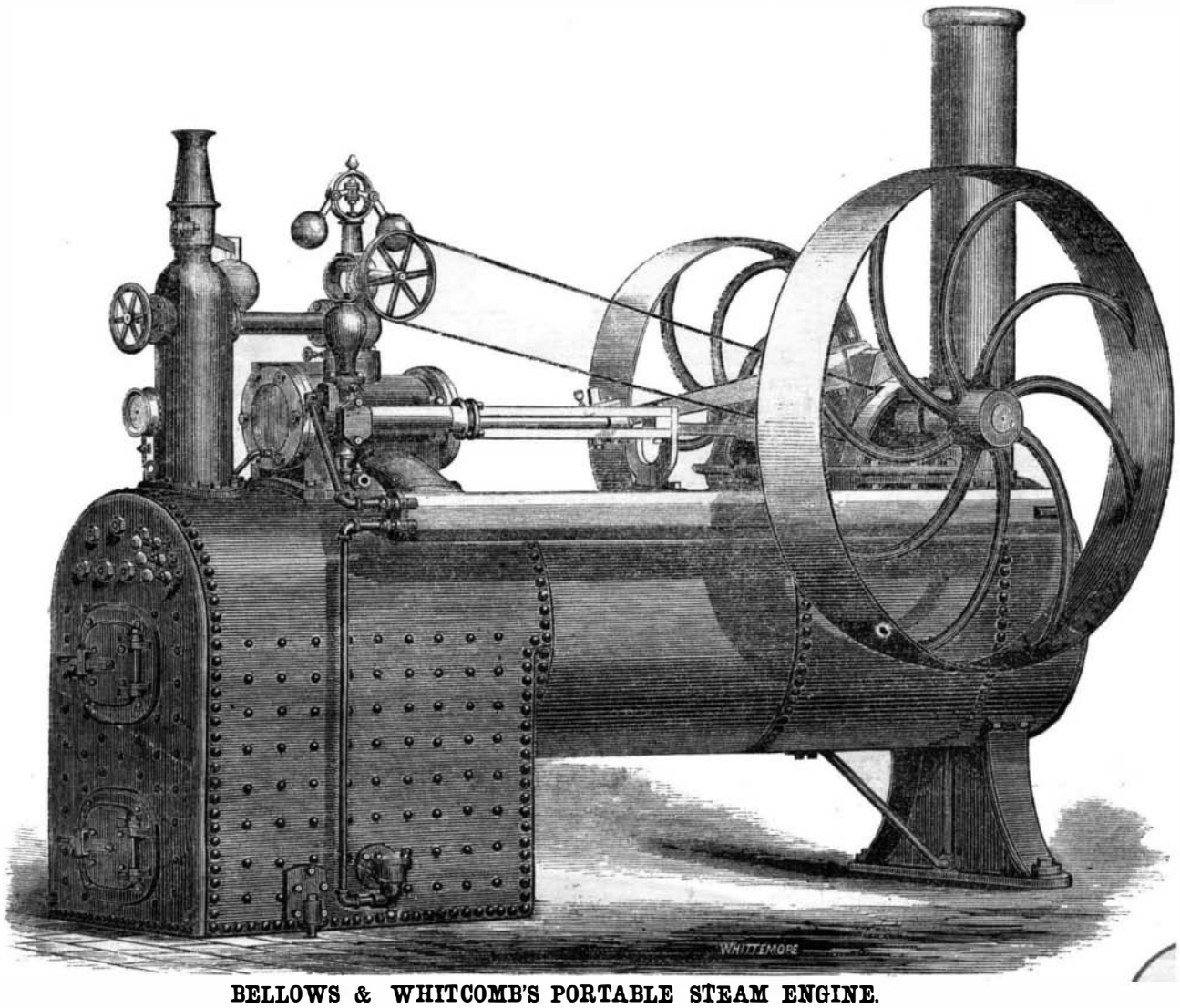
Improved Portable Steam Engine.

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 & Whitcomb, 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.



BELLOWS & WHITCOMB'S PORTABLE STEAM ENGINE.

THE WAR POWERS OF EUROPE AND AMERICA.

The strength of the three European countries now arming 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 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 property 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 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 exception 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

chamber, and thus forcing the contents of the well into the vacuum, whence it is discharged by the combined action of the compressed air and the pressure of the atmosphere acting on a vacuum. The same apparatus can be used for separate wells, or mines, there being always a surplus of power for contingencies. It has been applied to house pumps and works admirably, the pump never fouling nor freezing.

Those interested are referred to the description in No. 23 of Vol. XII., SCIENTIFIC AMERICAN, or to F. S. Pease, Buffalo.

New Steamboat Fuel.

The Cleveland (Ohio) *Herald* says:—"The other day, at the Islands, we noticed a novel kind of steamboat fuel. When the *Philo Parsons* was wooding at North Bass Island, she took on board a large number of sturgeon which had been landed from the fish ponds in that vicinity. As these fish had been lying a day or more in the sun they were, like the exploded dog, not good for much as fish. Curiosity as to the design of such freight was soon satisfied on seeing a huge sixty-pound sturgeon go head foremost into the furnace. Inquiring into this novel species of steamboat fuel, we were told that the oil from the fish assists the combustion of the wood very much, and that the boatmen are glad to clear the docks of sturgeon, which would otherwise be deemed worthless, unless to enrich the soil.

"It is said twenty sturgeon make as much steam as a cord of wood, though we do not know that the wood-measure tables have been 'reconstructed' so as to read, 'a score of sturgeons make one cord.'"

Low's Shingle Machine.

In the description of Low's shingle and barrel head machine, which was illustrated in No. 25, Vol. XIV., SCIENTIFIC AMERICAN, an error occurred in regard to its capacity. Instead of sawing from 1,700 to 2,500 shingles per day of eleven hours, we have seen certificates from concerns using the machines which state that they cut from 15,000 to 22,000 per day of ten hours, and that they are capable of doing even more. These machines are in use in all the Western States, in California, and in New Brunswick. They seem to give excellent satisfaction. For the convenience of our readers interested in the lumber manufacture we give the prices: with 36-inch saw and jointer, complete, $275; with 40-inch saw, $300. S. J. Ahern, 88 Wall street, is the agent in this city.

The Non-Recoil Gun.

It will be recollected that in our last number we stated the facts, in brief, in regard to experiments with an open tube as an instrument for propelling projectiles. The *Engineering* states that "Mr. Harding, the inventor, has brought it under the notice of the French and Belgian Governments, who have each appointed a commission to examine and report upon its merits. Mr. Harding is drawing, at the Hydraulic Tube Company's Works, a gun of 4-inch bore with 2-inch thickness of steel around the chamber, and we hope soon to be able to give the practical results of a conclusive trial of the most extraordinary system of ordnance known to modern times." The result of experiments on a scale that promises useful and practical effects will be awaited on this side the water with a degree of interest noways inferior to that of our cousins on the other side.

The Ames Gun.

Mr. Horatio Ames, the patentee and ma ufacturer of the gun which bears his name, and which has been repeatedly tried with extraordinary results by the ordnance officers of the American Government, has lately brought it under the notice of the Emperor of Russia. The resources of the Russian gun factories were at once placed at Mr. Ames's disposal, together with a liberal appropriation of money to establish the manufacture in that country; but, we believe, the offer has been declined, and indeed no experienced iron-master would think of commencing such an undertaking in a country so lacking in skilled labor and in general facilities for special manufactures of iron as Russia.—*Engineering.*

DURING the war over one thousand ships of our mercantile marine were transferred to foreign flags.

MISCELLANEOUS SUMMARY.

THE Hamilton Manufacturing Company, of Lowell, has entered upon a new department of business, that of manufacturing delaines. The machinery for this purpose was mainly imported from England at a cost of $400,000, and the company is now able to turn out delaines that will not suffer from comparison with the products of older concerns. The manufacturing companies of Lowell have introduced into their mills Francis's apparatus for extinguishing fires—by which the entire building can be flooded in a very brief period of time, and which can be effectually operated when it would be impossible to affect the flames by efforts from the outside.

THE people of St. Louis are again bestirring themselves to an extension of the North Missouri Railroad through Iowa via Cedar Rapids and into Minnesota, so as to tap the seven east and west lines in those States, and afford an easy and effectual cut-off for the benefit of St. Louis. They have hitherto relied upon the Mississippi as a cut-off, but are abandoning that idea with the multiplication of railroad bridges over the stream, and now propose a subscription of a million dollars in aid of a railroad extension to Cedar Rapids.

OLD MINES RE-DISCOVERED.—In Brazil, in the town of Rio Grand de Sul, old silver mines worked by the Jesuits have been re-discovered. There are said to be in the southern part of California, also, silver mines of the greatest richness which were worked before the formation of the Mexican Republic with great results, all traces of which were carefully concealed when the priests, who had taken the profits of them, were compelled to leave the country. The Indians were put under oaths, with fearful penalties, not to disclose the locations of them.

A VEIN of tripoli, twenty feet in thickness, fifty rods wide, and a mile in length, has been discovered near the town of Stillwater, Minn. It is said to be free from acids, mica, or calcareous earths, and equal to the Mount Eagle tripoli, so celebrated in this country and Europe. Nothing has ever yet been discovered equal to the pure tripoli for cleansing and burnishing all metallic and glass surfaces. Tripoli is composed of the exuviæ of infusoria, and is entirely an animal production, although found in the earth.

CRYPTOGRAPHY.—C. B. S., of Conn, sends a table intended to be used in cipher writing, which is precisely like one sent us by an Ohio correspondent, and which we referred to in No. 25, Vol. XIV. Like that, its value depends upon key words agreed upon by the parties in communication, and it is one of the most ancient forms of the art. An arbitrary transposition of the letters, guided entirely by the key words, constitutes its value.

THE city of Hartford, Conn., has produced no less than 821,000 volumes of books relating to the civil war, whose aggregate value is about $2,500,000; turned out more fire-arms than any other city, and built $1,500,000 worth of steam engines during the war.

MR. HUGHES gets for his telegraph 200,000 francs from France, 120,000 francs from Italy, and something from Russia, besides the Order of St. Anne. He can afford to frank a few dispatches for his friends—he can if any man can.

IT is stated that New Haven is the only place in the United States where fishhooks, needles, and steel-bowed spectacles are manufactured. Needles, however, are now made in Bridgeport and other places.

A NEW HAVEN company has begun the manufacture of a compressed stone for building purposes. It is made of sand, pulverized quartz, and silicate of soda, and hardens within 24 hours from the consistency of putty to the solidity of stone.

LEWISTON, Me., has eight cotton factories, with eighty thousand spindles and five thousand operatives. The mills are now all running on full time. The Androscoggin Mill there is one of the largest in the world.

THE first bushel of wheat ever grown in Minnesota was raised in 1829; last year the yield was 10,000,000 bushels; and this year, with a good harvest, the crop is put down at 16,000,000 bushels.

THE Jewish synagogue just completed at Berlin, but not yet consecrated, is one of the most gorgeous buildings in Europe. The entire cost of the structure is estimated at $750,000 in gold. It is surmounted by a huge dome of the Oriental type, which can be seen from every house-top in Berlin. It is not less conspicuous for its Eastern form, than for the heavy gilding which covers it in every part. Besides, there is also a minor dome, also richly gilded. The interior is broken up into the great central hall of worship, not far from a hundred feet in length, and provided with 3,000 chairs for the worshipers. These are of oak and richly carved. To occupy one of these chairs costs about $500 yearly.

ODORS OF DISEASE.—The odor of small pox has been compared to the smell of a he-goat; that of measles to a fresh-plucked goose; scarlatina to cheese. The smell of plague has been compared with the odor of May flowers, and that of typhus with a Cossack. That the typhus odor resembles ammonia, I have often observed, and the best and most recent investigators agree that it is a compound of ammonia. Probably the more intense the smell, the more operative the poison; hence the necessity on the part of the attendant to avoid inhaling this concentrated poison.—*Prof. Banks, Medical Press and Circular.*

THE origin of the earth's heat is the subject of a communication from H. L. of N. Y. He assumes it is caused by the impact of the earth upon whatever resisting medium in the line of its orbit tends to retard its motion. The idea is not new, and the subject is not really of practical importance. Until the existence or nature of a resisting medium is established and understood, all discussion of the question must partake more or less of conjecture.

A NEW PRESIDENTIAL MANSION.—It is proposed in Washington to erect a new dwelling for the President on the elevated plateau at the east of the Capitol, the present White House being deemed unhealthy and inconvenient. Probably the cost of building a roomy and permanent structure in the locality proposed would be hardly more than the expense of the continual repairs which seem to be required on the present edifice.

MEASURING GRAIN.—The variation between weight and measure of grain in different States has induced the Albany Board of Trade to recommend to the Boards represented in the Detroit Commercial Convention of 1865, the measurement of grain by the cental of one hundred pounds, with the object of uniformity.

THE grounds of the Portland Rolling Mills Corporation comprise eighty-five acres. This tract is divided by avenues into lots, and with a multitude of neat and substantial houses constitutes a pleasant little village. The mill has a capacity of 10,000 tuns per year, has an engine of 400-horse power, seven heating and three puddling furnaces.

IN speaking of city reforms, some weeks ago, we alluded to the fact that the new Excise Board intended to get enough from licensed liquor dealers to nearly pay the police expenses of the city. This Board went into operation on the 1st of May, and the Treasurer now reports over one million dollars on hand.

THE new bridge over the Schuylkill at Chestnut street, Philadelphia, is rapidly approaching completion. It is a splendid structure of cast iron, the total weight of the material being seventeen hundred and fifty tuns. It will be opened for travel July 4th, and will be entirely finished in the ensuing September.

AN exchange says that a sure sign of rain is the rising of moisture to the surface of the ground where it has before been dry, and accounts for it by the fact that as a storm approaches, the density of the atmosphere decreases, and the pressure upon the surface of the earth is lessened.

STEEL RAILS.—In consequence of being made too hard, several steel rails have broken lately. It is imprudent to attempt to obtain great durability by making over-hard steel. In the cases to which we refer, the engine weights were very heavy.

WATER in which indigo has been dissolved is recommended to remove smoke stains from walls before whitewashing, but common lye made from wood ashes is believed to be equally as efficacious