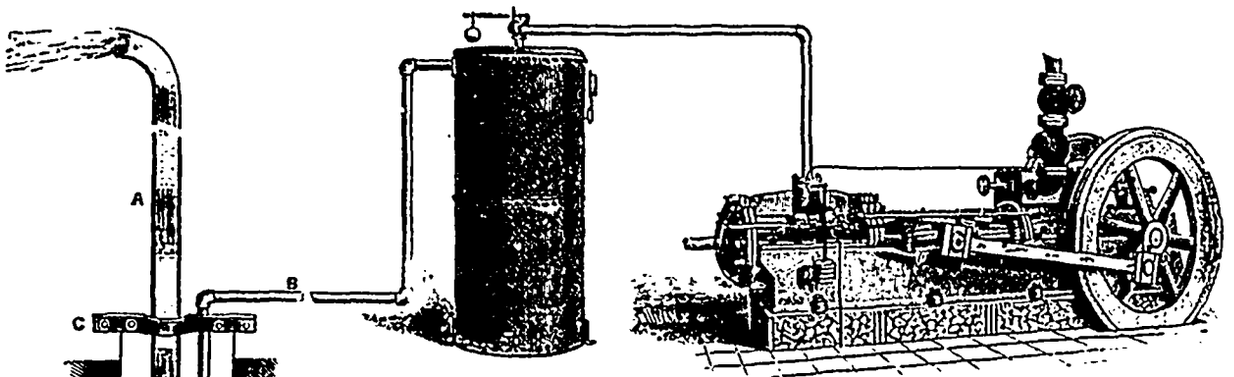

PUMPING WATER BY COMPRESSED AIR.

Those interested in mining and hydraulics will be glad to have some account of the Pohlé system of raising water from non-flowing wells, mines, etc., which has been introduced into Canada by the Ingersoll-Sergeant Drill Company of Montreal

The following description is given by the makers.—The pump proper consists of only two plain open-ended pipes, the larger one with an enlarged end-piece constituting the discharge pipe, and the smaller one let into the enlarged end-piece of the discharge pipe constitutes the air inlet pipe, through which the compressed air is conveyed to the enlarged end-piece to the under side of the water to be raised. No valves, buckets, plungers, rods, or other moving parts are used within the pipes or well.

In pumping, compressed air is forced through the air pipe into the enlarged end at the bottom of the water pipe, thence by the inherent expansive force of the compressed air, layers or pistons of air are formed in the water pipe, which lift and discharge the water layers through the upper end of the water discharge pipe At the beginning of the operation, the water surface outside of the pipe and the water surface inside of the pipe are at the same level, hence the vertical pressures per square inch are equal at the submerged end of the pipe, outside and inside As air is forced into the lower end of the water pipe, it forms alternate layers with the water, so that the pressure per square inch of the column thus made up of air and water, as it rises inside of the water pipe, is less than the pressure of water per square inch outside of the pipe Owing to this difference of pressure, the water flows continually from the outside to within the water pipe by gravity force, and its ascent through the pipe is free from shock, jar, or noise of any kind.

These air sections, or strata of compressed air, form watertight bodies, which, in their ascent in the act of pumping, permit no "slipping" or back flow of water. As each air stratum progresses upwards to the spout, it expands on its way in proportion as the overlying weight of water is diminished by its discharge, so that the air section, which may have been, say, 50 lbs. per square inch at first, will be only 1 74 lbs. when it underlies a water layer of four feet in length at the spout, until finally this air section, when it lifts up and throws out this four feet of water, is of the same tension as the normal atmosphere; thus proving that the whole of its energy was used in work, and that this pump is a perfect expansion engine

As the weight of the water outside of the discharge pipe (the head) is one-third greater per square inch than the aggregate water sections within the pipe when in operation, it follows that the energy due to this one-third greater weight is utilized in overcoming the resistance of entry into the pipe, and all the friction within it.

The Pohlé "air lift" pump gives ninety per cent. of efficiency from the air receiver in water pipes of large diameter, and as a rule, above eighty per cent. It retains this efficiency without repairs, or until the pipes rust through, whereas ordinary bucket and plunger pumps gradually lose efficiency from the first stroke they make, and lose it rapidly if the water contains sand or is acid in character It has been estimated by competent experts, that under favorable conditions and large diameters of water and air pipes, 1,000,000 gallons of water can be raised 100 feet high with one and a half tons of good coal.

The air reservoirs are all strongly made of homogeneous steel, tested and guaranteed at working pressures of 110 pounds; they are provided with the proper openings for inlet and outlet pipes, manhole and head, drain cocks, pressure gauge and safety valve.

As the pump has no valves, no standing water remains in the pump column after the operation of pumping; it recedes into the well, and there is none left to freeze in cold weather. The capacity of the pump is unlimited, and with the proper proportions of air to the water, will work efficiently in pipes several feet in diameter. Estimates have been made which indicate that a thirty-inch pipe will deliver 16,660 gallons per minute, equal to 1,000,000 gallons per hour.

As sand, silt, gravel, and bowlders in water form no obstacles to interfere with the action of the pump, its adaptability for dredging is suggested as well as its utility for pumping sewage. Experience has proved that by the use of this constant upward flow of water, artesian wells have been freed from their accumulated sedimentary deposits, as well as that lodged in the fissures and crevices of their wall rock, and have been thus made to yield greater quantities of water than they ever did before. For chemical uses, and for the liquids of the arts, there is no superior method than the "Air Lift" It is used successfully for raising sulphuric acid of high specific gravities, and is well adapted for ore leaching works, vinegar works, sugar refineries, dye works, paper pulp works, etc.

As an irrigating pump for raising subterranean water in the arid regions of the west, its field of usefulness is very promising, for with one air compressing plant at a central station, a number of wells, widely separated from each other, may be simultaneously pumped by branches of air-conveying pipes, taken from a main air pipe from the air compressor; for compressed air may be conveyed for miles without material loss of power.

It often happens that a single well does not yield the quantity of water desired, but that a number of wells would give the satisfactory result. By the old-fashioned deep well pump, each well would require a separate "steam head," separate sets of rods, and the other pharaphernalia, which, with the condensation of the steam, when conveyed to the several steam heads, would be very costly in the first outlay, and very wasteful of power in its maintenance, to say nothing of loss of time in repairs. By the Pohlé process, but one air compressing plant is required, and this may be placed in the engine room or the boiler house, directly under the eyes of the engineer, from whence the air may be conveyed to the several wells, all of which may be pumped simultaneously and economically. Further details of the construction and operation of this pump may be obtained by writing to the Ingersoll-Sergeant Drill Co., 164 St. James street, Montreal.