most energetic, is the one that will win against all obstacles. Though the hills be levelled to the earth, and the forests be left smoldering piles, good shall come out of it. For where the wilderness made the earth desolate, villages shall smile, and mills hum where savages lurked. The fables of the Arabian nights are idle tales, but the deeds which modern ingenuity achieves are not less less wonderful, while they advance the interests of mankind.

MAKING SIRUP FROM CORN.

"A German chemist has discovered a process of making sirup from Indian corn—not the stalks but the grain. He gets between three and four gallons from a bushel, and it is worth $1 50 per gallon. A company has been formed to erect an establishment at once, and put the process in practical operation. All the stock is taken, two of our leading sugar dealers having subscribed $50,000 each, and others who are anxious to invest in the enterprise are unable to get a chance." Such is the story which is now being told by men of the highest respectability in this community.

Perhaps all this relates to something new, and perhaps not. If the German chemist spoken of has discovered a cheap process of making cane sugar from corn, he has made one of the greatest chemical discoveries of the age, but if he is merely changing starch into grape sugar he is accomplishing nothing more than has been done ever since the origin of the art of making fermented liquors from grain.

All of our grains contain a large proportion of starch, that in Indian corn being from 64 to 80 per cent. Starch can be converted into grape sugar by several methods. The cheapest and most common is by sprouting the grain. The sprout comes out of the end of the grain and turning back grows along its side. It is found that as the sprout grows, the starch opposite to it in the grain is changed into grape sugar. This process is employed in malting. In malting diastase is produced, and this substance has the property of changing starch to grape sugar. One pound of diastase will convert 1,000 pounds of starch into sugar.

Another method of converting starch into grape sugar is to steep it in dilute sulphuric acid, in the proportion of 10 parts of acid to 1,000 of water and 500 of starch. In this way there is no difficulty in obtaining pure grape sugar from pure starch. This is practised as a commercial industry in France and Germany, the sugar being used principally for adulterating cane sugar.

Grape sugar is that which is found on raisins. It is far less sweet than cane sugar; the proportion of its sweetening property being stated at about one-third.

Grape sugar can be made from cotton and linen fiber, and from wood, as well as from starch, by the same process of steeping in nitric or sulphuric acid. Last winter Prof. Seely, of this city, made quite a quantity from waste paper and saw-dust.

Cotton, linen, and wood fiber, starch, gum, and grape sugar are composed of the same elements, carbon, oxygen, and hydrogen, combined in the same proportions with a minute quantity of water, and hence it is not strange that they should be convertible into each other.

PURIFYING GAS BY OXIDE OF IRON.

When bituminous coal is placed in a close retort so as to be shielded from contact with the air, and its temperature is raised to a bright cherry red, it is decomposed, and its elements re-combine to form a great number of new substances. Among these are light and heavy carburetted hydrogen, and a number of volatile hydro-carbons, which mingled mechanically together constitute illuminating gas. There are also a number of hydro-carbons which by being cooled are condensed in the form of tar. Besides these, three gases are formed which will not condense in cooling, and which are so offensive and deleterious that if they could not be removed they would render coal gas unfit for use in our dwellings; these are ammonia, carbonic acid, and sulphuretted hydrogen. Fortunately ammonia has so strong affinity for water hat it is only necessary to expose the gas to a large surface of water to have all of the ammonia absorbed. Both of the other two impurities are eliminated by passing the gas through several thin beds of lime.

This is the plan in general use in this country, but in England a different method of extracting the sulphuretted hydrogen has been invented, and is rapidly extending. This consists in substituting for lime the hydrated oxide of iron.

Le Gaz says when sulphuretted hydrogen is brought in contact with hydrated oxide of iron both compounds are decomposed. The oxygen leaves the iron to combine with the hydrogen, and the sulphur combines with the iron, forming sulphide of iron. Consequently oxide of iron is an efficient medium for purifying illuminating gas of sulphuretted hydrogen. But the cost of oxide of iron would have precluded its use for this purpose were it not for the fact that by exposure of the sulphide of iron to the action of the atmosphere it is again converted into oxide of iron—the oxygen of the atmosphere displacing the sulphur. This action is sometimes so rapid as to heat the iron red hot.

It is only necessary, therefore, to expose the iron to the action of the atmosphere for it to become ready for use a second time; and thus it may be employed 30 or 40 times. The sulphur displaced remains mechanically mingled with the mass, increasing its weight by repeated use finally to the extent of 30 or 40 per cent.

The oxide of iron is employed in the form of coarse powder mingled with saw-dust, and is spread in beds 12 to 18 inches in thickness, in purifiers similar to those in which dry lime is employed. The gas must finally be passed through one thin layer of lime to take out the carbonic acid.

SECOND TRIAL OF THE 1,000-POUNDER.

A correspondent at Fort Hamilton sends us a full description of the first trial of the 20-inch gun, substantially the same as that already published, adding, however, the statement that at the last fire with 100 pounds of powder and 1,080-pound shot, and 25° elevation, the time of flight was 24 seconds, and the range between 3½ and 4 miles. He then says:—On the 27th the trial was continued. One charge was fired with 100 pounds of powder and 1,080-pound shot, elevation 0°, recoil 6 feet 10 inches; second, 125 pounds of powder and 1,080-pounds shot, elevation 0°, recoil 7 feet 5 inches; both shot fell about 600 or 800 yards distant; the first richocheted eight times, the second only five, owing to the rougher surface of the water. But one difficulty appeared; this had been anticipated; the common friction primer was not sufficient to drive a flame through so long a channel of metal; the flame was chilled before it reached the powder. This caused a delay the first day, the vent having to be filled with fine powder to effect the discharge. This was obviated on the second day by a simple contrivance; the top of the vent was drilled out and tapped to receive a plug, over which were fitted two semi-cylinders which contained the friction primer with a small magazine filled with powder attached to it, over all was slipped a metallic ring to keep it together; this effected the desired result.

This gun is not to be fired again until some preparations are made to try the effect of the shot on a vessel which will be anchored at point blank range.

NEW BOOKS AND PUBLICATIONS.

THE AMERICAN CONFLICT. By Horace Greeley. J. G. Derby, General Agent, 5 Spruce street, New York.

When peace shall be restored to this now distracted country, when the great questions at issue are put to rest forever, there will be many who will wish to know the cause, the course, and the complete history of the events which are now transpiring. Truly, as has been often said during this struggle, we are making history; but even the lover of his country, not counting the half-hearted or the indifferent, is busy buying and selling, and knows nothing of what is transpiring in war except as he reads the daily journals, or sees eager crowds jostling each other at the bulletin boards.

It is to his countrymen that Horace Greeley addresses himself, though the work is dedicated to John Bright; and the great demand for the book proves the interest taken in it. In the usual preface, which Mr. Greeley, with a touch of humor, styles "Preliminary Egotism," the scope of the work is shadowed forth. The author says therein: "What I have aimed to do is so to arrange the material facts, and so to embody the more essential documents, or parts of documents, illustrating these facts, that the attentive intelligent reader may learn from this work, not only what were the leading incidents of our civil war, but its causes, incitements, and the inevitable sequences whereby ideas proved the germ of events."

Much more is also added, but this must suffice. From the first volume sent us we find that the performance is equal to the promise, thus far, and although the illustrations are not the best, still there is a fund of information upon the great rebellion which is invaluable. O. D. Case & Co., of Hartford, Conn., Publishers.

THE ROCKS IN WHICH PETROLEUM IS FOUND.

For the Scientific American.

MESSRS. EDITORS:—In Vol. III. (New Series), page 270, you published an article by me on the geological distribution of petroleum in the United States. Inasmuch as the most crude and erroneous notions and opinions still prevail, and are inculcated upon this subject, leading to vain expenditures of time and money, and vexatious looking for similarity in geological strata, where none can possibly exist, I wish in the present communication to enlarge upon this subject, and show how fully the geological science of our country has been sustained by the oily developments of the last five years.

The lowest geological horizon, or stratum, in which petroleum is found of commercial importance, is in Canada, at Enniskillen, near Lake St. Clair. The oil is in the corniferous limestone, which is largely composed of fragments of corals, with sea shells cemented together. The cavities of these corals and sea shells are often filled with liquid bitumen, which distills from them, as can be seen in the walls of the Second Presbyterian Church, in Chicago. This limestone in the United States is in its maximum about 350 or 400 feet thick. Immediately overlying the limestone is the marcellus shale, which is so highly charged with bitumen as to lead to great expenditures of time and money in vainly looking for coal in it. It is about 50 feet thick in Canada. These two rock formations, then, which in Canada are not over 150 feet in thickness, are the reservoirs, holding rock oil, however and whenever formed, in that country.

Ascending in the geological scale, and passing over into New York, the next stratum of rock yielding bitumen, oil and gas, is there known as the Hamilton Group, about 1,000 feet thick. The oil springs of Western New York, along the banks of its numerous lakes, are mainly in this group of rocks. They have as yet yielded oil only in small quantities for medicinal purposes. But they afford ample scope and verge for exploration.

Above this group succeed black shales, known as the Gennessee Slate, 300 feet thick. The wells of Mecca, Ohio, and others of that region are most probably in this rock. Above the Gennessee Slate comes in the Portage Group of slates and sandstones, 1,700 feet thick. The deeper weels of Oil Creek, Pa., will reach the sandstones of this group.

Still above lie the rocks of the Chemung Group, which are mainly composed of thin-bedded slates and limestones. In its maximum it is 3,200 feet thick, but in Western New York and Pennsylvania it is much thinner, being only about 1,000 feet thick. Much of the oil of Oil Creek is from this group; 400 and 500 feet of it are seen in the cliffs and hills of Oil Creek, the Alleghany River and its tributaries above, and in Venango County.

Measured in the maximum development of all the rocks enumerated we find between the oil of Canada and Venango County, Pa., 6,000 to 7,000 feet of sedementary rock, all of which bear the appearance of having been deposited in sea water. The entire group of rocks enumerated are known as the Devonian Series in England. The oil springs of Eastern Canada and New Brunswick, along the Gulf of Newfoundland, are in the upper members of this series.

In treating of a subject of so vast importance as the one under discussion, and which is now so largely engrossing the monetary circles of our country, and giving to one State from production and manufacture a sum total of $51,000,000—the growth of the last five years—we should enlarge our scope of observation and corresponding powers of analyzing and generalization.

Leaving for the present those portions of the United States where oil has been most successfully found, and before coming into the geological strata of the thick and heavy oils, we have on the eastern flanks of the Appalachain Mountains, in Pennsylvania and Virginia, 5,000 feet of the Catskill group of rocks. (Ponent of Prof. Rogers.) Lapping around the southern outcrop of the coal measures of Tennessee, Kentucky and Illinois there are 200 feet of the lower carboniferous and 3,000 feet of the middle carboniferous. (Umbral of Rogers.) A total in the aggregate, as measured in Nova Scotia and the United States, of 1,500 feet. Throughout the whole of the series oil and gas springs are found.

We now come into the true coal measures. These are divided into lower, middle, barren measures and upper, a total of the bituminous portion of 2,500 feet. The lowest member of the coal series caps the highest hills, near the mouth of Oil Creek, and lies about 600 feet above the bed of the creek, or 1,300 feet above the third sand rock, which is the most abundant oil-producing stratum.

At the Kiskiminetas, Slippery Rock, Butler Co., Pa., Beaver & Smith's Ferry, oil is in the lower coal measures—800 feet thick. High up the Kiskiminetas and on the Monongahela River, oil is found in the middle coal series 1,000 feet thick. At Marietta, Ohio, and in the oil region around the strata of the upper coal are the productive series.

To conclude, then, oil is found through 24,000 feet of rocks, as measured vertically in the geological scale, and geographically from Nova Scotia to Lake St. Clair, and from Virginia to Tennessee River. The geographical area, covered by the oil-bearing group of rocks in the United States, Canada, New Brunswick and Nova Scotia cannot be less than 200,000 square miles.

Over this area, wherever oil and gas springs are found, there we may reasonably hope for success in boring deeply for oil. But oil and gas springs are not always sure indications of subterraneous supplies of oil in their immediate vicinity, for the course the fluids may have pursued from deep depths to the surface may have been very tortuous. Neither is the absence of such springs absolute negative proof of oleaginous accumulations beneath, for in many very notable instances, such as the lower portion of Oil Creek, and at Smith's Ferry on the Ohio River, very copious fountains were struck where no surface signs were visible.

I deduce the following practical and economical conclusions:—

First, Each widely-separated locality must be governed by its own laws as developed by boring and observation.

Second, Each geological horizon or stratum of oil-bearing rock received its supply, not from another, but from causes operating at the time of its own deposition.

Third, There is not now any reproduction of oil, but we are drawing from fountains filled of old.

Fourth, No stratum of rock is so thoroughly saturated with oil as to form a subterranean sheet or belt of rocks where petroleum is surely to be found, but in frequently isolated cavities, or fissures, at various depths and of various sizes, and containing diverse grades of oils. R. P. S.

A NEW ELECTRIC ANNUNCIATOR.

Mr. Thomas Taylor, of Washington, D. C., has sent us a description of a new annunciator, which we publish below. He says:—

"I was invited the other day by a friend to witness a few experiments in the telegraphing line, by means of a very simply-constructed device, and named by the inventor, 'Electric Annunciator.' It is on private exhibition at the Smithsonian Institute, Washington, and was constructed and invented by Mr. John Blackie, recently of Scotland. The object of this invention is to enable the pilot of a vessel to communicate with the engineer or helmsman, whereby prompt and efficient orders may be transmitted. One most valuable feature of the device consists in the fact that every movement of the rudder is made known to the pilot or Captain in their respective apartments, day or night. The *Great Eastern* was in the trough of the sea ten hours before the Captain was aware that the shaft of the rudder was broken. The value of this instrument may be inferred from the fact that the annunciator would have informed him the moment the accident occurred; for it not only informs the pilot of the Captain's wishes, but also communicates the pilot's orders to the engineer and helmsman. Further: it informs the Captain whether his orders have been obeyed; the rudder itself giving the information by means of a different galvanometer. When the pilot sends an order he presses a knob and a bell rings, meaning attention. The engineer looks to the index, which resembles a clock face, on which are printed the 5 general orders used, viz:—stop; ahead easy; ahead full speed; back easy; back full speed. The pointer indicates the order, and always remains at the last, and is locked. The device by which the pilot transmits his orders to the engineer is constructed as follows:—First, there is a dial on which the five orders described are printed. A pointer, like the hand of a clock, moves at the will of the pilot from order to order. The pointer is attached to a cylinder of iron $4\frac{1}{2}$ inches long, $\frac{1}{2}$ inch diameter, which leads from the center of the dial backward at right angles, and is supported at each end eccentrically. On each side are two electro-magnets and one underneath; there being one magnet for each order. A wire from each magnet leads to the pilot-house, and all wires are connected with a battery. By means of five knobs in the pilot-house the connections are made—one on each wire. The iron cylinder, or keeper, moves from side to side, or downward, according to the attraction of the magnet, and as the pointer is attached to the keeper or cylinder, the movements on the dial will correspond with movements of the keeper, by reason of its eccentric motions. It is stated on good authority that four-fifths of the collisions on our rivers are caused by the present mode of signalizing by bells. The pilot rings to stop, and in an instant he may discover that he should proceed, and rings again, but the two orders are combined in one, and it may be forming one order in itself, to the engineer, yet having no relation to the pilot's order, first or last. The prompt action of the engineer increases the confusion, and before it can be rectified a collision takes place. Our late sea-fights at Mobile will suggest to any one the necessity of some brief yet more perfect mode of conveying positive information between the commander, pilot and engineer than ringing a bell. One false move may be the destruction of many lives and much property, and cause terrible disaster to the nation.

"I shall now describe the mode of arrangement by which the Captain or pilot may understand the movements of the rudder while in their respective departments. I shall first describe the arrangement of wires, etc., then the mode of attaining results. From the battery to the rudder head a wire is led. From the rudder head to the cabin two wires are led, and from thence to the battery one wire is led and connected. I shall now describe the arrangements in the cabin. Each of the two wires mentioned terminates in a coil, but they are wound up in opposite directions; each coil is placed on the top of the other and in contact (insulating wire is used), the two ends are left out, and connected here with the third wire which leads to the battery. The coil is of oval form, about $4\frac{1}{2}$ inches long and 2 inches wide. A magnetized needle is suspended in the center; a dial is also used, to which the needle points. This combination forms a differential galvanometer. I shall now describe the combination at the rudder head. A coil of wire like a bell spring, say 6 inches long and $\frac{3}{8}$ inches in diameter, connects the two wires alluded to previously, which lead to the cabin. The third wire is connected to a roller which rests on the coil at right angles to it, but this roller is connected with the rudder head in such a manner that when the rudder moves from side to side, the roller will move from end to end of the coil, and in contact. The only use of the wire being in coil form is to have a long piece of wire in a short compass. This completes the arrangements. The battery being in action, a current will pass from the battery to the rudder head, conducted by the roller to the coil. If the roller is in the center the current will split, and one-half go by each wire to the cabin, and as the two coils are wound up in different directions one current will traverse in one direction, and the other in another, but of equal strength. The needle, therefore, will stand perpendicularly. But should the roller move to one end of the coil, by a movement of the rudder, the greater part of the current will take the shorter route, and the needle will be deflected say to the right. A movement to the other end of the coil will cause a deflection to the left for the like reason. It will at once be seen that intermediate movements on the coil will cause corresponding movements of the needle. Thus every movement of the galvanometer indicates every movement of the rudder.

THOMAS TAYLOR.

Washington, D. C., Oct. 16, 1864.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING NOVEMBER 1, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

44,844.—Apparatus for Raising Grates.—Isaac W. Allyn, Philadelphia, Pa.:

I claim the cam-shaped levers, F, hung to the sides of the fireplace and operating on the horizontal grate of a stove or range, substantially as and for the purpose herein set forth.

44,845.—Corn Planter.—Daniel W. Amos, Bedford, Pa.:

I claim the combination of the indented driving-wheel, the gearing, the reciprocating feeding mechanism, and the cut-off with the seed tubes, substantially in the manner described, for the purpose of feeding the corn grain by grain, and securing an accurate register between the planting and covering devices, as set forth.

44,846.—Steam Engine.—Sol. Andrews, Jr., Westfield, N. Y.:

I claim, first, The return of caloric from the exhaust steam to the steam or water spaces of a steam boiler or steam and water passages of steam engines by means of atmospheric air.

Second, Forcing air into the steam or water spaces of a steam boiler or steam and water passages of steam engines by means of an air pump in combination with the air tube and exhaust pipe, substantially as set forth.

Third, The heating of air on its passage from the pump to the steam or water spaces of a steam boiler, or steam and water passages of steam engines by the waste heat of the exhaust steam.

Fourth, The construction and arrangement of the parts hereinbefore described for the purpose of increasing the power of a steam engine and the saving of fuel, and the production of fresh water from salt water for drinking and other purposes, or for other purpose on the working of a marine engine without additional expense for such a purpose or loss of power to the engine.

44,847.—Harvesting Machine.—Wm. B. Birdsall & Edwin H. Cogswell, Hudson, Mich.:

We claim the arrangement of the rake-heads, m, constructed and operating as described in relation to the stand, B, and the dumper, M, substantially as and for the purpose herein set forth.

44,848.—Cover for Milk Cans.—Albert Brightman, New Bedford, Mass.:

I claim a tubular ventilating handle for a milk or other can, constructed and operating substantially as set forth.

44,849.—Balanced Slide Valve.—Alexander Buchanan, New York City:

I claim, first, The attachment of the valve cover to the back or cover of the steam chest by means of hooks, l l, and eye-bolts, m m, or their equivalents, substantially as and for the purpose herein specified.

Second, The attachment of the valve cover to one end of the steam-chest by braces having flexible connections which permit the cover to rise from the valve, substantially as and for the purpose herein specified.

[This invention relates to the protection of the back of the valve from the pressure of the steam by means of a valve cover attached to the back or cover of the valve chest, and it consists in a novel mode of supporting and sustaining such valve cover whereby it is enabled to adapt itself to the back of the valve in such manner that the valve will work against it perfectly steam-tight but without binding or unnecessary friction, and that in case of the engine being suddenly reversed the valve may be permitted to be lifted off the seat and thereby prevent the compression of any steam that may have been shut in the cylinder.]

44,850.—Sugar Evaporator.—Harlow Butler, Chesterfield, Ohio:

I claim, first, The use of the clarifying receiver, I, or a tall narrow vessel for receiving and clarifying the already heated juice, the scum rising and flowing off by a spout, whilst the percipitate falls below the insertion of the discharge pipe for the thus clarified juice, substantially in the manner and for the purposes set forth.

Second, The combination and arrangement of the worm, H, the receiver, I, with the discharge tube, K, and the evaporating chamber, C, substantially as specified.

44,851.—Ice Cream Machine.—John R. Champlin, Laconia, N. H.:

I claim the combined arrangement of the coupling devices whereby the whole freezing apparatus is readily coupled to the driving gear, and as readily removed therefrom, substantially as and for the purpose herein specified.

I also claim the construction and arrangement of the adjustable scrapers, P P, of the beater, substantially as and for the purposes herein set forth.

I also claim the combined arrangement and construction of the two scrapers or scoops, R S, being concave in front, and having their lower edges most advanced in combination with the side scrapers, P P, substantially as and for the purpose herein specified.

44,852.—Stopper for Jars.—G. F. J. Colburn, Newark, N. J.: