The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Three Dollars per annum—One Dollar in advance, for our months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. IX, NO. 9...[NEW SERIES.].....*Nineteenth Year.*

NEW YORK, SATURDAY, AUGUST 29, 1863.

THE NATIONAL BANK.

Capitalists who, seeing this heading, look to the column below for a financial dissertation on the prospect of a national bank, will be disappointed. We have no such object in view at this writing.

The almost illimitable expanse of country west of the Alleghenies contains in its boundaries the food and the future prospects of thousands on thousands of human beings. It may not inaptly be called a never-failing bank, with no repudiated or protested notes, and no shaky credit. Of the vast capacities of the Western country for growing grain it is unnecessary here to speak; but it may not be amiss to place on record a few figures concerning the amount of food in the shape of breadstuffs, exported from the region in question, as compiled, by the *Commercial Bulletin*, from the report of the Chicago Board of Trade:—

"The Upper Mississippi basin, including the nine States lying northwest of the Ohio river, embracing an area of 525,301 square miles, and first colonized in 1788, now contains a population of over 9,000,000, which, on an average, has doubled itself every ten years since the beginning of the present century. This territory, from the adaptability of its physical features to agricultural pursuits, and the uniformity of its climate, soil and productions, may well be called the great food-producing region of the New World. Its industry, thus far, has been almost exclusively devoted to this purpose, and the value of its annual product is upwards of $350,000,000, notwithstanding that only about 15½ per cent of its area has as yet been brought under cultivation. After supplying the deficiencies of the seaboard States, the Northwest has a surplus of breadstuffs and provisions left for export to foreign countries, which, in four years, has increased in value from $38,300,000 to $133,750,000; being more than 70 per cent of the entire exports of the country last year, exclusive of gold.

"Of this immense product, the cereals alone brought into market from 8 of these food-producing States, according to the last census, amounted to 550,000,000 bushels in 1859, when the crops were nearly one-third deficient as compared with those of the two succeeding years. To convey an adequate idea of the motive power required to distribute this prodigious mass in a crude state, it may be stated that it would employ more than 64,400 locomotives, each hauling 8,500 bushels, and, if required to deposit their freight at a given depot, trains must arrive oftener than once in seven minutes, by day and by night, throughout every working day in the year.

"The commerce of the Great Lakes—which are now and must continue, for all future time, whatever may by the political condition of the country, the principal outlet for the productions of this inland region—reaches an annual value of $450,000,000; more than twice the external commerce of the whole country—and is carried on by a fleet of 1,643 vessels, of an aggregate tunnage of 413,026. It is estimated that before the lapse of another decade, the increase of this branch of commerce will require double this amount of tunnage, and of course a corresponding increase of transportation facilities between the Lakes and the Atlantic seaboard.

"The re-opening of navigation on the Mississippi can be of no great advantage to the Northwest, unless at the same time the great Southern market for the consumption of its products is also restored. As a channel for exportation, by which the European markets may be reached, it is of but little account to that region, as the very insignificant shipments of Western produce from New Orleans, previous to the war, as compared with those from Atlantic ports, clearly demonstrate. The exports of provisions and breadstuffs from the former, in 1860, were only $1,200,000 in value, against $21,200,000 from New York.

"In the early settlement of the West, it is true, the Mississippi was the only outlet for the products of that section, notwithstanding the disadvantage which it involved of a detour of 3,000 miles from the direct Eastern route to Europe, of a malarious climate, and the heated waters of a tropical sea destructive to most articles of food of Northern production. But the opening of the New York and Canadian canals, in addition to five trunk railways between the East and West, has naturally diverted the current of Western trade from the South to the East, and rendered the free navigation of the Mississippi a matter of secondary importance.

"Aside from military and political considerations, what the commercial exigencies of the present day demand, is increased facilities of communication with the West, by the shortest, cheapest and most practical route."

The development of the agricultural resources of the Western empire, for such it is in extent, has been due to wholly natural causes; but they have been aided materially by the artificial outlets provided by various states, and incorporated bodies likely to reap benefit from their outlay. Of these means of transporting the grain to market, and of feeding the hungry in every part of the world, the Erie canal and railroad, the Illinois Central, and, in fact, many other important lines of railway and canals afford examples in point. Another cause of the growing importance of the Great West is the steady stream of immigrants, who, taught frugality and industry by vain efforts to wrest subsistence from the ungenerous soils of the Eastern States, seek the promised land, and find their anticipations fully realized. We believe the Western country affords innumerable opportunities for enterprising and determined young mechanics to settle at various points, and contribute of their skill to make the wilderness hum with the sound of civilized life, to decorate the fertile plains with comfortable homes, to erect mills and factories of all kinds, for which the peculiar locality affords facilities; or in a more humble way assist the immigrant, as he will aid them, to establish a high grade of social and mechanical cultivation. For all of these enterprises there is scope and verge enough; and the new State of Nevada, which we learn is about to petition for admission to the Union, will afford another outlet for the surplus population of our large cities. It is necessary for the moral health of overcrowded towns that they should change their population often; so that the disaffected may reap benefit by a change of scene, and the city derive advantage from their absence. In every large vessel containing liquid, there will be dregs, and continual excitement and shaking brings the turbid element to the surface. So when political agitations upheave all classes of society, riot and mob-law strive very hard to get the upper hand. Let all such be sent to the wilds of the Western country; not among honest settlers, for these would repudiate them, but from the grizzly bear and the wolf let them learn mercy; and from the savages who yet roam the prairie, how to respect those who are helpless. Let the Judges sentence the rioters to a sojourn in the wilderness, and they will do the States more service than anywhere else.

THUNDER STORMS—LIGHTNING CONDUCTORS.

During the late "heated term" thunder storms were more frequent and the lightning more vivid than usual. Cases of buildings struck by the electric fluid have been numerous; but less damage to life and property has resulted than could have been expected. We have collected a few facts respecting some buildings which were struck, which we think will be interesting and instructive.

In the Eastern District of Brooklyn the house of Mr. Harris, in Devoe street, was lately struck by electricity, in a storm which took place at midnight. The third building from this is a high brick structure used as a manufactory, and the one next to it is a frame house, like itself, but much higher. A common opinion prevails that lightning always strikes the highest objects in the vicinity of which a storm occurs. This notion was not verified in the present case, as the lowest building in the line of three was the one struck; and the electric fluid, instead of entering by the chimney—the highest point—entered by the corner beam of the upper room. It passed along the ceiling, throwing down the plaster over and around the bed, where two children were asleep, then passed out by the frame of the window, leaving a charred hole, and breaking one pane of glass. The beam by which the lightning entered was reduced to powder; and during a small portion of the course taken by the fluid, it moved on the gas pipe, and bent down the arm of the burner, just before passing out by the side of the window. We would have conjectured that it would have passed down to the earth by the gas pipe; but, upon a visit to the house, we could not learn that even a portion of the charge had taken this course. A sulphurous smell pervaded the atmosphere after the building was struck, and a blue smoke was visible in the room, but none of the inmates were injured, and the property was but slightly damaged. Another house, in the same neighborhood, was struck a few days afterwards, which stood within forty feet of a much higher building, having several lightning conductors upon it. A similar case is related in the Boston *Traveller*, which says:—

"The house of Mrs. George Darling, of Providence, R. I., was struck by lightning during a heavy shower. A daughter of Mrs. Darling was slightly burned on one ear, but beyond this no person was injured. The house was a cottage, surrounded by higher buildings and trees, all of which were spared, in spite of the prevailing idea that lightning always strikes the tallest of contiguous objects."

Electricity discharging from a cloud to the earth, takes the best conductor and the shortest course. We have not heard of a building furnished with a sufficient number of suitable lightning conductors having been struck this season, which is favorable evidence of their utility. High buildings in the vicinity of which a thunder storm takes place, may present a more difficult course for the lightning than lower buildings; in which case the latter is liable to receive a disruptive discharge. The object of a lightning rod is to conduct the electric fluid silently to the earth; but differences of opinion prevail respecting the area that a conductor will protect. About four hundred square feet of a roof, it is considered, will be protected by a rod ten feet higher than the roof, and extending about two feet above the chimney. According to this rule, one lightning rod should afford protection to most of the houses built on city lots; and it would be well to provide each with such a safeguard. Some persons entertain the notion that metal attracts lightning, and have contended that lightning rods were more dangerous than beneficial. But metal does not attract lightning; it merely acts as a conductor, and copper, which is devoid of magnetic power, is, next to silver, the best material that can be used for a lightning rod. A copper rod of one-eighth the sectional area of an iron one will answer just as well for a lightning conductor. Lake Superior copper makes the best electrical conductor; and should be used in preference to any other metal.

PISTON SPEEDS OF BEAM ENGINES.

At one period of the science of steam engineering it was the practice to fix the limit of the speed of the piston at so many feet per minute; and from this and the other data usually taken into account—as the area of the piston, pressure of steam, &c.—the horse-power of the engine was calculated. If we are not in error, 250 feet has been set down as a standard speed for pistons; but modern engineers prefer to drive their pistons as fast as they can with safety, and to disregard rules which experience proves the uselessness of. We have, as a result, the performance of the engine of the *Golden City* (a new steamer belonging to the Pacific Mail Steamship Company). It is of the beam variety; the beam weighing upward of eighteen tuns. This engine has a

piston 105 inches in diameter by 12 feet stroke, and upon a recent engineers' trial-trip, achieved the remarkable speed of 420 feet, or 17½ double strokes per minute. We have no doubt that the engine will be able to add materially to this speed, as the machinery was entirely new, it being merely an experimental trip. This is not an isolated case, by any means. The *City of Buffalo*, formerly a passenger steamer upon Lake Erie, now dismantled for the want of trade, had an engine with a cylinder of 76 inches diameter and 12 feet stroke, which drove paddle-wheels 34 feet in diameter, whose floats had 31 inches face, were 11 feet long, and had from 36 to 40 inches dip—19½ revolutions, or 39 single strokes per minute. By a severe exercise of mathemathical knowledge, we ascertain this to be a piston speed of 468 feet per minute. We remember these facts and figures very well, as at that time we were pretty much occupied in looking after the engine aforesaid. The beam weighed nearly sixteen tuns, and was stopped and started thirty-nine times in a minute, working with great ease and certainty. The beam of a beam engine appears to some to be an insuperable obstacle to the general adoption of the class of engines to which it belongs; and its weight, momentum, velocity, &c., are charged heavily to its demerit. These theories, we fancy, are disturbed by the actual facts in the case, which are, that the beam is so poised and balanced on its center that the supposed shock of changing its line of motion is utterly neutralized; and as for the weight—that is supported by the framing, and is no more against the power exerted by the piston than the smoke stack. A beam weighing fifteen tuns, or eighteen tuns, can be moved through any portion of its arc of vibration, by the strength of a man; providing, of course, that the binders of the pillow blocks are not screwed up, and that the journals set fairly on the brass. The above cited cases of the speed of beam-engine pistons are all distanced by the extraordinary performance of the *C. Vanderbilt*, a Sound steamer, in her race, June, 1847. This engine is of 65 inches cylinder and 12 feet stroke, and on the occasion mentioned, attained to 540 feet, or 22½ double strokes per minute. It is not at all uncommon or extraordinary to obtain a piston speed in beam engines, of 400 feet per minute, in this country; but the performance of the *Golden City*, we think, is the best on record, considering the size of the cylinder.

Since writing the above, we have ascertained that all the facts just mentioned are below the mark. The *Mississippi*, a large paddle steamer, having an 81. inch cylinder and 12 feet stroke, has made 24 revolutions per minute, the wheels having 36 inches dip, and attaining a piston speed of 576 feet per minute. The *Metropolis*, a large Sound steamer, having a cylinder of 105 inches diameter and 12 feet stroke, has made 20 revolutions per minute, and we think a higher number. The working beam on the *Mississippi* weighs fourteen tuns; that on the *Metropolis* about sixteen tuns. The engine of the *New World*—a side-wheel steamboat 420 feet long, on the Hudson river, having a 76 inch cylinder, and fifteen feet stroke, has made twenty revolutions per minute, or forty single strokes. The *Richard Stockton*, however, has outstripped the whole fleet, and, we think, attained the highest piston speed for an engine of this class ever made in the world. We do not know the exact dimensions of the cylinder, but have been told it is between 50 and 60 inches, with ten feet stroke. The *Stockton* has feathering wheels, and makes 32 revolutions, or 64 single strokes, per minute; and has done this duty for years, having been built by Robert L. Stevens for the express object of testing the speed at which a piston could safely travel. This is the highest speed within our knowledge ever attained by a piston in an engine of similar size; if any other instances come to mind we shall place them on record. It would be difficult to point out any other class of marine engine of the same size as that in the *Golden City*, which could achieve 17½ turns a minute, and keep it up as a regular duty. The standard of 250 feet per minute will have to be changed, and made to suit modern pistons, as the engines themselves stubbornly refuse to be controlled by any such snail-like movement.

THE English papers state that all the winners at he late rifle matches were blue-eyed men.

PORTABLE ENGINES.

It is astonishing how mankind in general, and farmers in particular, obstinately adhere to the traditions and usages of the past. We allude at this particular time to the substitution of machinery for hand labor. While agricultural implements of all kinds are having a fair trial, we think it not amiss to say a word here in favor of the power that drives these machines—that much-abused animal the horse. We have assumed, broadly, that in most instances the horse furnishes the motive power. This assertion is, we believe, the fact in the case; and it is a state of things which might be changed for the better by the adoption of the steam engine. A machine of this class can be had for about the same price that a pair of first-rate horses will cost; with the advantage that it has, stored up within its brass and iron muscles, the force of three teams; and that it never tires, as flesh and blood does. Not only is this true, but the cost of keeping a pair of horses and that of running a steam engine of two horse power, is not to be compared for an instant. For it must be recollected that the engine will do the work in half the time required by an animal: that it consumes only when actually at work; and is not "eating its own head off" when the earth produces nothing, and man rests from the labor of the summer.

It is our opinion that in every instance where a stationary power can be employed, steam will be found preferable to any other that is used for farming purposes. With the same degree of intelligence that will keep a pair of horses from being ruined, or injured in body and health, the steam engine can be run and kept in order; and as the latter can be wheeled from place to place, there are but few localities where it could not be advantageously introduced. In rocky and hilly countries, in new land—where stumps spread out their roots, and neither use the ground themselves, nor permit the farmer to do so—the steam engine, aided by the proper tools, would soon subdue these intractable obstacles, and clear the way for the seed that comes after.

We think it would be a profitable speculation for some enterprising farmer to introduce a portable engine to his neighborhood, and let it out to his neighbors at a nominal price, so that its practical advantages would be manifested to the most prejudiced person. We are not so enthusiastic as some on this subject; we do not foresee the time when every farmer shall have his portable engine, just as certainly as they all have churns; for such a state of things would be unadvisable. But we do think that for all the rough work about a farm (and of this there is plenty) steam power would be much more efficient and economical than any other in use: and we hope to see sufficient enterprise manifested to enable us to chronicle the advent of many more engines than there are at present on the large farms about the country.

PERPETUAL MOTION.

The Boston *Journal* publishes a letter from a correspondent at Newport, Vt., who describes a "perpetual motion" machine, on exhibition at that place, and states that it is attracting great attention. Mr. Leach, of Vermont, claims to be the inventor. The writer says:—

"It is a simple wheel, runs on gudgeons, and is independent of any outside spring, weight, or power, as a propeller. On the same axle on which the metal wheel is fixed, is a band wheel, on which a band runs over a small pulley that drives a small circular saw. Set it on a table and remove the brake, and it will start itself and run with great velocity, driving the saw. It is the simplest thing in the world, though I cannot intelligibly describe it; but it is at once understood by the beholder. It will not, nay *cannot*, stop without a brake, as it is so fixed by means of balls and arms, that the *descending* side of the wheel is perpetually further from the center of motion than the opposite *ascending*. The most incredulous beholder here is at once convinced, on seeing it, that a wheel can be made its own motive power. The model runs on and runs ever. It is a small wheel, ten inches in diameter, with ounce balls attached to movable arms. Whether an increase in the dimensions of the wheel will increase its power in proportion, remains to be tried; but one thing is certain, it will make Mr. Leach, who is poor, a wealthy man. It is no cheat, no humbug, no Yankee trick, but a stubborn and fixed fact; and ere long the world will be convinced that the principle of perpetual motion ever existed, and has now been discovered by a Green Mountain boy."

It is evident from the above that the fools are not all dead yet. When the laws of nature are so far reversed that water will flow up-hill, instead of down—when men can lift themselves by pulling upon the seats of their pantaloons—then, and not till then, will wheels manufacture their own motive power.

The above device *is* a cheat and a humbug. In principle it is the same as the "perpetual motion" of Willis, exhibited in this city about seven years ago, of which an engraving may be found on page 201, Vol. XI. (old series), SCIENTIFIC AMERICAN. A concealed bellows was the motor in that case, we believe. Several contrivances on the same plan were subsequently exhibited at Barnum's Museum. This Vermont show is probably one of them. Many people have been gulled by these perpetual motions; but we never knew that any of the "gay deceivers" who manage them, have made fortunes. It is to be hoped not, at any rate.

PRIZE EXHIBITION OF FARM ENGINES.

For several years past, much attention has been directed, in England, to improved steam engines for farmers; and an exhibition of such motors was lately held by the Royal Agricultural Society, at Worcester. On this occasion the engines were divided into two classes, namely, fixed and portable. Seven of the first order, none of which were to exceed 10-horse power, competed for prizes. Their power was tested with a friction brake, and a certain quantity of coal was weighed out to each. The amount of coal consumed per horse-power ranged from 4.88 lbs. to 15.32 lbs. per hour. The one which consumed the least coal gained the first prize of £15 ($75).

No less than nineteen portable engines competed for prizes. They ranged from 4 to 12 horse-power, and were divided into three sections, according to their size. The consumption of coal, per horse-power, ranged from 3.59 lbs. to 13.28 lbs., per hour; and the prize, of £10, was awarded to the one which consumed the least fuel. In all the trials, the small engines consumed a proportionally greater amount of fuel than the large ones. The price of each engine was given in to the prize committee. The one which gained the first prize was valued at £230 (about $115 per horse-power). The price of the smallest was £85 (a 4-horse power.) The boilers of all were of the tubular character, and each engine was so constructed, according to the conditions of trial, that it could be easily taken apart, and its valves and pistons inspected. The judges of these trials were, D. K. Clarke, C. E., inspector of machinery in the International Exhibition, and author of a work on railway machinery, G. V. Gooch, C. E., J. Stewart and J. Easton, railway engineers.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

The following persons have applied to the Commissioner of Patents for the extension of their pattents for a term of seven years:—

Method of fitting the Heaving Socket and Head of Windlasses,—Charles Perley, of New York city, obtained a patent on the 13th of November, 1849, for a method of fitting the heaving socket and head of windlasses. The said Charles Perley now prays for the extension of the patent.

Binder Pulleys for Belts and Brakes.—Mertoun C. Bryant, of Lowell, Mass, obtained a patent on the 13th of November, 1849, for an improvement in binder pulleys for belts and brakes. Caroline Bryant, executrix, of Lowell, Mass., now prays for the extension of the patent.

The testimony on the above applications will be closed on the 12th day of October next; depositions and other papers relied upon as testimony, must be filed in the Office on or before the morning of that day.

Looms for Weaving Figured Fabrics.—Moses Marshall, of Lowell, Mass., obtained a patent on the 11th of December, 1849, for a loom for weaving figured fabrics, and now prays for the extension of his patent.

The testimony will be closed on the 9th of Novem-