the service rendered, and shall be paid by those who profit by it, the grant of Letters Patent takes precedence of any arrangement hitherto made, and of every proposition yet advanced.

WHAT IS MATTER?

The author of "More Light: A Dream in Science," has published a treatise purporting to answer that, in our opinion, never-to-be-humanly-answered question, "What is Matter?" We have always denounced speculation upon topics which we believe to lie beyond the boundary of physical inquiry; believing that scientific methods cannot be applied to such investigation, if that may be called investigation, which is nothing more than either conjecturing what may be the causes of existing facts, or deducing a system from a basis of conjecture. Such speculations are generally a patchwork of guesses, with new names for old facts, which only transfer the mystery surrounding the ultimate causes of things.

The best illustrations of this statement we could possibly give are some short quotations from the work in question.

The universe is filled with centers of force; each center the center sphere; each sphere a compound of two spheres, having the same center, one a sphere of attraction, the other a sphere of repulsion.

* * * * *

It is by the separation of these two spheres of attraction and repulsion, and therefore by the calling forth and exercise of their powers by each, that we have the different modifications of matter.

The Divine Mind caused a certain immense, but yet finite, portion of space to be marked off from His immediate presence as a center—a great sphere—of space. This, by some manifestation of His power and presence, was filled with centers of force, the seeds, as it were, of that which was to be known as matter, round each of which two forces, attraction and repulsion, were in abeyance.

If the reader is not disgusted with the absurd and visionary character of these propositions, he will perhaps be interested in their analysis. The propositions may be thus restated. *Matter is force. Force has a Divine origin.* The latter proposition may be considered as foreign to the purpose of the work, which is to tell us what matter is, not from whence it originated.

But somehow the idea that matter is force does not seem satisfactory. We do not get a very good notion of it by calling it force, a term which is as mysterious as was matter before our author had poured upon it the brilliant light of his powerful intellect.

He would doubtless tell us were we to ask "What is force?" that force is—is—in fact—is matter, which would be perfectly intelligible and satisfactory. We should then have got to the ultimatum, and further inquiry would be superfluous.

We are not surprised at the severe lashing this book has received from the reviewers. Dreamers in science are out of place in the present age. The world does not need or want them. Dreaming and speculation are not just now in favor. There is too much work to do, to waste time and thought in such futile occupations.

DIVERSITY OF SPRINGS AT SARATOGA---NEW DISCOVERIES.

The visitor for the first time at Saratoga invariably expresses surprise at the great number of springs he finds there, and the variety of mineral ingredients analysis shows the waters of the different springs to contain. For many years waters from the Congress and Empire springs have been very widely known for their medicinal qualities, and an extensive business in bottling and shipping to all parts of the world has been profitably carried on. But how few, except visitors at Saratoga, have ever heard of the score and more of other springs within a radius of two miles, each possessing chemical ingredients in every case, varied in quantity, and generally very unlike in quality. Within a few yards of each other one spring produces a cathartic water, and the other gives a water having astringent properties. In the first no iron can be detected by chemical analysis, in the other particles of the oxide are seen by the naked eye. Every year new discoveries are made and new springs developed. Last year quite a sensation was produced by the discovery of a sulphur spring, and a commodious bathing house, erected after last season closed, has been extensively patronized this year. In removing some rubbish on the site of a barn, which was burnt last summer near Congress Hall, a new spring was discovered, which has been named "Hathorn Spring," after the proprietor of the hotel, by whom it is owned. It has been a favorite water this summer, and is believed by many to be the best cathartic spring yet discovered.

Mr. C. R. Brown, the enterprising jeweler on Broadway, opposite the Congress Spring grounds, has recently discovered a spring which he has named "Crystal Spring," on a valuable plot of ground he recently purchased, between his store and the Columbian Hotel, which he is about to have tested, and by next season the public will be invited to try its medicinal merits.

An analysis has just been made by Prof. Chandler, of the School of Mines in this city, and his report indicates the water to contain some valuable properties not to be found in like proportions in any of the many other springs at Saratoga.

The spring is located in a most central position, within a few feet of Broadway, and is more accessible to most of the hotel visitors than even the Congress. We hope the owner's sanguine expectations as to the value of his newly-acquired possession may be fully realized, and from its location and the analysis of the water, we have no doubt of the great value of the property. A stock company will probably be formed before many months for carrying on the business of bottling on an extensive scale. Any one desiring an analysis of either of the new springs can procure printed copies by inclosing ten cents and addressing Mr. Huling, office *Saratogian*, Saratoga Springs, N. Y.

HINTS ON THE BURNING OF ANTHRACITE COAL.

The burning of anthracite coal requires appliances quite different from those used for the burning of wood, or bituminous coal, but the reasons for these differences, are not well understood by the mass of people who use anthracite, and as we are constantly receiving inquiries suggested by imperfections in the construction of stoves, furnaces, and heaters, we deem it timely to give some hints on this subject.

In doing this we shall necessarily be obliged to repeat in substance much that we have said in former seasons upon the same and kindred subjects, but the importance and practical nature of the topic must be our excuse.

The temperatures at which different kinds of fuel ignite, vary greatly, and as anthracite is the most difficult to kindle of all the fuels in use in this country, novices in its use often find trouble in lighting it. This can only be done by the use of some more easily kindled fuel, wood or charcoal being generally employed for the purpose. Anthracite coal being a much more dense material than the other fuels named, requires a concentrated and powerful heat to raise it to the temperature at which it will commence to combine with the oxygen of the air. A common fault with those unaccustomed to it, is to use too coarse wood for kindling, and too much of it. This, while it generally succeeds in lighting the coal, leaves a bed of ashes below the coal which interferes with the draft unless raked out; an operation which always retards the combustion of partially ignited coal.

The wood should be of some rapidly burning variety which gives a quick and high heat, and should be split fine. It should be so placed that the coal will remain on the top of it and not fall through to the grate, leaving the kindling on the top of any part of the coal. The amount of kindling wood required depends much upon the size of the coal. A common mistake is to use too large sized coal. A good rule, where stoves or furnaces have a good draft, is to use coal as small as can be used without inconvenience from its sifting too freely through the grate.

Grates should have their bars closely set for stoves that are cleaned out daily, and have fires lighted in them each morning, while those which are intended to have fire kept in them continuously for days or weeks will not admit of fine grates, on account of the accumulation of ashes and small "clinkers."

There is much difference in coal in regard to the formation of clinkers. These are nothing but vitrified, or partially vitrified earthy matters, and only can form when a high heat is maintained; they are apt to be troublesome when there is too great draft. A coal stove or furnace should therefore be so constructed that its draft can be perfectly controlled. The bottom draft should admit of being closed air tight, as nearly as is possible to make it, and there ought always to be provision made for a top draft. If, however, the draft of a chimney should be so strong, that air in too great quantities is drawn in at the bottom when the dampers are closed, a damper in the pipe which will close it partially must be employed, though in sluggish chimneys such a damper is apt to force the gases of combustion into the room, and therefore it ought always to be avoided when possible.

The practice of putting ashes on the top of a fire to keep it, is very productive of clinkers, although it answers the purpose very well in other respects. Damp coal screenings are better, and may be economically burned in this manner.

If a coal fire gets very low, the quickest way to extinguish it, is to rake it at the bottom. To preserve a fire under such circumstances, a little coal should be placed on the fire, and when it has caught more may be added, and the raking deferred until it has got well ignited.

When the fire bricks have become burdened with clinkers which have fused and adhered, they may be cleaned by throwing oyster or clam shells into the fire box when the fire is very hot, and allowing the fire to go out. The clinkers will generally cleave off without the use of much force the next morning. From two quarts to one-half a peck, will be sufficient for most stoves, and the operation can be repeated if some of the clinkers still adhere.

In a subsequent article we shall say something on the proper regulation and adjustment of apparatus for warming buildings by hot air

GAS FROM THE LIGHT HYDROCARBONS.

We notice a description of a new(?) gas machine in the *Mechanics' Magazine*, of Aug. 6. This machine is described as being of any size desired, within certain limits, and the journal alluded to, considers it as an improvement upon anything hitherto known or employed in this direction.

Some of our American inventors will have a hearty laugh over this, when they read the description of the apparatus, the principle of which has been unsuccessfully tried over and over again in this country, in various forms, including the one described. The machine is stated to be "cylindrical in form, having a space between an inner cylinder which receives the charge of rock oil and the outer case. From the charge cylinder the oil exudes slowly into the space referred to, at the bottom of which it is absorbed by a layer of wool. The vapor rising from this oil in the saturated wool furnishes the essential element in the gas to be produced; the only other element is atmospheric air, with which the vapor is diluted. The air, which is only introduced into the machine when the consumption of gas is going on, is regulated in its admission by a piece of machinery actuated by a spring barrel movement, similar to that of a spring timepiece. The pump, which admits the atmospheric air, and the machinery with which it is connected, are put in motion as soon as gas begins to be drawn off, and the process of manufacturing the gas, the mixture simply of the atmospheric air with the vapor of the oil, at once commences and continues self-acting, as long as the charge of oil lasts, and gas continues to be drawn off. The process is beautifully simple, the gas being made instantaneously, without the application of heat, or any labor or attention whatever."

That the action of this machine is a repetition of the experience of many American inventors is evident from the following quotation from the journal referred to.

"The gas, as we saw it produced, was not very brilliant, but experience as to the qualities of the oils used, and practice in the use of the machine, will probably lead to the production of as high a quality as can be desired. According to the inventor's statement, a gallon of oil at 2s. 6d. will produce 1,000 cubic feet of fifteen-candle gas, and a charge of 3½ gallons will burn for 750 hours through an argand burner. The apparatus is adapted for use in houses, shops, theaters, churches, or other public buildings."

It might have been added, that its adaptation to the above purposes yet remains to be demonstrated, and we can promise, that when the oil becomes impoverished by the evaporation of its more volatile portions, or when its volatile character is decreased by a low temperature, the light will be still less brilliant than when exhibited to the editor of the *Mechanics' Magazine*.

Such experiments have had their day in this country, and it is well understood, that the principle upon which they are based is wholly inadequate. Eight years ago we experimented with and tested a large number of similar devices. The results of our investigations were the following conclusions. First, only the lightest of the hydrocarbons will volatilize at, say, 50 degrees, with sufficient rapidity to supply even a few burners with air saturated with hydrocarbon vapor in the proper proportions for illuminating purposes. Second, the oils, even if sufficiently light at first, rapidly become heavier by the consumption of their more volatile constituents, so that only a small proportion can be consumed ere the light begins to deteriorate. Third, if heat be applied to any machine of this construction, even admitting the safety of such an application, the amount of condensation in the service pipes will soon generate a train of evils well known to those who have been "through the mill," and which it is, therefore, unnecessary to specify here.

These difficulties have compelled the abandonment of the principle, and with its renouncement, to the adoption of better plans for utilizing the valuable illuminating properties of the light hydrocarbons.

One of these improvements was recently illustrated and described at length in these columns, and something which shall admit of adjusting the flow of the air to the volume of vapor generated, so that recondensation in pipes can be obviated, will be found an absolute essential to the success of any device for manufacturing gas from the distillates of petroleum.

STARCH AND ITS ADULTERATIONS.

This substance, which is of great importance in the arts, more especially in printing and finishing cotton and linen goods, is often adulterated, and in other respects may be of such a quality as to disappoint the manufacturer. Some inquiries which we have recently received upon this subject will be concisely and fully answered in the following extract from O'Neill's "Dictionary of Dyeing and Calico Printing:

"Starch is a widely-diffused vegetable product; it exists in a vast number of plants, fruits, and trees, and seems to be one of the fundamental bodies of organic life. Its composition is very similar to that of sugar, being a compound of carbon with hydrogen and oxygen, in the proportions requisite to form water. It is extensively used in printing and finishing, but does not in either case exercise any actions of a purely chemical nature; as a thickening it is only a vehicle for conveying the color or the mordant to the fiber; as a finish it is only to give stiffness or fulness to the cloth. But its actions in many cases involve the play of chemical affinities, and should be minutely known. Pure wheaten starch, when closely examined under the microscope, is found to be composed of very small globules. In commerce it is found in a peculiar state of aggregation, incorrectly said to be crystallized; the quality of the starch is often judged and determined by the appearance of these columnar masses called crystals. No other starch but that from wheat takes the same form in drying. It is not prudent, however, to depend too much upon this as a test, for I believe the crystalline character can be communicated to other starches, and that it is not an essential character of wheaten starch, but rather an accidental one, due to a partial decomposition and breaking up of some of the globules, which communicate a gummy nature and adhesive character to the remainder, or to a residue of unremoved glutinous matters. Starch does not dissolve at all in pure water when cold, it mixes up, but then settles down, leaving the liquid clear; it dissolves in hot water, swelling out to a great extent; it begins to dissolve, or the particles to burst, at about 150° F., but color cannot be well thickened at this heat, it must be boiled to get a good result. Starch boiled with acids, or acid liquor, thickens at first but afterwards becomes thin, owing to the destruction of the starch and its conversion into sugar; colors should not, therefore, as a general rule, be boiled until they begin to grow thin again—although in special cases this is prescribed, and is an advantage, but it is usually unnecessary, and likely to injure the color.

"A good wheaten starch is white and clear, has a sweet taste