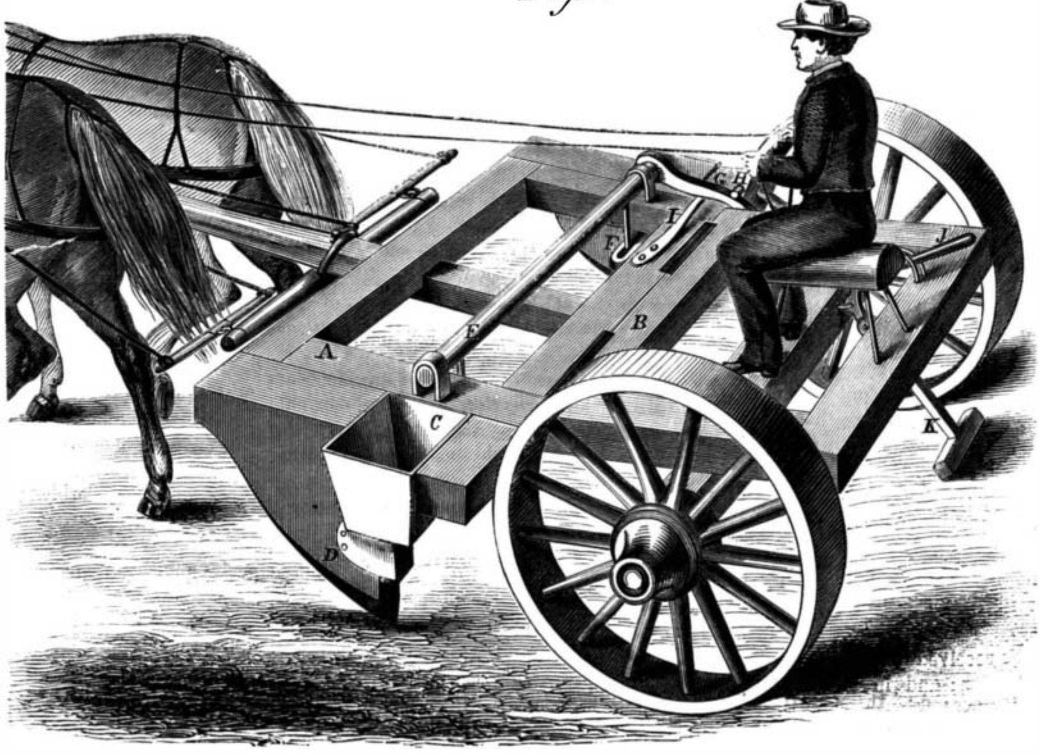
Improved Corn or Seed Planter.

The labor and time occupied in seeding ground is well known by practical persons to be very great; and since the introduction of machinery to perform this duty it has been much facilitated. The engravings published herewith represent a new corn-planter, for which a patent is now pending through the Scientific American Patent Agency.

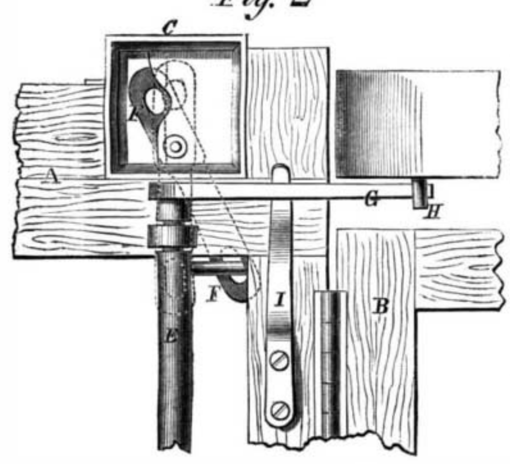
The plan of the machine consists in providing a rectangular frame, A, with a second one, B, mounted on wheels and secured by hinged joints to the first one mentioned. In A the seed boxes, C, are placed, as also the automatic arrangement for opening and closing the apertures in the bottom of the seed hoppers, through which the grain falls into the track made by the drills, D. The seed-distributing machinery consists of an iron shaft, E, working in bearings, and having two vertical arms which are connected to a vibrating slide (see Fig. 2), F, in the bottom of the seed box. The shaft has also a horizontal arm, G, which is driven by two or more pins, H, placed at equal distances in the rim of the wheel. It will be seen that by this arrangement the pin strikes against the arm and depresses it, and in so doing moves the slide, F, to one side, so that the corn or other grain falls out. After the pin passes over the lever the same is restored to its position by a small spring, I, on the under side. When the driver has traversed the whole field and wishes to retrace his ground in order to plant a second row in line with the first, the machine is turned about and brought into the proper place; at this time the lever behind the driver's seat is brought into requisition. In order to make the planting begin at the proper time the pins must strike the lever at a certain point; to do this the driver raises the lever, J, which throws the T-headed bar, K, down on the ground and raises the wheels clear; they are then to be turned by hand until the pins are in the proper position to commence work. By the arrangement of these several parts a convenient and simple machine for planting grain of any kind, and at all distances apart, is secured.

Fig. 1.



M'KELL'S CORN OR SEED PLANTER.

Fig. 2



For further information address the inventor, James McKell, at Burlington, Iowa.

We learn from a foreign contemporary that the 9-inch cast-steel gun of Krupp has pierced two 4½-inch iron plates bolted together. One of the guns burst at the 69th round. The weight of the projectile, as also the range and charge of powder, is not stated.

AMERICAN CAST-IRON ORDNANCE.

The appended letter (cut from the Philadelphia *North American*) contains some interesting information concerning the progress our founders are making in the matter of combining iron ores, so as to produce the greatest possible tensile strength. The name of a Reading firm appears rather too prominently, but for the sake of the information we are glad to reprint the article:—

"The manufacture of heavy ordnance for the army and navy of the United States, recently commenced on a somewhat extensive scale in this city, has been attended with such favorable and extraordinary results, and is so likely to be associated hereafter with the most important manufacturing interests of the commonwealth, that I am induced to forward you for publication some of the main facts and features of the enterprise. For these facts I am indebted to a very intelligent gentleman who has for some time been connected officially with the deputation sent here by the Army Bureau to conduct the experimental tests of the strength of the ordnance produced, and I deem them of such importance as that a record should be made of them for the information not only of our own people, but for whatever satisfaction may be deduced therefrom by those of foreign nations, whether friend or foe.

The first trial of the iron of this county for ordnance was made in 1861, under an informal contract between the Chief of the Naval Ordnance Bureau and the firm of Seyfert, McManus & Co. As they had not, at that time, completed their arrangements for the regular manufacture of cannons, they sent the metallic material to Philadelphia, where a 9-inch gun was cast and sent to Washington, to undergo the usual proof-tests to which all classes of ordnance are subjected. This gun was tried 600 rounds with a service charge of 10 pounds of powder, and with shells weighing 69 pounds. The charge was then increased to 12½ pounds of powder, and a corresponding increase of the weight of solid shot, with 500 additional rounds. This series of discharges was made with great rapidity, with a view of imposing an additional test of capacity—reaching as high as 196 rounds per day. The experiment was so entirely successful and satisfactory that Admiral Dahlgren, in his report, mentions the gun as one of extraordinary excellence.

"In the meantime, Messrs. Seyfert, McManus & Co., were erecting the necessary machinery for the regular manufacture of similar guns at their own foundry; and contracts for fifty 9-inch and fifty 11-inch guns were subsequently obtained, and the cannon manufacture was thus, for the first time, regularly commenced in this city.

"As guns of all classes and caliber are required to be tested, it is the practice to select one which combines certain fixed data of density, tensile strength, &c., and subject it to what is termed extreme proof. It is assumed that all other guns made of the same iron, and under circumstances precisely similar, will exhibit the same peculiar strength and qualities; and this rule holds good so far in experience that deviations from it are extremely rare and exceptional. In accordance with this rule an 11-inch gun was selected, and under the supervision of the authorized agents of the Navy Department, was subject to the same ordeal, with the following extraordinary results. One thousand (1,000) rounds were fired, with service charges of 15 pounds of powder and shell weighing 132 pounds. Subsequently the charges were increased to 25 pounds, and solid shot weighing 164 pounds, and the gun withstood the enormous pressure of 127 rounds, when it burst. This was a test which would never have been required or attempted in actual service, and probably has but few, if any, parallels in the history of cannon.

The famous attack of the rebel iron-clad *Merrimac*, and the destruction of our wooden naval vessels, and her subsequent defeat by the first monitor, initiated an entire revolution in naval combats. Iron-clad vessels, propelled by steam, and carrying two or three guns, of very heavy caliber, have since taken the place of our wooden (armed) sailing vessels, with their broadside bottoms. To meet the exigencies of this radical change in the armament of our navy, the Bureau of Ordnance gave orders for three thirteen-inch guns to be made; one at Providence, R. I., one at Pittsburgh, and one at Reading. These guns were of the same size, weight and dimensions, made in accordance to diagrams and instructions from the Naval Bureau, excepting that of Providence, which was cast solid, while the other two were cast upon the plan of Major Rodman, U. S. A.—that is hollow, or on a core, as it is termed. When finished, however, the guns were required to conform to the size and dimensions specified in the diagrams of the Bureau, so that in that respect no difference existed between them. The length of the guns, as finished, was from cascabel to muzzle, 13 feet 6 inches; diameter at breech, 3 feet 9 inches; at muzzle, 2 feet 4 inches; caliber, 13 inches; length of box, 10 feet 10 inches; estimated weight, 37,000 pounds.

"Now, let us witness their qualities. The Providence gun was tested in that city by an experienced ordnance officer. Commencing with a charge of thirty pounds of powder and 280 pounds of solid shot, ten rounds were fired. With forty pounds of powder and same shot, ten rounds more; with fifty pounds of powder, and shot same as before, 158 rounds more—finally bursting on the one hundred and seventy-eighth round. (Illustrated on page 324, Vol. IX. of the Scientific American.) The greatest enlargement after the first ten rounds was the 89-1000ths of an inch; after ten rounds, 127-1000ths of an inch; after the one hundred and seventieth round, 150-1000ths of an inch.

"The Pittsburg gun was sent to Washington, and no authentic details of its proof have been received; but it is sufficient to state that, while undergoing trial, the bore became so terribly scored by the abrasion of the balls that it was considered unsafe to prosecute the experiments within the limits of the navy-yard, and it was consequently removed to some point down the river, where it burst into fragments at the one hundred and fiftieth round, or thereabouts.

"The Reading gun was proved near this city, under direction of the Navy Department. It has fired five hundred rounds with fifty-pound charges of powder, and with solid shot weighing 280 pounds. Its greatest enlargement during this enormous test was 87-1000ths of an inch; and there is not a visible defect to warrant a doubt of its capacity for another five hundred rounds. It is safe to declare that no gun in this or any other country has ever been subjected to and withstood a severer test.

"The guns made here are fabricated from an iron composed of hematite and magnetic ores, obtained in the vicinity of Reading. The magnetic oxides occur in the range of mountains known in Virginia as the Blue Ridge, and on the Susquehanna as the Conewago hills. The iron is associated with silex and feldspar, and generally occurs in rocky veins. When it is free from sulphur, and mixed with suitable proportions of hematite, it produces iron of the highest quality, and adapted for almost any desired purpose. The magnetic variety is what is termed a neutral ore, and makes iron of extraordinary strength and hardness, which may be modified at pleasure by the introduction of hematites. The success achieved in the manufacture of ordnance has created an unusual demand for that particular variety of metal, and it is eagerly sought for, not only by the gun foundries of Pittsbugh, Trenton and the East, but also by the manufacturers of wire, screws, cutlery, and every variety of iron requiring peculiar strength and hardness. Indeed, large quantities of the raw ore have already been sent to remote points—in some instances they have been hauled a distance of fourteen miles by wagons, and then shipped by railway a distance of 360 miles to be smelted. These facts indicate not only the local value of the iron mines tributary to Philadelphia, but would seem to justify the expenditure of large capital to manipulate them into the different manufactories now successfully carried on in distant regions under the stimulus of a more enterprising spirit.

"I may add, in conclusion, that the credit of making the strongest gun ever cast in the world belongs mainly to James McCarty, of the firm of Seyfert, McManus & Co. It was through his experiments in securing a proper combination and treatment of ores that the highest strength was secured to the metal; and although the task would now appear to be simple enough, yet at the outset it involved a vast amount of patient labor and research, the benefit of which will ultimately accrue no less to his fellow-countrymen than to himself. ELI BOWEN."

DEFECTS OF THE BRITISH IRON-CLADS.

We republish the following sensible remarks from an editorial in *Mitchell's London Steam Shipping Gazette* :—

"For sea-going ships the deck battery is a defect, for, no doubt, such vessels would roll badly. The weights could not be properly distributed. They would lie much better with the addition of guns between decks. No better specimens of war ships have ever been constructed than the two rams built by Messrs. Laird at Birkenhead. These vessels are armor-plated from bow to stern, and have projecting beaks. If one of them were to steam bow on to the *Warrior* or *Black Prince*, she would probably crack the unprotected hull of these big ships under water like egg-shells.

"We believe there is not a perfect iron-clad yet commissioned in the Royal Navy. All the partially-armor-plated vessels must roll in a seaway, and then they expose common iron-built hulls below the load-line, with screw propellers inviting well-aimed shots. No nation has succeeded in solving the problem of turning out vessels quite impenetrable and yet lively at sea. Our *Warrior* class are certainly magnificent ships, but they are expensive ones. They all leak badly, and require constant docking. The *Minotaur* and *Northumberland* carry their armor plating from bow to stern, but they are propelled by one screw, and are not adapted to attacks in shoal water, from their great draught. Mr. Reed, the Constructor of the Navy, has designed a new class of ship which, we suspect, will be found suitable for sea-service; and, as he is not wedded to ancient ideas, he may yet improve our fleets by attending to the suggestions and advice submitted to his department, and keeping pace with the advanced notions of those who give their attention to naval architecture."

Correspondence

Laplace's Correction for the Velocity of Sound.

MESSRS. EDITORS:—I wish to place on record in the SCIENTIFIC AMERICAN, a single numerical result of experiments made on a cubic foot of air, and repeated a score of times, from 1852, up to present date, 1864, for the purpose of verification. I wish to place it on record, because I know the attention of several European physicists is directed to this point at the present time.

Experiment.—A cubic foot of air was heated from 32° to 522° under constant pressure, thereby doubling its volume by expansion, and raising 144×15=2,160 lbs. 1 foot high. The same cubic foot of air was afterward heated from 32° to 522° under double pressure, and with a constant volume.

Now, in these two experiments, the quantity of matter heated is the same—one cubic foot of air; the range of temperature is the same—490°; but the quantity of heat imparted is not the same in both cases. The quantity applied, when the pressure is constant and the volume variable, is to the quantity applied when the pressure is variable and the volume constant, as—1·41724 : 1·00000.

In other words, 0·41724 additional grains of combustible matter were consumed in producing heat that lifted 2,160 lbs. 1 foot high. I wish to place this result on record, for the ratio of the two specific heats used by Laplace in his correction of Newton's formula for the velocity of sound, and also used by Meyer, Dr. Tyndall and other eminent physicists, for computing the mechanical equivalent of heat, is 1·421.

When Newton calculated the theoretical velocity of sound in air by means of the formula

$$v=\sqrt{\frac{e}{d}}$$

in which v represents velocity, e elasticity and d density, both at zero; he found that it differed from the observed velocity by about one-sixth of the whole amount. In this calculation, Newton only considers the changes of elasticity due to changes of density; but Laplace accounted for this deficiency by assuming that the effective elasticity is augmented by changes of temperature produced by pressure in the condensations and rarefactions of sonorous waves. So that, according to Laplace, the effective elasticity must be multiplied by the square root of the quotient obtained by dividing the specific heat of air at constant pressure by its specific heat at constant volume.

But since the ratio was then not known by actual experiment, Laplace reversed the process of his calculation, and deduced from the velocity of sound, which had been well determined, the ratio of the two specific heats, which he found to be 1·421. The excess of 0·421 is now used to express the amount of heat consumed in external work, when the air is allowed to expand under constant pressure. And from this number also is deduced the mechanical equivalent of heat. But my own direct experiments with a cubic foot of air (made with great care, under favorable circumstances and with the best instruments) prove that this excess is too much; the correct value is between 0·417 and 0·4173, and the average is 0·41724.

Laplace's correction is purely inferential, and its correctness depends on the assumed value of the velocity of sound *with no allowance for radiation.* Although air is practically a vacuum, as regards the radiation of heat, and has no sensible power to neutralize, by radiation, the differences of temperature in the condensed and rarefied portions of a sonorous wave; yet the vapors mixed with the atmospheric elements —in the lower strata of the atmosphere especially, where the velocity of sound has been tested experimentally—are competent to neutralize this difference, because they have been proved to possess a sensible power of absorption and radiation. They will, therefore, so far diminish that portion of the elastic force on which Laplace's correction depends, that a less ratio for the two specific heats must be deduced from the velocity of sound, and more in accordance with the ratio I have deduced from direct experiment—it must be nearer 1·41724 than 1·421.

Dr. Tyndall's recent experiments on the radiation of vapors in the atmosphere, cited in his recently-published work on "Heat as a Mode of Motion," and his anticipations in the form of a "note" in the *Philosophical Magazine*, coupled with the published views of other eminent physicists, all lead to the expectation of a correction in Laplace's formula, and a slight diminution in the excess (0·421) which his formula gives, which deduction is due to radiation from every condensed portion of a sonorous wave. Direct experiment with atmospheric air is the only satisfactory mode of settling this question; and my experiments, made for this very purpose, and often-times repeated, prove that the ratio of the two specific heats for condensed and rarified air is as 1·00000 to 1·41724.

S. BESWICK.

Brooklyn, N. Y., January 30, 1864.

Ventilation of Public Buildings.

MESSRS. EDITORS:—I presume that there are very few who have not suffered from the inconvenience of ill-warmed and poorly ventilated public buildings, but more especially churches. When these last are of modern construction and high in pitch, open timbered and with lead sashes, it is a difficulty to treat them; and this difficulty, particularly in country places, is rarely overcome. I have recently furnished the plans for a building of this kind, and the method of warming and ventilating that I have adopted has proved so efficacious and is withal, I believe, so novel, that I am led to offer in your columns a description of it for the benefit of others.

The building that I had designed and purposed warming was a church of the usual cruciform style, having a nave and transept. The whole length of the nave in the clear is 82 feet, while the arms or transepts are 12×30 feet; the hight of roof to ridge, 32 feet; the side walls, 12 feet. My plan was to do away with the great absorption of heat in the mass of masonry usually surrounding a furnace, and to take the whole space under the church for a hot-air chamber. The foundation was well laid and the wall closely built, making all tight up to the sills. I caused the ground to be excavated under the cross section to the depth of 8 feet, and about the same size as the transept; thus making under that part of the building a room of 11×24 feet. From this the ground was excavated on an inclined plane up to the extreme end of the church, where the distance from the floor to the ground was about 18 inches. The entrance to this room was from the end of the building near the transept, in which, as usual, was a door under the floor. Into this space below, two chimneys (carried up through the wall) entered and carried up the smoke of two large-sized "box stoves." These stoves had pipes of some twelve feet in length, to secure the transmission of all the heat ere entering the chimney. Directly over the stoves two openings in the floor formed registers, 4×3 feet, capable of being opened or closed at pleasure. Then in all the seats, at such distance as the feet of persons sitting or standing would come, there were bored in the floor with an inch auger, five holes, in diamond form, making a kind of small register to each person.

The system of heating is this :—The inclined plane of the ground under the floor, through the whole length of the building, acts as a *descending* grade for the cold air dropping through all these numerous apertures in the floor. The cold air flows down and is drawn toward the stove in the chamber, either for combustion or heating. The hottest air meantime, passing directly up through the large opening over the stove, ascends into the building and aids in pressing down the colder air falling through the other apertures. The result is that the building is heated with great rapidity; two or three hours sufficing for doing what an ordinary furnace would, by mere radiation or compression, require six or seven hours to accomplish.

When the time for divine service has arrived and the congregation have assembled, the registers over the stove are to be closed and the process thus far going on is in a degree reversed : the warm air then flows *up* the inclined plane pressing against the floor and rising through the numerous openings, to the feet and clothes of the individual seated or standing above, effectually warming them. By this contrivance the air above, instead of being much (as usual with one column of furnace heat) hotter than that around