revolutions of crank) per minute, when we saw them in operation. The great bulk of air to be operated upon in an air engine, is the great obstacle to its use.

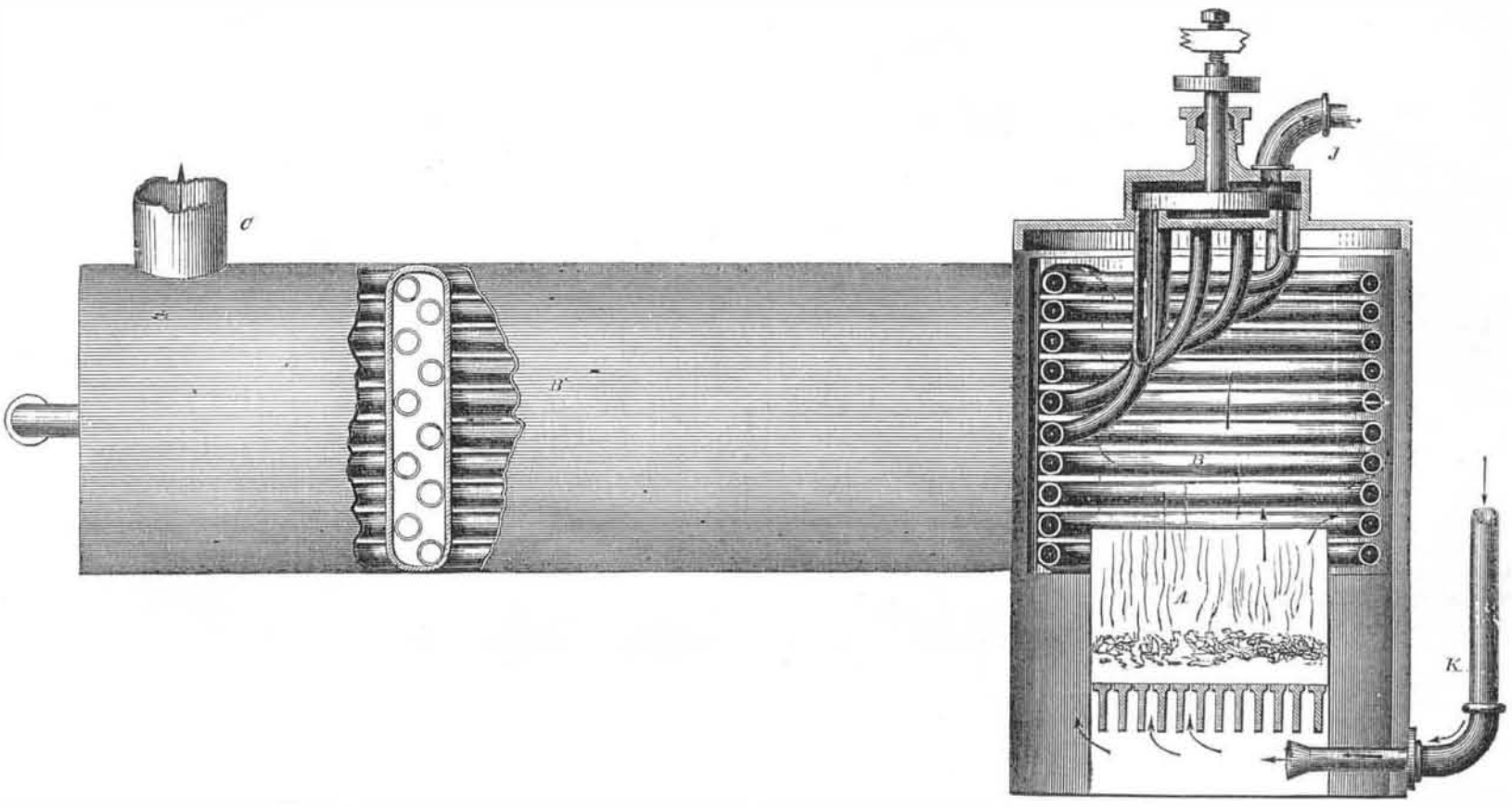
The fact is here revealed to us plainly, that it is impossible to use condensed air in air engines, when the feed pump is only equal or less than the main cylinder. It requires the feed pump to be of greater capacity than the main cylinder to do this.

The new "Ericsson" engines, in which highly compressed air, was stated to be used, were delusions, because the feed pumps were of less capacity than the main cylinders. The quantity of hot air admitted into the main cylinder every stroke, and its temperature, are the exponents of its force. For example, if the pump, D, feeds the air into F, at 60 lbs. and the quantity contained in the pump is fed into the heater, and takes up 491°, and then passes into the main cylinder: this is simply 16 cubic feet of air at atmospheric pressure reduced to 4 cubic feet. Thus 16×15 (491°) $\div 4 = 60$; and $15 \times 4 = 60$.

The question of compressed and non-compressed air, is just as broad as it is long, for it requires the same amount of power to compress it as is obtained afterwards from the same air in its compressed state, so that the simple question in relation to the power of any hot-air engine is resolved by the quantity of air at atmospheric pressure, heated to a certain temperature in a given time—the degree of heat determines the pressure, and the space through which it will move the piston.

When properly understood, the question is very simple. We regret to state that scientific men—Professors in some of our colleges—who have written on this subject, have involved it in mystery, by rushing into page after page of symbols and figures, to explain a question that requires only a very few figures in the most common rules of arithmetic. Calculating the effective force of hot air in a cylinder (under a certain pressure) at different points of the stroke—is labor lost in discussion, for such calculations merely relate to that economy of its use, which is equal to that of steam, and which is practiced in steam engines.

Figure 2.



The great question to be asked in discussing hot air versus steam, is what advantage has air over steam? What is there in its nature that would render it superior as a motive agent to steam? It is far inferior to water raised into steam, as a motive agent. The only single quality that it has, reasonably, over steam, is its inferior capacity for heat. Thus while the capacity of water for heat is 1·0000; air is only 0·2669, or 0·7331 less. But one cubic inch of air heated to 210° will raise only 6·12 lbs. one inch, while 1 cubic inch of water raised to steam at 212° will lift 15 lbs. 1728 inches. Now let us suppose that the air is 815 times lighter than the water, and of 3·75 inferior capacity for heat, the advantage is still with the steam:—thus $1728 \times 15 = 25920 \div 815 = 31 \div 3{\cdot}75 = 8$, or about two pounds on the square inch. The great bulk of air, in comparison with that of water—it being 815 times lighter than water, is an objection to its use. It requires huge cylinders amounting to about 217 times greater frictional surface than steam engines. It acts chemically upon iron and oxydizes the parts exposed with great rapidity. The moisture of steam relieves the piston of much friction, and this is the reason why anhydrous steam (stame) when mixed with moist steam, produces better results than the *stame*. Steam at the low temperature of 283° exerts a pressure of 50 lbs. on the square inch, while air at 491° exerts one of only 15 lbs. The steam boiler is a reservoir of force, not subject to those sudden changes involved in an air heater, when such an immense bulk of air has to be heated for every stroke of the piston.

Mr. Shaw is a sincere and honest explorer in this field. He presents his engine to the American public, and has courted a candid criticism, and for this he deserves the thanks of the community.

A World's Fair in France.

Preparations have been making on a grand scale in France, ever since 1851, to have a World's Fair, (like that in London), next year, 1855. The exhibition is to be opened in Paris, on the first of next May. There will be, strictly speaking, two great exhibitions—one of industry, including agriculture and manufacture; the other of the fine arts. These exhibitions will be simultaneous. A Board, or, as the French term it, a Commission, divided into two sections, has been nominated, who direct and superintend each its proper branch. The President of the general commission is Prince Napoleon.

The warmest hopes are entertained and expressed that the United States will be well represented in all its great strength, as well artistic as industrial. The various articles sent for exhibition will be received between the 15th of January and the 15th of April, It is desired that only those liable to suffer from too long package be sent at the latter date. The heavy and cumbersome descriptions should be ready for reception before the end February.

Books and Magazines with Uncut Leaves.

We advise all publishers of books and magazines who follow the practice of leaving many of their leaves uncut, to alter their system, and send no book, magazine, or pamphlet from their offices hereafter, with its leaves untrimmed We believe it would ultimately inure to the benefit of all publishers of magazines to trim their leaves, for it would undoubtedly tend to increase their circulation.

A Large Straw Cutter Wanted.

Messrs. Editors.—Permit me to call the attention of inventors to a want which farmers in the West feel severely. We want a machine for cutting straw and corn stalks—one which will allow us to throw in our straw by forks-full. We do our thrashing by machines, and our straw is not in a fit condition to cut to advantage in one of the machines which are in use at present. If this want could be supplied we should be enabled to keep one-third more stock, as we could feed all our straw, which now often stands year after year, in piles in the yard or fields, and finally disappears. Such a machine would add 25 per cent. to the capital of the Western States, as it would enable farmers to feed all their straw which now they feel to be an incumbrance. A Farmer.

Detroit, Mich., June 15, 1854.

[Many of the small straw cutters now in use, have but to be enlarged, and worked by horse, steam, or water power, to answer all the purposes desired by our correspondent. More work, by almost any machine, only requires more effective force to drive it, that is providing its parts are strong enough to be driven at a higher velocity. All straw cutters, in fact every farming implement and machine, should be constructed with a view to simplicity and strength. We have no doubt but many of our readers can furnish straw cutters to meet every want of our Michigan Farmers.

The Tea Culture Again.

The "Dunkirk Journal" says that a gentleman passed through that village *en route* for Cincinnati, with some twelve Chinese tea culturists, for the purpose of testing the practicability of growing tea in the vicinity of Cincinnati. Since the death of Mr. Junius Smith, of South Carolina, we have heard nothing of the progress of the tea culture in the United States.

A Curious Incident.

Mr. Flauddin, in his narrative of a residence in Persia, relates a curious incident which occurred when he was at Ispahan:—

"The Persian servant of a European had been stung by a scorpion, and his master wished to apply ammonia, the usual remedy in such cases, but the man refused, and ran off to the bazaar. When he returned he said he was cured, and appeared to be so. The European, rather surprised at this almost instantaneous cure, questioned him, and found that he had been to a dervish, who, he said, after examining the wound and uttering a few words, had several times touched it with a little iron blade. Still more astonished at the remedy than the cure, the European desired to see the instrument by which the latter was said to have been effected. At the cost of a small pickech he was allowed to have it for a few minutes in his possession. After a careful examination, finding nothing extraordinary in the instrument, he made up his mind that the cure was a mere trick; that the dervish was an impostor; that the scorpion sting had not penetrated, and that his servant had been more frightened than hurt. He threw the blade contemptuously upon the table, when, to his great surprise, he beheld it attach itself strongly to a knife. The quack's instrument was imply a magnet. But what power had the loadstone's attraction over venom? This discovery was very odd; incredulity was at a nonplus, and yet the man stung by the scorpion was cured, and he who had cured him was in great renown at Ispahan for the treatment of that sort of wound.

Refining Gold.

The gold is melted with three parts of silver, and, when in a melted state, is thrown into cold water. This has the effect of dividing the metal into small flakes, which are thrown into glass matrices and treated with nitric acid, which dissolves the silver and leaves the gold untouched. The gold, after this process, is taken from the matrices, and collected in a large copper pan or other vessel. Any one to look at it, so far from taking it to be refined gold, would imagine it was a collection of worthless brown sand. It is then washed and dried, and afterwards put into a crucible, re-melted and cast into bars of fine gold.

The liquid into which the gold was put for the purposes of disengaging the silver, and which it holds in solution, is taken and thrown into a large vat containing salt and water. The mixture is kept in a continual state of agitation. The silver, by this means, is precipitated as an insolvent chloride.

This white chloride is washed thoroughly in warm water, it is then put into a proper vessel and mixed with granulated zinc. Under violent ebullition for sometime, the nitrogen gas is disengaged and the silver left pure. The chloride having a greater affinity for zinc than silver, unites with the zinc and forms a chloride of zinc.