

# Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XI.—No. 23.  
(NEW SERIES.)

NEW YORK, DECEMBER 3, 1864.

\$3 PER ANNUM  
(IN ADVANCE.)

## Improved Air Engine.

On page 97, Vol. VIII, we gave an illustration of Roper's air engine, the first engine, we believe, either air or steam, which has proved practically successful in using the products of combustion to increase the pressure in the cylinder. This achievement will permanently give to this invention a prominent place in the history of prime movers, as being one of the great steps in the progress of that foundation department of mechanics. The great interest which attaches to this invention, and the fact that it has gone into practical use on a large scale, induces us to present to our readers another illustration of it, embracing some improvements which have been added since the first one appeared.

The engine is exceedingly simple. It may be regarded as a steam engine worked by air, with the furnace inside of the boiler.

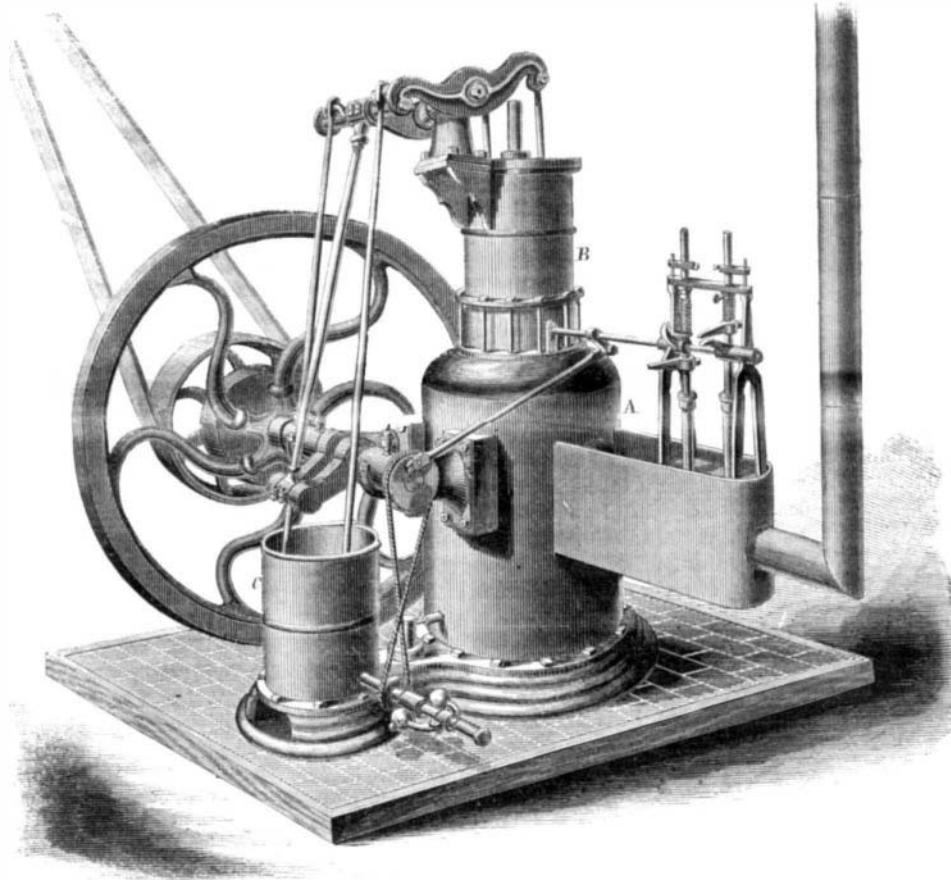
Referring to the engraving, the large upright cylinder, A, is the chamber in which the air is heated, the fire being inside in direct contact with the air. The door through which the coal is introduced is on the opposite side of the air chamber, and is not shown in the cut. This door closes air-tight and is secured to withstand the pressure at which the air is worked.

As the air is expanded by heat it is let into the bottom of the working cylinder, B, through a valve opening, at the proper time, and forces up the piston, thus vibrating the beam at the top of the cylinder, and turning the wheel through the connections shown.

The two rods on the outer end of the beam operate the piston of the air-pump, C, by which the air is compressed and forced into the heating chamber, A. The air enters the heating chamber through two pipes, one above the grate and one below; the larger portion of the air entering above the grate. This arrangement prevents a blast through the fire that would carry ashes and bits of unburned coal into the cylinder.

The general plan of this engine has been described by Professor Rankin and by Fairbairn as "Joule's engine of constant pressure;" but without Roper's device of placing the fire in the heating chamber, it would probably never have come into general use as an economical and practical motor. This arrangement not only utilizes the pressure of the hot gases generated by the combustion of the fuel, but it has another advantage of far greater importance. One of the most serious difficulties in air engines has been the extreme slowness with which heat can be imparted to air through iron plates. When air is passed directly through the fire the oxygen that en-

ters into combination with the carbon and hydrogen of the fuel, is, by the act of combination, heated to a temperature of some 3,000 degrees. Then these white-hot gases are mingled with the cool air entering above the fire, and their temperature is brought down to the point at which they can be worked through the cylinder without destroying the packing. As the quantity introduced above and below the coal may be varied by a stop-cock upon the outside, the temperature of the working air can be adjusted with the nicest precision.



ROPER'S AIR ENGINE.

A sufficient quantity of coal is introduced in the morning to last till noon, so the engine does not require to be stopped for feed any oftener than the men must stop for the same purpose. The rapidity of the combustion is controlled perfectly by the quantity of air admitted below the grate.

Economy of air engines is claimed only in cases where small powers are required—from one to four horses—and in these cases the great saving is in dispensing with the services of an engineer. It is also claimed that two years experience has shown this engine to be less costly in interruptions and repairs than ordinary steam engines.

For further information in relation to this engine address Crosby, Butterfield & Haven, 47 Pearl street, Boston, or 22 Dey street, New York, where machines can be seen in operation. More than 200 of these engines are now in use, and not one, we are told, has ever been condemned.

A MAN in Bridgeport sent a box to his son in New Orleans, and enclosed a screw-driver that he might withdraw the screws with which it was fastened.

## Preservation of the Teeth.

Horace Walpole says ("Letters," vol. iii. p. 276): "Use a little bit of alum twice or thrice in a week, no bigger than half your nail, till it has all dissolved in your mouth, and then spit it out. This has fortified my teeth, that they are as strong as the pen of Junius. I learned it of Mrs. Grosvenor, who had not a speck in her teeth till her death." Do not let your brushes be too hard, as they are likely to irritate the gums and injure the enamel. Avoid too frequent use of tooth powder, and be very cautious what kind you

buy, as many are prepared with destructive acids. Those who brush their teeth carefully and thoroughly with tepid water and a soft brush (cold water should never be used, for it chills and injures the nerves) have no occasion to use powder. Should any little incrustation (tartar) appear on the sides or at the back of the teeth, which illness and very often the constant eating of sweetmeats, fruit, and made dishes containing acids will cause, put a little magnesia on your brush, and after two or three applications it will remove it. While treating on the care of the teeth, which is a subject of the highest importance to those who have young families, and in fact every one who wishes to preserve them, I beg to remind my readers that as the period generally occupied by sleep is calculated to be about (at least) six hours out of the twenty-four, it would greatly promote the healthful maintenance of the priceless pearls whose loss or decay so greatly influences our appearance and our

comfort, if we were to establish a habit of carefully cleaning them with a soft brush before going to bed. The small particles of food clogging the gums impede circulation, generate tartar and caries, and affect the breath. Think of an amalgamation of cheese, flesh, sweetmeats, fruit, etc., in a state of decomposition, remaining wedged between our teeth for six or seven hours; yet how few ever take the trouble to attend to this most certain cause of toothache, discoloration, and decay, entailing the miseries of scaling, plugging, extraction, and the crowning horror—false teeth!—*Goody's Lady's Book*.

At the beginning of the war the Government took the hides from dead army horses and buried their flayed bodies at Rall's Cross Roads and elsewhere, at a cost of fifty thousand dollars a year. Now it receives from a firm in Alexandria, Va., fifty thousand dollars per annum for permission to take dead animals off its hand.

Mr. George W. Brockett has established a sorghum sirup manufactory in North Haven, capable of making 100 gallons every twenty-four hours.