gas companies of New York, thus sums up the case against them:

"The citizens of New York to-day stand perfectly helpless before the monopolists. They are compelled to pay for what they do not receive; and the thing that is foisted upon them for their money's worth is nearly worthless. The governments of the continent of Europe, which we are accustomed to regard with such horror, are a little more careful of the people's pockets than this; and with all our boasted self-government we are no better than a prey to political and mercantile swindlers."

This condition of affairs upon which the country has unfortunately fallen, is partly due to the want of foresight in the framing of charters; but chiefly to the ease with which legislative bodies can be manipulated by vast monied interests. The history of the gas investigation last winter at Albany, proves that no ordinary means will avail to compel honesty in the dealings of incorporated companies, when they are rich enough to spend money freely. The attempt was made to fix a standard quality for gas, and to enact that when less than fourteen candle gas was delivered, a drawback should be allowed to the consumer. It is well understood how that bill was killed in the Senate, and how by a liberal use of money, and judicious distribution of shares, the gas companies procured its defeat.

How to now curtail the power of such monopolies is a question of the utmost difficulty. Every attempt to do it has thus far signally failed. We confess that we can at present see no adequate means by which the people at large can combat the power so imprudently vested in unscrupulous corporations. But this we can see; that this power is becoming a danger to the commonwealth, which it is blindness to ignore, and the consideration of which it is folly to defer.

THE PRESERVATION OF MEATS WITHOUT SALT.

There are two reasons why the use of salt for preserving meats is objectionable. The first and most important is that meats thus preserved lose important nutritive qualities, and therefore, if used constantly, give rise to scorbutic diseases, of which impaired nutrition is undoubtedly a cause.

Second, salt meats are for the most part less palatable than fresh.

It is true that in temperate climates where a great variety of food—vegetable, as well as animal—is used, salted meats are largely used without seriously bad effects, their defects being compensated for by other kinds of food; but even with the most abundant supply of vegetable food, fresh meats are preferred when obtainable, and they constitute a large proportion of the food supply of all large cities in civilized countries.

Such being the case, all attempts at preserving meats fresh during their transportation through long distances, from localities where meat is cheap and abundant, are of the highest importance, especially to the poor who find it difficult to obtain a proper supply of fresh meat.

It has been recently announced, that an eating house in London has been able to furnish a good nourishing bowl of meat soup to the poor, at the low price of two cents, and a plate of well cooked, wholesome, fresh meat at the same price It is also stated that a similar establishment has also commenced operations in Paris. These meats have been brought from New Zealand and Australia, and are said to arrive in excellent condition.

We have from time to time discussed various meat-preserving processes invented in this country and in Europe, and we will in this article give some particulars of more recent methods.

One of these is a method employed by M M. Tellier and Lecoq, at Monte Video. The apparatus used was a freezing machine, invented by M. Tellier. The fullest account of this apparatus we have met with is contained in the *Leader*, a journal published in Melbourne, Australia:

M. Tellier, as his means of freezing, uses the volatile gas of ammonia, or methylic ether. Under the influence of the heat contained by the liquid or the air to be cooled, the vaporization of the gases takes place; a force-pump compresses the vapors thus formed, which are condensed in a worm or or series of small tubes, surrounded by cold water, where, being again liquefied, they return to the evaporator, and reproduce the same effects. M. Tellier prefers methylic ether, as under his system he obtains from it the same results in cold, by a pressure not exceeding 50 lb. to the square inch, as he can with the pure gas of ammonia under a pressure from 120 lbs. to 200 lbs., according to the temperature of the atmosphere.

As all forms of ether, from the liability of ignition, are objected to on board ships, M. Tellier was compelled to employ the pure ammoniacal gas as his freezing agent. The meats to be preserved were suspended in a small room between decks, carefully protected by thick non-conductors. Air cooled in the machine down to 32 degrees Fahrenheit was, from time to time, circulated round the meats, the object being not to freeze them.

These gentlemen placed on board a steam packet running to London, about half a tun of fresh beef, mutton, poultry, game, and fish, inclosed in a temperature reduced to 32° by means of one of M. Tellier's freezing machines.

It seems that the machine was too complicated, and that by the time the ship reached the equator, the pump worked with difficulty, and a large escape of gas ensued. From the seventeenth to the nineteenth day out, the temperature rose from 32° to 36° Fah, and when the pump ceased to act, the meats decomposed before repairs could be effected.

An important defect in this experiment appears to have been in not freezing the meat at the outset, as in a frozen state it would have doubtless kept until the pump could have been repaired. The pump works under a pressure of two hundred pounds per square inch, and it must be therefore a matter of some difficulty to keep it from leaking during an entire voyage. On shore, as an ice-making machine, the apparatus is said to work well. One of them is at work at Marseilles in France, producing, it is stated, ten tuns of ice per tun of coal consumed.

The use of flat boxes for packing frozen meat, is said to have proved very good for the purpose, the broad sides being of sheet iron to form a freezing surface, and the narrow sides of deal to form a non-conducting surface. The boxes are about a yard square, and from five to ten inches in depth; and Mr. Julius Jeffreys, the originator of this plan, proposes to place them together in one solid mass, and to keep a double current of chilled air in constant circulation over the whole surface of the mass. Blowers or fanners will draw the currents from the chilling chamber surrounding the ether or ammonia vessel, as the case may be, and containing a series of sheet metal chilling tubes. The air will be driven along air passages traversing lengthways an air casing, surrounding everywhere the block of boxes.

An ammonia ice-making machine, invented by Mr. Rees Reece, is highly spoken of by the Australian press, and our readers will bear in mind that in no part of the world has more attention been paid to this subject than in Australia, where cold is regarded as the only means by which her vast surplusage of mutton can find a market. The details of this machine are not given; but the *Leader* states that its special superiority consists in its construction and arrangement for effecting the continuous distillation and rectification of dilute solution of ammonia upon what is known as the separative principle. By its use, it is stated, twenty-five to thirty tuns of ice can be made with a consumption of one tun of coal, and even more than this is claimed, but it is evident that these results are over-stated.

The tendency of opinion seems to be at present setting more and more strongly to freezing processes as a means for preserving meats, and we think there is more hope that success will be reached "on this line" than in any other way.

CANAL THROUGH THE ISTHMUS OF DARIEN.

There are probably few thinking men who do not foresee that, sooner or later, a ship canal must connect the Atlantic and Pacific waters. Which of the routes hitherto surveyed and discussed will be ultimately selected as most favorable to success in a work of this kind, time will show; but at present there is really too little knowledge of possible routes to form a correct and final judgment. An error in choice, easily avoided by a proper exploration at the outset, may involve unnecessary and enormous expense in construction.

Three routes have been much mooted, and our general knowledge of them obtained by former surveys is enough to give a tolerable idea of their feasibility. The Panama route involves only twenty-eight miles of construction, but there are difficulties which, although not insurmountable are of great magnitude. The Nicaragua route *via* the river San Juan and Lake Nicaragua involves only sixteen miles of construction, but it involves the improvement of the river navigation, and, without doubt, also that of the lake. The third route discussed, called the Tehuantepec route, is one hundred and thirty miles in length, and there is probably less accurate knowledge in regard to it than either of the others.

The matter standing thus the Government has acted wisely in dispatching a steamer to Aspinwall to make surveys and gain further light.

Meanwhile, and in anticipation of the presentation of the subject to Congress for definite action, the press, which will undoubtedly almost unanimously favor the project, can do much to create a popular opinion in its favor.

That the immediate construction of such a canal would result in great and lasting benefit to the commerce of the United States seems to us as scarcely admitting of dispute. The most casual inspection of the map of the world will show that many of the richest and most productive portions of the globe would be brought so near to our Atlantic ports that no nation would be able to successfully compete with us in securing their traffic. The East Indies, China, Japan, and the whole Pacific coast of South America, would naturally pour their vast products into our warehouses and freight our merchant vessels with profitable cargoes. And last, but not least, the dangerous passage of Cape Horn, hitherto the dread of navigators and the scene of untold disasters, would be abandoned forever as an avenue of commerce.

NEW FACTS ABOUT THE PRESERVATION OF TIMBER.

Mr. Charles Coisne, from Belgium, in a report on the prepared timber exhibited in Paris, in 1867, remarks, that at present only two methods for the preservation of railway sleepers seem to be in use, to wit: The saturation with sulphate of copper, and the one with oil from gas tar. Only the latter is considered as really practical and effective. The Southern French Railway Company exhibited pine sleepers that had been impregnated with sulphate of copper; but, albeit, they had been only from seven to ten years in use, some of the specimens, on examination, were found to be more or less rotten. Specimens of Dorsett and Blythe, in Bordeaux, appeared well preserved; but no date as to the time of their being in use could be ascertained. The creosotized fir sleepers from Bethell, in London, were perfectly unaltered after having been in the ground from sixteen to twenty years. Creosotized beech and oak sleepers of Dorsett and Blythe showed also no marks of rot; but they lacked data as to the time they had been in service. The first wood-creosotizing establishment, according to Mr. Coisne, was founded in Antwerp, in 1858, the second in Ostende, in 1859, and a third in Ghent a year later. 1,682,880 railway sleepers were impregnated in these establishments during the last decade, besides a great deal of timber for Belgian sea-ports. Two thirds of all the sleepers in Belgium have undergone the process of creosotizing. It might, therefore, be supposed that the cost of maintenance for ties on these lines would soon be reduced to almost nothing. However, this will probably not be the case, for some of the ties that are injected with oil from gas tar exhibit, after the first few years, marks of a more or less advanced decomposition. This cannot be attributed to the ineffectiveness of the creosote, but must be ascribed to the fact that the impregnation had not been complete. It has been taken for granted that 150 liters of creosote are sufficient for one cubic meter, but this quantity is hardly sufficient to saturate the sap-wood; the denser heart wood becomes rarely saturated. This accounts for the fact that the latter is most subject to rot. Mr. Coisne, in 1864, recommended to perforate the level part of the sleepers where the heart wood lies exposed, and also the surfaces of support of the chair. It is satisfactory to state that this process has been employed with goodresults by the chief civil engineer of the Department de la Vendée, France. When improper timber is selected, or when the timber is treated on wet or cold days, or when inferior creosote is employed, one may be almost certain that the hopes anticipated as to the endurance of the material will not be fulfilled. The results which Béthell obtained in England have been confirmed in Belgium. Thirty per cent of creosotized fir sleepers were found to be still unaltered, after eighteen years' service. As to the amount of creosote absorbed by them, it was ascertained to be twenty liters, which quantity was obtained in deducting the average weight of non-prepared sleepers from that of prepared sleepers. The creosote did not contain any carbolic acid, but considerable portions of napthaline; it was distilled at a high temperature, dissolving in naphtha to which it imparted a green color.

In 1862, 1,297 telegraph poles were creosotized in Ghent, Belgium; in 1863, 3,553 pieces. On the other hand, 600 were treated in 1864, in closed vessels with sulphate of copper, and 3,010 in 1865. The last mentioned process must be considered far superior to the method of Boucherie, for which the trees must be felled in the most unfavorable season. If not well executed, the impregnation of telegraph poles with creosote oil, will likewise not yield satisfactory results.

Coisne finally recommends to comply with the following requirements: 1. The injection should be carried to complete saturation, 250 liters of creosote being necessary for one cubic meter of wood. For oak, of which only the sapwood need to be saturated, 100 liters are considered sufficient. 2. The creosote employed should be distilled at a high heat. Two thirds should be gathered at a temperature exceeding 480 Fahrenheit, while one-third at most should not be collected below 390 Fahrenheit. The oil should be of a greenish color, and not contain over thirty per cent of napthaline. 3. The heartwood, wherever it lies exposed, should be well perforated with a proper instrument so that the preservative may pass everywhere. 4. The wood should be exposed to the air for eight or ten months, before treating, and the saturation must be effected first in the vacuum and subsequently under pressure.

MADDER EXTRACTS AND THEIR APPLICATION IN TOPICAL DYEING.

In spite of the discovery of the aniline pigments, madder has retained its prominent position in topical dyeing, or calico printing. This is easily explained when we take into consideration the beautiful shades produced by means of alumina and iron mordants, and also their wonderful stability.

Since the beginning of this century great strides have been made in the preparation of extracts of madder; partly on account of the introduction of cylinder printing machines, partly because of the rapid increase of the knowledge of the chemicals employed in this art.

Let us glance over the various modes for preparing madder root. Formerly this latter was simply dried and ground, but in more recent times, great care has been bestowed upon the removal of the foreign ingredients with which madder is associated; and this eventually led to the preparation of the madder flowers, garancine, and alizarine. But as these dyestuffs are admixed with a considerable proportion of fibrous substances, their coloring power is only seven or eight times greater than that of the root, and, besides, they can serve for dyeing only, not for printing, at least not according to the old methods.

Various attempts have consequently been made for some time past to fix the madder dyes on the cloth by printing. Experiments in this direction were undertaken by Robiquet, Colin, Lagier, and Persoz in 1827; ten years later, Gastard, in Colmar, discovered a process which was improved upon in 1855 by Hartmann, and introduced into some print works of small extent. These methods were similar to each other in that the cloth was uniformly mordanted, then printed with a solution of madder extract in ammonia, soda, or soap, and finally exposed to steam. However, it was soon discovered that uniform mordanting is not practical, unless perfectly pure alumina bases are at hand, and, besides, the madder extracts at that time brought into market were too impure to yield constant results, or to allow the simultaneous fixation of mordant and pigment.

These extracts were mostly prepared by exhausting madder flowers or garancine with wood spirits or alcohol, their coloring power was fifty times greater than that of the dye root, but they contained about sixty per cent of ineffective resinous matter.

As a very excellent product for its time may be mentioned the "colorin" of Lagier and Thomas, which, however, did