bly be used when the spokes are to be adjusted in a single plane, and the slotted faced when the wheel is to be built staggered. Patented through the Scientific American Patent Agency. June 30, 1874. For further particulars regarding sale of rights, etc., address the inventor, Mr. John W. Davis, Newton, Catawba county, N. C.

THE CHILIAN EXPOSITION.

The second International Exposition of the Republic of Chili, a brief mention of which has already appeared in these columns, opens at Santiago on September 16, 1875. The large South American trade which yet remains undeveloped, and the constantly increasing demand which the progressive republics of that continent are making for American productions and inventions, will, we think, offer great inducements for our manufacturers and inventors to contribute to this enterprize. Special arrangements have been made for the transportation of articles for exhibition, at low rates; and the passage of mechanics and special workmen, in charge of goods, will be in part defrayed by the Exposition Committee. No rent is charged for space, and storage and power are offered free. The Exposition closes December 31, 1875. The condition and number of general premiums have not, as yet, been determined, but three liberal special prizes are to be awarded as follows:

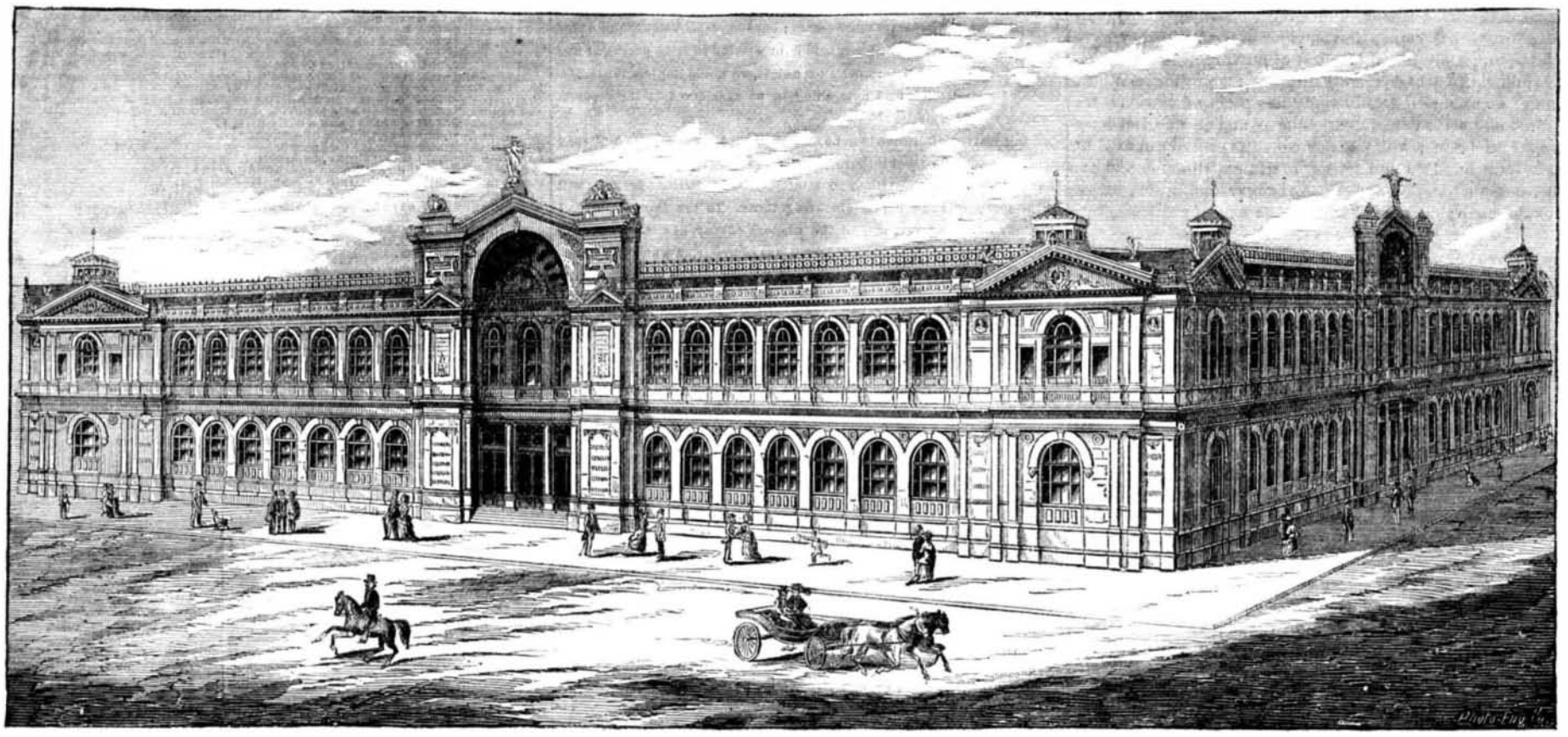
First. One thousand dollars, in gold, for the best style of narrow gage railroad, not exceeding three feet, shown by fixed and rolling stock, including locomotive and tender sufficient to accommodate and carry 6 to 100 tuns up gradients of 1 in 50, with curves of 164 feet radius

Second. One thousand dollars, in gold, for the best system of measuring and distributing water for purposes of irrigation, in specified or proportional quantities. The invention must be accompanied by the necessary apparatus to demonstrate its applicability to the requirements of Chili.

Third. Five hundred dollars, in gold, for the best exploring drill, adapted to mining operations of coal, iron, copper, silver, gold, etc.

The city of Santiago in Chili is situated in a most picturesque valley at the foot of the Andes, and is adorned with beautiful parks containing lakes, gardens, fountains, theaters, libraries, amusements of all kinds, observatories, etc. In one of these parks, the size of which is two square miles, the Exposition will be held. The structures include several buildings, the main one of which covers over 60,000 square feet of ground. It is over eighty feet in hight, is constructed of stone, brick, and iron, and contains many spacious galleries. An efficient fire brigade will be constantly in attendance during the Exposition. The street railways which pass round the park have branches extending within the edifice in order to facilitate the conveyance of heavy machinery and other cumbrous goods.

Full particulars can be obtained of the Chilian consuls at New York, Baltimore, Washington, and Philadelphia. We give herewith an engraving of the main exposition building, which is of considerable architectural beauty.



BUILDING FOR THE GREAT EXPOSITION AT SANTIAGO, CHILI, 1875.

The Builder of the First Telegraph.

A few days ago a telegraphic despatch from Maine announced the decease in that State of Mr. G. E. Smith, who constructed for Professor Morse the forty miles of magnetic telegraph from Washington city to Baltimore, which constituted the original of the vast system of telegraphs now extended throughout the world. That line was completed for use in the last week in May, 1844, the first news despatch having been sent over the wire on the 29th of May. The quite recent death of the constructor of that line naturally carries the mind backward over the thirty years of the existence of the magnetic telegraph, and brings into bold view the feeble beginning of the marvelous progress of this peculiarly American work. After the patient but persistent efforts of Professor Morse for several years, Congress in 1843 made an appropriation of $30,000 for an experiment with the Morse telegraph between Washington City and Baltimore, and it was this line that was completed in the spring of the following year. The money, grudgingly granted in the midst of scoffs and jeers and references to "animal magnetism," etc., has been frequently referred to as a munificent gift in the interest of Science and the diffusion of intelligence. Perhaps it was, but it may serve at once to illustrate the magnitude of the growth of the telegraph, and how greatly the government profited by its generosity, to say that quite recently, within a period of five years, the Western Union Telegraph Company alone paid to the Treasury in taxes $850,000, and in gold duties, on imports of telegraphic wire, 328,000 more. Thus the investment of that $30,000 repaid itself in those two items alone, in those five years alone, and from one company alone, more than thirtyfold.

Going back to the forty miles of wire between Washington and Baltimore, which measured the whole dimensions of the magnetic telegraph this day thirty years ago, we are better able to appreciate the two hundred thousand miles of wire which form the immense network of the telegraph over the United States to day. Of these two hundred thousand miles of American wires, which would encircle the globe more than eight times, about one hundred and seventy thousand belong to one company. In June, 1844, there were two operators at work; in June, 1873, there were nine thousand nine hundred and thirty persons employed by one American company, and about twelve thousand by all the American companies. In this exhibit of the growth of thirty years, we limit the figures to the statistics of our own country, leaving the Old World out of view altogether.

In some other respects, the change wrought by the telegraph in less than the period of one generation is still more striking. It requires no strain upon the memories of even the junior partners of some of our old business houses and offices to recall the anxious times when they were more or less at the mercy of shrewd and active men who used carrier pigeons, relays of fast horses with their hardy express riders, semaphore signals from hill top to hill top and along the coast, and other similar expedients for getting advance views of important events, with all the resulting advantages. In those days fluctuations in the prices of commodities in the great markets of the world were frequently secrets known only to a few, who sold their knowledge to another few, and thus a small knot of men in every commercial center were enabled to buy the property of their uninformed neighbors for far less than its value, or sell their own for far more than its value. Now all business men get their information simultaneously, and, if they wish it, they can get it from all the markets and money centres of the world. The merchant at our Commercial Exchange is in immediate communication with corn, cattle, cotton, produce, shipping, and commercial exchanges everywhere in our own country and abroad. The banker on Third street has his wire extending from his office to New York, Chicago, San Francisco, New Orleans, London, Paris, Frankfort, Berlin, Amsterdam, Constantinople, Bombay, Calcutta, Rio Janeiro and Shanghai, and all cities and countries between. He sits there with instant knowledge of the financial, commercial, political, and other important current events of Europe, Asia, Africa, Australia, the East and West Indies, and South America, as well as of his own country. The telegraph, the Associated Press, and the newspapers within that organization concentrate this universal intelligence, and lay it before the whole public simultaneously at least twice every day; and all this marvelous change and the vast and wonderful system that has brought it about is, as the decease of the builder of the pioneer line sharply reminds us, the growth of but thirty years.—*Public Ledger.*

A Wonderful Oil Well.

The Titusville (Pa.) *Herald* thus describes a wonderful oil well that has been opened recently in that vicinity.

The road leading to the Parker well from Petrolia is in moderately good condition; and soon after leaving Central Point, the traveler observes the words "no smoking permitted here" in conspicuous places. After about two and a half miles a ride, the top of a hill is reached, where a loud, roaring noise is distinctly heard, and eighty rods further on brings us in sight of the well. A dense fog or mist envelopes the derrick, engine house and tanks, while fully one thousand persons are there, gazing on the wonder of Armstrong county. The derrick has conspicuously placed upon it, in large letters, "Boss Well," and "Creswell City." There are two 250 barrel tanks full of oil; also two 1,200 barrel tanks, one of which is full. Three dams, one below the other, catch the dripping; and the rivulet beyond, we are told, for ten miles of a circuitous route to the Allegheny River, is covered with oil.

There are two 2 inch pipes connected with the well, one of which is shut completely off, and out of the other flows a steady stream of oil with immense force. There is no perceptible intermission in the flow; and as it gushes into one of the 1,200 barrel tanks, the foam and spray envelop the whole surrounding atmosphere in a dense mist.

"A trustworthy gager informed us that he had gaged the well three times since the stream was turned into the 1,200 barrel tank, and he found it doing 1,750 barrels, and he estimated the leakage to be at least 50 barrels per day. He further stated that in his opinion the well started off out of the two 2 inch pipes at the rate of 2,500 barrels per day. He also claimed that, although this was almost incredible, he believed that, if the full stream were turned on now, it would do at least 5,000 barrels.

"The well is claimed to be the largest ever struck in the lower region. A farmer walked up to us and offered to sell his adjoining farm of 100 acres for $100,000, which ten days ago, for farming purposes, would not have brought $1,000. The surveyors are at work laying out Creswell City.

"The Parker well stands two and one eighth miles due east of the most eastern well of the fourth sand development, and about two and three quarter miles east of Petrolia. The number of wells drilling on this belt, east of the most easterly well on the McGarvey farm, are six, namely: Two on the Snow farm; one on the Steel farm: the Cushford well, 1,000 feet deep; the Crawford well, 300 feet deep, and the Prentice well, 1,450 feet deep. The latter is half a mile due west of the Parker well, and is due next week."

The Reason Why.

It is always desirable that facts should be supported by a reason. The editor of Arthur's *Home Magazine* give the following questions and answers, which are pertinent to this season of the year:

Why is fruit most wholesome when eaten on an empty stomach?

Because it contains a large amount of fixed air, which requires great power to disengage and expel it before it begins to digest.

Why is boiled or roast fruit more wholesome than raw?

Because, in the process of boiling or roasting, fruit parts with its fixed air, and is thus rendered easier of digestion.

Why are cherries recommended in cases of scurvy, putrid fever, and similar diseases?

On account of their cooling and antiseptic properties, and because they correct the condition of the blood and other fluids of the body when there is any tendency to putrescence; at the same time, like all fresh fruits, they possess a mild aperient property, very beneficial to persons of a bilious habit.

What effect have vegetable acids upon the blood?

They cool and dilute the blood, and generally refresh the system. All fruits contain acids and salts, which exercise a cooling and invigorating influence. Apricots, peaches, apples, pears, gooseberries, and currants contain malic acid. Lemons, raspberries, grapes, and pine apples contain citric acid. The skins of grapes, plums, sloes, etc., contain tannic acid, which has a bitter taste.

Why should salt be applied to vegetables intended for pickling, previously to putting them in the vinegar?

Because all vegetables abound in watery juices, which, if mixed with the vinegar, would dilute it so much as to destroy its preservative property. Salt absorbs a portion of this water, and indirectly contributes to the strength of the vinegar.

Why is bread made from wheat flower more strengthening than that made from barley or oats?

Because, as gluten, albumen and caseine are the only substances in the bread capable of forming blood, and consequently of sustaining the strength and vigor of the body, they have been appropriately called the food of nutrition, as a distinction from those which merely support respiration. Wheat contains eight hundred and twenty-five parts of starch, three hundred and fifteen of gluten, albumen, and caseine, and sixty of sugar and gum; while barley contains twelve hundred of starch, one hundred and twenty of gluten, albumen and caseine, and one hundred and sixty of sugar and gum; hence wheat is much richer than barley in the food of nutrition.

The Discovery of Oxygen—Celebration of the One Hundredth Anniversary.

There was a large gathering of American scientists at Northumberland, Pa., on July 31, to celebrate the one hundredth anniversary of the discovery of oxygen by Joseph Priestley. The proceedings commenced in the main hall of the village academy with an address of welcome by Colonel Taggart, of Northumberland. Professor Charles F. Chandler, of Columbia College, New York, was called to the chair, and Professor A. R. Leeds, of the Stevens Institute, Hoboken, N. J., was appointed secretary; telegrams were exchanged with Birmingham, England, where a statue of Priestley was at the time being unveiled by Professor Huxley, and Professor H. H. Croft introduced the business of the day by reading a paper on "The Life and Labors of Joseph Priestley," in which he rapidly but clearly traced Priestley's great life and works. His fondness for chemical dabbling was pursued, like all his work, on a plan of his own, regardless of the schools; his wonderful discoveries, embracing at least two thirds of the now known gases, showed conclusively the compound structure of the air. He traced also the theological wars in which Priestley's controversial propensity kept him constantly engaged. Like Ishmael, his hand was against every man, and every man's hand was against him; and, though his powerful intellect vanquished one enemy after another, and the volumes hurled against his foes numbered more than a hundred, new opponents constantly arose. The Church banned him, society thrust him out, until at the age of sixty-one, feeble, worn out, his house burned from over his head, his books and papers destroyed by howling mobs, injustice and opprobrium heaped upon him, he fled to America, where he met a joyous welcome, which must have sounded passing strange to his ears, accustomed to years of constant strife. Some of his family having settled at the Forks of the Susquehanna, he followed them here, and found a land of peace and restfulness. The third and fourth generations of the great chemist's descendants still reside in the town.

Professor J. Lawrence Smith, of Louisville, Ky., offered and had adopted the following resolution:

Resolved, That a committee be appointed to confer with the committee of the Centennial Exhibition, to correspond with the chemists and professors of cognate sciences in Europe, in order to induce a large representation of them to visit this country in 1876.

Professor T. Sterry Hunt, of Boston, read a paper on "The Century's Progress in Theoretical Chemistry." The lecturer traced the progress of the art from its earliest stages, and defined Stahl's phlogistic hypothesis, in which Priestley placed such unwavering faith. The three great chemists of the century just expired were Scheele, Priestley, and Lavoisier. Of these the two first were great experimenters, but failed to interpret their discoveries properly. Priestley, though the founder of a new school himself, adhered firmly to the old philosophy, and died the last defender of phlogiston. Lavoisier seized, with a marvelous comprehension, the true significance of the facts made known by his contemporaries, greatly enlarged the field by his own researches, and like another Newton, showed the great harmonies which govern all the changes of matter in the mineral, animal, and vegetable kingdoms. Lavoisier justified by the aid of the balance the old doctrine of Hermes, that in the changes of matter nothing is lost and nothing is gained. With Wenzel, he made chemistry a quantitative science, and the great laws of definite and multiple proportion made known by Dalton showed that all things were ordered by weight, by number, and by measure.

A second session was held in the evening of the day, at which Professor Joseph Henry was to have presided; but being prevented by ill health, Dr. Henry Coppie, President of the Lehigh University, filled the chair, and delivered in the open air an eloquent and glowing tribute to the chemist in whose honor the gathering was held. In the lecture hall, Dr. J. Lawrence Smith reviewed the whole progress of chemical science during the past 100 years.

On the following day, August 1, Professor Silliman read an essay on American contributions to chemistry; and various other papers on the history of the subject were given, and many interesting letters and other relics of Priestley were exhibited.

Another New Comet.

Now that Coggia has passed for ever from our view, it is gratifying to know that a new comet has just made its appearance. It was discovered at Marseilles, France, July 26, and first observed in this country by Professor Swift, Rochester, N. Y., July 30. He says: "It is quite large and bright for a telescopic comet, and has a strong central condensation, but, as far as I could judge by observation, both in the solar and lunar twilight, it has no nucleus or tail. It is in the fourth coil of *Draco*, and moves at the rate of about one degree a day."

IMPORTANCE OF ADVERTISING.

The value of advertising is so well understood by old established business firms that a hint to them is unnecessary; but to persons establishing a new business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the importance of advertising. The next thing to be considered is the medium through which to do it.

In this matter, discretion is to be used at first; but experience will soon determine that papers or magazines having the largest circulation, among the class of persons most likely to be interested in the article for sale, will be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the vendors of any new article in the mechanical line, we believe there is no other source from which the advertiser can get as speedy returns as through the advertising columns of the SCIENTIFIC AMERICAN.

We do not make these suggestions merely to increase our advertising patronage, but to direct persons how to increase their own business.

The SCIENTIFIC AMERICAN has a circulation of more than 42,000 copies per week, which is probably greater than the combined circulation of all the other papers of its kind published in the world.

DECISIONS OF THE COURTS.

United States Circuit Court.---Eastern District of Pennsylvania.

PATENT FIRE EXTINGUISHER.—THE NORTHWESTERN FIRE EXTINGUISHER COMPANY *et al. vs.* THE PHILADELPHIA FIRE EXTINGUISHER COMPANY.

[In equity.—Before Judge McKennan.—Decided April, 1874.]

Suit brought on letters patent reissued to Dawson Miles, administrator of P. F. Carlier, deceased, and Alphonse A. C. Vignon, No. 1,994, dated July 16, 1872 (original patent No. 88,944, dated April 13, 1869), for improvement in extinguishing fires.

The claims of the reissued patent are as follows:

1. The improvement in the art of extinguishing fires, hereinbefore described, by throwing upon the fire or conflagration a properly directed stream of mingled carbonic acid gas and water by means of the pressure or expansive force exerted by the mass of mingled gas and water from which the stream is derived.

2. We claim a strong vessel provided with a proper plug or lid, by which an orifice in it can be closed, and a stopcock, through which its contents can be ejected, and a flexible tubing or hose for directing the stream as ejected at the will of the operator, these parts being substantially such as described, and capable of operating as specified.

3. We claim a strong vessel provided with a proper plug or lid for closing an orifice in it, and also with a stopcock, in combination with another vessel or tube, the combination being substantially such as specified, and the construction being substantially such as described, so that the vessels may keep separately the ingredients for making carbonic acid gas, and that when their contents are mingled they may be discharged in a stream of carbonic acid gas and water.

4. We claim, in combination with the vessel's lid or plug and stopcock combined, and capable of operating as in the above third claim, a hose and nozzle, so applied, as described, that the mingled stream of carbonic acid gas and water may be suitably directed, as hereinbefore set forth.

5. As the preferred arrangement of our apparatus, we claim a strong vessel provided with a lid or plug and a stopcock near the bottom thereof, in combination with a vessel or tube arranged in the interior thereof, the arrangement being substantially as described.

6. We claim a strong vessel provided with a lid or plug and a stopcock, in combination with a vessel or tube arranged in the interior thereof, and a rod passing through the wall of the outer vessel, and capable of operating substantially as described.

7. We claim a strong vessel provided with a lid or plug and a stopcock, in combination with the vessel or tube arranged in the interior thereof, and a rod and cock or valve, the whole being and operating substantially as described.

8. We claim the elements or parts of a whole apparatus specified in the fifth claim, and arranged as therein specified, in combination with a flexible hose and nozzle, and with handles or loops, whereby the apparatus may be supported and the stream directed, substantially as specified.

9. We claim, in combination, a strong vessel, a lid or plug for closing the same, a stopcock near the bottom of the vessel, a hose and nozzle, and handles or loops, whereby a volume of water charged with carbonic acid gas may be confined and transported, and a stream thereof directed, in the manner and for the purposes described.

10. The keeping of the acid and alkali or alkaline solution in separate and distinct vessels, but in such proximity to each other that they may be immediately brought into contact when the apparatus is required for use, one mode of accomplishing which we have above set forth.

11. A closed receptacle, made of suitable material, containing one of the gas-generating ingredients, placed within the main reservoir containing the other gas-generating ingredient, to be discharged of its contents in the manner herein set forth, or by other equivalent means.

This bill is founded upon a reissued patent to Dawson Miles, administrator of the estate of Phillipe F. Carlier, deceased, and Alphonse A. C. Vignon, as joint inventors of an "improvement in extinguishing fires." They are described as residents of the city of Paris, and subjects of the Emperor of France at the time of the invention. The answer denies that there was any person named Phillipe F. Carlier, and avers that François Phillipe Carlier was the name of Vignon's associate in the alleged invention; and for this misnomer it is urged that the patent is void.

Assuming, then, that the Christian name of Carlier was François P., he is demonstrated to be the same with Phillipe F., by conclusive proof of his connection with the subject of the patent, and of the impossible applicability of the additional description to any other than Vignon's associate. There is, therefore, no doubt or the personal identity of the patentee, and the most that can be said is that, by a transposition of his double Christian name, he is not thereby accurately designated. But this will not void the patent, where it supplies upon its face an added description, by which the patentee may be certainly identified. The patent must, therefore, be treated as valid.

The main enquiry in the cause relates to the novelty of the invention claimed by Carlier and Vignon. I have no doubt they were original inventors; but were they the first?

The earliest date to which their invention is carried back is June, 1862. Although there is no evidence in the cause fixing this date, yet, from what incidentally appears and for the purpose of determining the priority of their invention, it may fairly be taken as the time when invention was completed.

What, then, did they claim to have invented? This is very clearly described in the reissued patent in controversy.

"It consists," says the specification, "first, in the process or method of extinguishing fires by means of a jet or stream of mingled water and carbonic acid ejected from a closed vessel in a suitable direction by means of the pressure or expansive force of the mixture contained in the vessel; and, secondly, in the construction of apparatus for containing and delivering this extinguishing medium, which apparatus may be made of an exceedingly portable nature, and kept always charged and ready for use at a moment's notice at the particular locality which it is desired to protect."

To show that the invention thus claimed is not novel, the defendants have exhibited in evidence a rejected application of Dr. William A. Graham. It appears that on the 23d of November, 1837, Dr. Graham applied for a patent for a method of extinguishing fire, by projecting upon it a stream of mingled carbonic acid gas and water, and filed a specification, in which he fully described the mechanical devices to be used in effectuating this method, and the process of operating them. On the 25th of November, 1837, his application was rejected, for reasons stated by the Examiner, which now seem strange enough. This decision was reaffirmed on the 16th of December following. On the 29th of December, 1837, an amended specification was filed, and thus the case stood until December, 1851, when a model and drawing and a third specification were filed, and the application was renewed and finally rejected. These several specifications and the drawing are all in evidence in the cause; and it is urged that *they, of themselves*, are effective proof of prior invention by Graham.

But it does not follow that a rejected specification and drawings are, under all circumstances, inadmissible as evidence. By themselves they are inconsequential, but when the inventor's idea is perfected by a practical adaptation of it, in the form of mechanism, they are valuable guides in ascertaining the date of the invention, the design of the inventor, and the principle, intended functions, and mode of operation of his mechanism, and they must, therefore, necessarily be considered in connection with it.

So, in the present case. Dr. Graham embodied what he supposed he had discovered in a practical form; for the proofs establish beyond question that as early, at least, as 1853 he constructed apparatus which he then exhibited.

As early, at least, as 1851, a model and drawings of the apparatus described in the specification were filed by Dr. Graham in the Patent Office. With the aid of all these there certainly could be no difficulty in constructing the necessary apparatus for the practical application of the invention. Indeed such apparatus was constructed by Dr. Graham as early at least as 1853, and it was produced at the hearing, with the immaterial substitution of a piece of new hose for the old piece originally attached to it, its identity having been incontestably established.

It appears that, in 1852 or 1853, Dr. Graham made a trial of his apparatus near Lexington, Va., in the presence of a large number of witnesses, by setting fire to a large pile of straw, and then throwing upon it a stream of mingled water and carbonic acid gas projected from his extinguisher by the expansive force of the gas. That this trial was successful is apparent from the fact that the progress of combustion was promptly arrested, and the failure to extinguish the fire entirely was manifestly due solely to the insufficient capacity of the extinguisher, as compared with the magnitude of the ignited material. The incompatibility of carbonic acid gas with fire needed no proof, because it was an indisputable fact; the problem to be demonstrated was the practicability of the proposed method of discharging and directing carbonic acid gas in combination with water upon an ignited mass, whereby the well known properties of both these substances could be made usefully available. So far as this result was concerned the trial made must be considered as having proved the utility and efficiency of the invention.

But equally if not more satisfactory proof on this point was furnished at the hearing of this case. The same appliances, used by Dr. Graham on the occasion referred to, had been made exhibits in the case, were produced in court, and were subjected again to the test of trial. They consisted of a metallic fountain, or closed vessel, charged with carbonic acid gas and water, to which was attached leather hose ending in a bunch of nozzles, and alternately a single nozzle. When the stopcock opening into the hose was turned, a stream of mingled gas and water at once issued from the nozzle, and, by means of the expansive force of the contents of the vessel, was projected to a distance exceeding that stated by Dr. Graham in his specifications, until the vessel was emptied.

Against the pressure of all these proofs I cannot resist the conclusion that Dr. Graham devised an original method of extinguishing fires by the combined agency of carbonic acid gas and water, and that he "perfected and adapted" his invention by embodying it in the form of mechanical appliances capable of operative and successful use.

It was urged, however, that the efforts of Dr. Graham are to be treated as abandoned experiments. An experiment may be a trial, either of an incomplete mechanical structure, to ascertain what changes or additions may be necessary to make it accomplish the design of its projector, or of a completed machine to illustrate or test its efficiency. Obviously, in the first case, the incompleteness of the inventor's efforts, if they were then abandoned, would have no effect upon the rights of a subsequent inventor.

But if the experiment proves the capacity of the machine to effect what its inventor proposed, the law assigns to him the merit of having produced a complete invention.

It is hereinbefore shown that the theory of Dr. Graham attained this practical condition, and there, apparently, his efforts ceased. But why? Repulsed from the Patent Office by the arbitrary assumption that his enterprise was impracticable with the employment of any mechanical auxiliaries whatever, without pecuniary resources, his "poverty, not his will, consented" to an abandonment of further effort to secure the full benefit of his invention to himself and to the public. But this will not help the complainants. The most that can be predicated of his inaction is that he abandoned his invention to the public, although I do not affirm this hypothesis. But if he did, it will not reduce his matured invention to the grade of a mere experiment, and open the way to the complainants to appropriate the title of first inventor.

From what has been already said, the first claim of the patent cannot be sustained. Graham was prior to Carlier and Vignon in devising the "improvement in the art of extinguishing fires" embraced in this claim, and the merit of novelty cannot, therefore, be accorded to the latter.

The other claims are for mechanical combinations.

The ninth is for a combination of a strong vessel, a lid or plug, a stopcock near the bottom of the vessel, a hose and nozzle, and handles or loops, "whereby a volume of water charged with carbonic acid gas may be transported and a stream thereby directed, in the manner and for the purposes described."

The tenth is for "the keeping of the acid and alkali or alkaline solution in separate and distinct vessels, but in such proximity to each other that they may be immediately brought into contact when the apparatus is required for use."

All these claims, except the last, are for combinations of devices, none of which devices are alleged to be new, and while the coefficiency of all of them is necessary to effectuate the ulterior design of the patentees, they are subdivided into groups and claimed as several inventions. Indeed the specification is a notable example of ingenious multiplication of claims, so as, it must be presumed, to embrace and protect the invention in every possible aspect of it.

It is not to be doubted, however, that a valid combination may consist of old elements, which have not been before similarly arranged, or, if they have, that a novel result is produced by their conjunction. Either the instrumentalities employed or the effect caused by their operation must be new to constitute a patentable combination. If substantially the same devices have been used before for a like purpose, or if they are applied merely to effectuate a method known and practiced before, such employment of them will not be protected by a patent.

Were these elements, then, similarly combined before and used for an analogous purpose? I am convinced that an inspection and analysis of some of the defendants' exhibit, and especially of Nichols' "portable soda water fountain," patented in 1854, must result in an affirmative answer to this question. The devices which compose the combinations claimed in the complainants' patent are substantially embodied in Nichols' apparatus, and it in they are arranged and operated in substantially the same way as in the complainants.

The object of Nichols was to construct apparatus in which acid and an alkali could be kept in separate vessels, but in such proximity to each other that they could, at the will of the operator, be brought into immediate contact: carbonic acid gas thereby generated and a body of water contained in an inclosing vessel impregnated with it, and that the acidulous water could be discharged through a suitable opening by the elastic pressure of the gas and used as a beverage. The essential elements of his apparatus are a strong metallic vessel of portable dimensions, to be filled with water, with an opening in its top; a plug to be screwed into this opening; another vessel enclosed within the strong one to contain diluted acid, and connected with it by an exterior pipe which extends into and to the bottom of it; a tube or smaller vessel, for holding an alkali within the acid chamber with an open bottom, which is provided with a tight-fitting lid attached to a rod exteeding up through the top of the vessel, by which the bottom can be opened and closed at pleasure; and a stopcock to permit and direct the discharge of the contents of the strong vessel in a mingled stream of carbonic acid gas and water. To operate this apparatus the strong metallic vessel is nearly filled with water through the opening in its top, the alkali chamber is taken out of its place within the acid chamber, into which latter is poured a quantity of diluted acid, an alkaline substance is put into the alkali chamber, against the bottom of which its metal covering is tightly drawn by means of the rod attached to it, and it is then replaced and tightly screwed into the acid chamber. By a revolution and slight pressure of the rod, the bottom of the alkali chamber is brought into contact with the acid in the chamber below. Carbonic acid gas is at once generated and is conducted through the pipe provided for that purpose to the bottom of the water vessel, where it is intermixed with the water and from which it is driven, as desired, through the discharge pipe by the expansive force of the gas.

It is plain to my mind that it is only necessary to add a hose and nozzle to the discharging stopcock in the Nichols fountain to make it as effective a fire extinguisher as the complainants'. The obvious addition of so simple an element to the devices which coexisted in the old machine and perform all the fundamental functions of the subsequent one, cannot constitute the combination of a new and patentable one.

But it is urged that the prior construction of structures of this class cannot affect the question of novelty here, because they were not applied to the extinguishment of fires, and their use and that of a fire extinguisher are entirely diverse. It must be observed that there is a marked analogy in the means employed and the result produced by both machines up to the point of divergent application. The function of both is the prompt generation of carbonic acid gas and the impregnation of water with it, and the same projectile force is employed to expel the acidulous water from the vessel containing it. In the one case, a stream of this water is directed into a vessel, where it may be used as a beverage, and, in the other, upon a mass of ignited matter. This difference, then, in the ultimate application of the same agencies, marks the line of distinction between them.

Now, the art of extinguishing fires by means of carbonic acid gas and water intermingled was not new, for it had previously been practiced by Graham; and the real question, therefore, is: Does the application of old mechanical devices, without material change, to a use in which they were not employed before, but which was known and had been practiced, constitute a patentable invention? A decisive answer to this question is furnished by Mr. Justice Story, in Bean *vs.* Smallwood (2 Story, 408), where he thus states the law:

> Now, I take it to be clear that a machine, or apparatus, or other mechanical contrivance, in order to give the party a claim to a patent therefor, must in itself be substantially new. If it is old and well known, and applied only to a new purpose, that does not make it patentable.

And, in Curtis on Patents (3d ed., sec. 56), the result of the authorities is thus accurately stated:

> Of course, if any new contrivances, combinations, or arrangements are made use of, although the principal agents are well known, these contrivances, combinations, or arrangements may constitute a new principle, and the application or practice will necessarily be new also. But where there is no novelty in the preparation or arrangement of the agent employed, and the novelty professedly consists in the application of that agent, being a well known thing, or, in other terms, where it consists in the practice only, the novelty of that practice is to be determined, according to the circumstances, by applying the test of whether the result or effect produced is a new effect or result not produced before.

It is apparent, therefore, that where an effect or result has been before produced, the mechanical agencies by which it is reproduced, if they are not in themselves new, are not the subject of a patent.

This rule is decisively applicable to the present case, both as to the result achieved and the means employed to effectuate it; and the claims for both being thus invalid for want of novelty, the bill must be dismissed with costs.

[*Edmund Burke* and *Keller & Blake*, for complainants. *Chas. B. Collier* and *D. L. Collier*, for defendants.]