

**Improved Portable Steam Engine.**

Within a few years the steam engine, in portable form, has become a favorite motor, being used even for purposes requiring fifty horse-power. The unusual demand for these handy and easily-managed engines has greatly stimulated the builders to add improvement after improvement, until they may be considered as near perfection as any machine in general use.

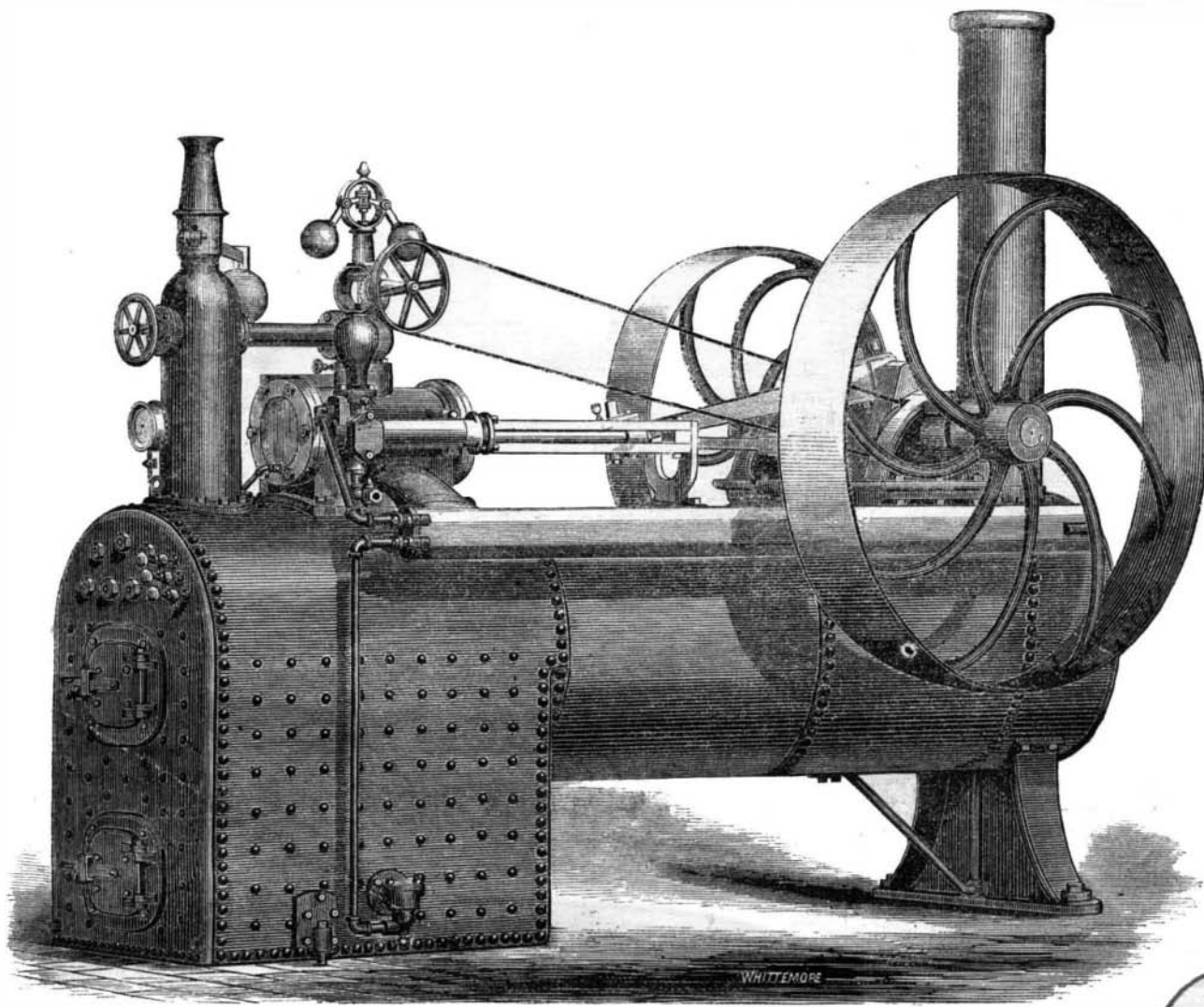
The illustration gives a perspective view of a very excellent engine, manufactured by Bellows & Whit-

comb, Worcester, Mass. must be supplied with food, clothing, military munitions, and appliances. During the first months of a war these may come from the accumulations in the granaries and warehouses, but for the maintenance of armies through repeated campaigns, there must be a continued surplus production of them beyond the needs of that portion of the population which continues in peaceful pursuits.

The war in this country for the suppression of the rebellion cost the nation 3,500 millions of dollars, and a portion of this was drawn from the personal prop-

erty that we had on hand when the war broke out. The merchandise in our warehouses, the grain in our cribs, and the cattle in our fields, were probably less in quantity at the close than they were at the beginning of the war, but the quantity was not diminished to the extent of 3,500 millions of dollars. According to the census returns, we were accumulating wealth immediately before the war at the rate of more than 900 millions of dollars per year. This rapid accumulation was checked by the withdrawal of a million of men from productive labor to unproductive consumption, but it was not stopped. Indeed, it may be an open question whether the general introduction of the reaping machine, the sewing machine, coastwise propellers, and other agencies for facilitating the production of wealth, did not fully counterbalance the withdrawal of the soldiers from peaceful industry. There are many farmers, manufacturers, and traders, who have as large stocks as they had before the war, and who have besides some Government bonds—these bonds having been bought with the profits of their business during the war; in other words, their surplus products have been furnished for the support of the armies.

forty to fifty cents per day of value when measured in the markets of the world. The American mechanic, by calling to his aid the forces of nature and innumerable ingenious appliances, is able to produce value to the amount of three or four dollars every day that he works. This great ability to produce wealth gives the people of this country the power to maintain armies, and thus endues them with military strength in proportion to their numbers—probably not less than three-fold that of any other nation, with the excep-



**BELLOWS & WHITCOMB'S PORTABLE STEAM ENGINE.**

comb, Worcester, Mass. The builders claim that these engines furnish the maximum of power with the minimum of fuel. The cranks and connecting rods are of the best forged iron, the workmanship is of first-class quality, and every plate used in the boiler is thoroughly tested before being used. A patent steam piston packing and an improved governor, of their own invention, is believed to give better results than any others in use. Each machine is tested by actual working before it leaves the manufactory, and is guaranteed to work to the full power at which it is rated. The engines are furnished complete, ready for operation, with the exception of pipes and belting, which will be provided if desired. For further information address as above.

**THE WAR POWERS OF EUROPE AND AMERICA.**

The strength of the three European countries now arraying for strife is thus stated:—Austria, square miles, 236,311; population, 36,795,000; army, 800,000. Prussia, square miles, 108,212; population, 19,304,000; army, 700,000. Italy, square miles, 98,784; population, 21,703,710; army, 400,000.

The Northern States of this Union contain about 20,000,000 of inhabitants, and at the close of the war our army numbered 1,000,500 men.

The military power of nations, however, is by no means in proportion to their population, or to the size of their armies at the opening of the contest. When numbers so large are enlisted, the element that mainly determines the victory is the continued ability to support the armies, and this depends upon the nation's capacity for producing wealth. Soldiers

erty that we had on hand when the war broke out. The merchandise in our warehouses, the grain in our cribs, and the cattle in our fields, were probably less in quantity at the close than they were at the beginning of the war, but the quantity was not diminished to the extent of 3,500 millions of dollars. According to the census returns, we were accumulating wealth immediately before the war at the rate of more than 900 millions of dollars per year. This rapid accumulation was checked by the withdrawal of a million of men from productive labor to unproductive consumption, but it was not stopped. Indeed, it may be an open question whether the general introduction of the reaping machine, the sewing machine, coastwise propellers, and other agencies for facilitating the production of wealth, did not fully counterbalance the withdrawal of the soldiers from peaceful industry. There are many farmers, manufacturers, and traders, who have as large stocks as they had before the war, and who have besides some Government bonds—these bonds having been bought with the profits of their business during the war; in other words, their surplus products have been furnished for the support of the armies.

Now, the production of wealth in proportion to the population is two, or three, or four-fold greater in this country than it is in either of the European countries that are now going to war. The Prussian manufacturer of scissors has the iron and steel of his articles carried from fifteen to twenty miles on the heads of his workmen, during the process of manufacture, and the labor is unaided by water or steam. The consequence of this unwise direction of industry is, that the skilled mechanic produces but

tion of Great Britain. This power we owe to the intelligent use of productive machinery, and for the extent of this use we are indebted to our free institutions, our common schools, and our patent laws.

**INTERESTING TO OIL MEN AND MINERS.**

In Vol. XII., No. 23, we gave an illustration and description of an apparatus for pumping oil wells and mines, patented by F. S. Pease of Buffalo. Last week we had an opportunity of witnessing its operation by working models on a large scale, and we are satisfied, after a lengthy investigation, that the improvement is one of great importance.

Its negative advantages are, that it dispenses with all pump rods; has no apparatus in the bottom of a deep well which can get out of order, can pump and lift gas, atmospheric air, water, oil, or paraffine, and can act in any position, the pipe turning corners at all angles. Its positive advantages are certainty of action, using the pipes already down in oil wells, the creation of an efficient vacuum, and the ease and economy of its application.

It has been subjected to severe tests and never yet has failed. Indeed, its performance exceeds the promise of the inventor. The lowest estimates made by practical and scientific men, who have examined its operation, is that it is equal to at least 2,200 barrels per day through a two-inch pipe, 4,090 from a two-and-a-half-inch pipe, and 8,200 barrels through a three-inch pipe. The depth of the well or mine does not prevent its efficient action.

The principle of its operation is that of forcing compressed air down a tube, exhausting the air