was reduced to $\frac{1}{824}$ of its volume by pressure, and by press ure and cold to $\frac{1}{554}$; hydrogen by cold and pressure to $\frac{1}{378}$; it is stated that none of these gases exhibited any appearance giving a correspondent's theory, and pointing out that fire of liquefaction. Berthelot also made experiments in the same officials and other authorities had reached no definite condirection in 1850, and, by means of the expansion of mer- clusion as to its cause. Investigation as to theinflammable or cury, subjected oxygen, nitric oxide, and carbonic oxide to immense pressures. He concludes "that pressure alone is was chlorate of potash, a small amount of fulminate, used not capable of effecting the liquefaction of gases under cer- for the making of snap crackers, and a large quantity of tain conditions of temperature," but suggests that better re- starch, from which material moulds are made for candy. sults may possibly be obtained by the aid of powerful re- These moulds, it appears, after being charged with syrup, frigeration. Natterer of Vienna has also made valuable are put in a drying room, which is highly heated. And it experiments in the same line.

than half a century has defied all experimenters has been Starch also was probably present in several of the work for duplicity, as the several matters, although relating in a solved. Almost simultaneously, yet by different methods, rooms in the form of fine dust, owing to its being used in the liquefaction of the supposed permanent gases has been this condition in some of the manufacturing processes, accomplished by Raoul Pictet, of German Switzerland, and M. Cailletet, in Paris. M. Cailletet's apparatus consists reasonable theory as to the cause of the catastrophe. It may of a massive steel cylinder with two openings, through one be assumed that accidental conditions were such as to ignite of which hydraulic pressure is communicated. A very strong small tube passes through the other and is inclosed explode with terrific violence, and that thereby the powin a freezing mixture. It opens within the cylinder into a dered starch in the rooms became fired and also exploded; second smaller cylinder serving as a reservoir for the gas to or the circumstances may be reversed, as it is quite as reabe compressed. The remaining space in the large cylinder sonable to suppose that the starch, being highly explosive in is occupied by mercury. The gas is compressed into the its comminuted state, blew up first, constituting the major small tube and then suddenly placed in communication with explosion, which subsequently involved the chemicals. The the atmosphere, when its expansion causes its intense re- examination of the details of many other mysterious explofrigeration.

The original announcement of M. Pictet's discovery is starch lies at the bottom of this one. given in another column. The following details are given Two years ago just such a casualty occurred in the Pullin Nature:

those used for making ice in his ice machine (which we recent- haust blast into a pipe and forced to the furnaces, where ly illustrated), driven by an engine of 15 horse power. Two they were consumed. When it was not desired to direct of these are employed in procuring a reduction of tempera- the material into the furnace, communication therewith was ture in a tube about four feet long containing sulphurous closed and a grating prevented the escape of the dust, etc. acid. With the pumps at full work there is a nearly per- from the cupola in the roof, to which it was conducted. fect vacuum over the liquid and the temperature falls to While cleaning this receptacle the workmen discovered its cool the carbonic acid after compression, as water is used to furnace. A stream of water was thrown in, but the instant sufficient for the complainant to show that wherever the parcool the sulphurous acid after compression. This is managed this was done a tremendous explosion ensued, killing 13 men⁺ ticular patented improvement was introduced other kindred as follows: In the tube thus filled with liquid sulphurous and destroying the adjacent portions of the building. Two devices could not be sold. acid at a temperature of -76° Fah. there is another central months prior to this casualty a similar one occurred at the one of the same length but naturally of smaller diameter. works of the Milburn Wagon Company at Toledo, where This central tube M. Pictet fills with liquid carbonic acid at the fine wood dust in a shaft exploded, causing extensive a pressure of four or six atmospheres. This is then let into destruction. another tube 12.8 feet long and 1.2 inch in diameter. When thus filled the liquid is next reduced to the solid as ordinary illuminating gas is liable to explode when mixed form and a temperature of -220° Fah., the extraction of with air in the right proportion, so will the dust of any inheat being effected as before by the pump.

taining carbonic acid was placed in the tube containing sul- Ofen-Pesth (Austria) steam mill a terrific explosion was phurous acid, so is a tube containing oxygen inserted in the caused by a cloud of dust of some very fine varieties of long glass tube containing the now solidified carbonic acid. flour being ignited by a candle. In 1872, at Glasgow, a One end of this tube is connected with a strong shell con- flour explosion was caused by sparks from the millstones. taining chlorate of potash; the other end is furnished with a Professors Rankine and MacAdam investigated the subject, stop-cock.

applied to the chlorate, and a pressure of 500 atmospheres furnished by the decomposition of flour and of wood, may was registered; this descended to 320. The stop-cock was produce explosions. Flour and bran mixed gave off at 450° then opened, and a liquid shot out with violence. Pieces of Fah. a gas which, mingled with nine times its volume of air, lighted wood held in this stream spontaneously inflamed ignites; and such a temperature may be obtained by friction with tremendous violence

paratus. Under a pressure of 200 atmospheres the tube was laden air with a light. opened, and a number of drops of liquid nitrogen were formed. Hydrogen was next experimented with, and this, gory in this respect. The correspondent whose letter we the lightest and most difficult of all gases, was reduced to published last week states that finely pulverized cork in air the form of a mist at 280 atmospheres. The degree of cold is also explosive, and that it caused a similar disaster at the attained by the sudden release of these compressed gases is Linoleum Company's factory on Staten Island, where it is specific devices embodying the same general features of conscarcely conceivable. The physicists present at the experiment estimated it at -508° Fah.

it was deemed of interest to carry out the process with air, and the apparatus was filled with the latter, carefully dried and freed from carbonic acid. The experiment yielded the same result. On opening the tube a stream of liquid air kind, as well as those tending toward slow spontaneous com- plies with equal aptitude to each, that there are generic issued from it resembling the fine jets forced from our mod. | bustion, often exist over long periods of time in manufac. | features of identity which indicate the same basis of invenern perfume bottles.

atmospheres, and at +12 Fah.; the details relative to the been filled with starch dust day after day for years, just as is such diversity as will require a division of the application,

MYSTERIOUS EXPLOSIONS.

explosive material in the manufactory has shown that there is stated that in previous fires in candy manufactories, when Within the last few weeks the problem which for more the flames have reached this room, explosions have occurred.

It seems to us that here are quite sufficient data to base a the chlorate of potash or the fulminate, which last would sions fortifies us in the belief that the finely pulverized

man Car Works at Detroit. There all the sawdust and shav-M. Pictet uses four vacuum and force pumps, similar to ings from the wood-working machines were taken by ex-

Much further evidence can be adduced to show that just flammable material. A sawdust explosion occurred four Now it is the turn of the oxygen. Just as the tube con-years ago in the town hall of Friedele, Germany. At the and found that the rapid combustion of the finely divided When the tube was as cold as its surroundings, heat was flour, as well as the ignition of a mixture of air with the gases in the grinding process, or, as might have been the case in M. Cailletet first introduced pure nitrogen gas into the ap- the Barclay street disaster, by actual contact of the dust-

Flour, bran, starch, sawdust, all belong to the same cateused in the manufacture of floor covering. In the Grahamite mines of West Virginia an explosion was caused by a Although oxygen and nitrogen had both been liquefied, dry, resinons, brittle material filling the mining shaft in the form of impalpable dust, which it was afterward found could not be entered with impunity without safety lamps.

We do not doubt but that conditions for explosions of this rooms in other candy factories now are; but the combining proportions might not have been exactly right, or the misopportune spark might not have been applied. So also in wood-working shops. Under the flooring of many we dare say there are abundant accumulations of sawdust and shavings-perhaps steam pipes are imbedded in this refuse. Inspection may reveal no immediate apprehension of danger, but a few drops of oil may trickle in upon the mass, rapid oxidation may be caused, and a disastrous fire or explosion may ensue. The ounce of prevention in such cases would be worth many pounds of cure.

May 15, 1873, for the term of five years, and the reissue in A singular explosion occurred in a candy manufactory in question was not limited to expire at the same time with the carbonic oxide by same to 1/278; and nitric oxide to 1/80. Yet this city about a month ago. We adverted to this last week, foreign patent. 2. That new matter was introduced into the reissue which was not shown and described in the original patent. 3. That for the purpose of deceiving the public the description in the reissued letters patent was made to contain less than the whole truth relative to the alleged invention. The plea or pleas were set down for argument, and the first question raised was whether the same were not bad for duplicity. The counsel for the defendant insisted that they were not, because, although three distinct matters were alleged against the right of the complainant to recover, they all related to a single defense-to wit, the invalidity of the complainant's patent. The court held that the plea was bad general way to but a single defense, namely, the invalidity of the complainant's patent, were essentially independent of one another, and by their retention destroyed the very office of the plea, which was to secure singleness in the issue. The court therefore ordered that the pleas as filed might be set down as an answer at the option of the defendant, or that the defendant might elect within a specified time which of the several grounds of defense he would stand on, and that the other grounds be overruled.

The case of the Gould's Manufacturing Company vs. Cowing came up on exceptions taken by the defendant to the report of the master under the interlocutory decree directing an accounting upon the infringement of the plaintiff's patent. The invention was one only of an improvement in a pump, and not of the entire pump. Numerous parts of the pump were in general use prior to the grant of the complainant's letters patent, and were not claimed therein, and were free to be used by the defendant. The patented invention claimed was a special construction of a side chamber, whereby the same was adapted to use with valve casings bolted on the outside. Held: That the damages could not exceed the profits upon such improvement, and that upon the failure of the complainant to show the profits or damages arising from the use of the improvement, the master should decide that nom--85° or -94° Fah. M. Pictet uses this sulphurous acid to contents to be on fire, sparks having been drawn in from the inal damages only could be recovered; and that it was not

OF THE PATENT OFFICE.

The interlocutory appeal in the matter of the application of Henry Law for letters patent for "improved window blind actuator" has been decided adversely to the applicant.

The claim was for two independent results produced by two independent mechanisms, namely, a device for opening and closing window blinds and a device for locking and unlocking the blinds.

Rule 15 of Office Practice authorizes the claiming of two distinct devices in one application where they are "dependent upon each other and mutually contribute to produce the new result." The question to be determined in the case, therefore, was: Had the applicant combined the two devices so that the operation of each contributed, either simultaneously or successively, to a unitary_result?

It appeared that not a single part of the mechanism for opening and closing the blinds was described as affecting the operation of any part of the locking mechanism, nor was the latter dependent on the former in any respect whatever. Both mechanisms performed precisely no other function, when used together on one window, than when used separately a thousand miles apart. The Commissioner held that there was not such an intercommunication of parts or mutual dependence of the distinct devices to entitle them to be incorporated in the same application.

In the interlocutory appeal of Howland, lately decided, the practice of the office in regard to the admissibility of several struction in a single application is laid down as follows: Whenever a generic claim can be predicated which is good in view of the state of the art, and which will include the modifications or specific devices described or exhibited in the drawings, then these may all be retained in a single application; for it is manifest, from the fact that the claim aptories without the immediate cause of disaster happening to tion. On the other hand, where no claim of the charac-M. Cailletet reports the liquefaction of nitric oxide at 146 come into action. Probably the rooms in this factory had ter indicated can be maintained, it is equally true that there

other gases are not yet at hand.

The discoveries of MM. Pictet and Cailletet are of the highest importance, both as adding still further confirmation to the dynamic theory of heat, and as opening the way to new studies into the nature of our atmosphere. They will also tend to induce further examination into Professor Graham's inference of the existence of hydrogen in solid form-a substance which he named hydrogenium-believed to exist in an alloy with palladium, and the density of which he calculates to be 0.733. As it appears clearly from the records of the experiments now at hand that refrigeration-as Berthelot predicted-has more to do with liquefaction than compression, it would seem possible to find a limit for our atmosphere, which could not exist in gaseous form if suddenly dispersed in planetary space. The idea is suggested that a boundary may exist at which, through the intense a circulation is constantly taking place.

WHILE this winter may yet be very cold, Professor Smyth's predictions to that effect thus far are hardly verified.

NOTES OF PATENT LAW DECISIONS.

OF THE COURTS.

In Reissner vs. Auness, the suit was brought against the and a series of pipes by means of which hot water may at defendant for infringement of certain letters patent, No. any time be conveyed through the filter. The water enters cold, air is always liquefying, falling, revaporizing, and thus 7,751, reissued to John A. Fray, June 19, 1877, for "improve- at the discharge end and passes through to the supply end, ments in coal oil stoves," to which the defendant put in a where it escapes to a pipe leading to the sewer. The hot plea embracing three distinct defenses, namely: 1. That water dissolves the various salts hitherto held in solution by the reissue to Fray was unlawful, because he had previously the cold water, and mechanically removes all solid matter obtained a patent in Canada for the same invention, granted i from the charcoal filling.

this restriction being pursued until the matter retained in a single case can be safely said to relate to but one invention, or, in other words, can be contained in the broadest patentable claim that is capable of being drawn to it.

A New and Easily Cleansed Filter.

Filters are liable to become choked with the material which they collect, especially where water is filtered before use in a steam boiler, and the result is that the supply through the stoppage of its conduit is materially diminished. Messrs. Ralph S. Jennings and Norman G. Kellogg have recently patented, both in this country and abroad,

an ingenious device which they claim entirely obviates the above mentioned trouble. The filteris provided with a valve