33 per cent of copper into sulphate, the bath was easily kept at standard strength without the addition of any copperas whatever. The salt added was equal to twenty-five per cent, and the maximum of iron consumed, to seventy-five per cent of the copper produced.

Our cost of making copper, obtained as cement, exclusive of mining and dressing the ores, and not including the power required to work the stirring tanks, which was merely nominal, was, for producing 2,100 pounds of copper, from 21 tuns of 5½ per cent ores, $76.96, equal to 3⅔ cents a pound.

The cost of the plant required is small. The furnaces are simple and inexpensive in construction, and require about 2 5,000 bricks each. The tanks cost, complete, about $60 each, and the labor employed need not be skilled or high priced.

AMERICAN ACADEMY OF SCIENCES.

During the second day's session, papers were read by Professor Elias Loomis on the phenomena of great storms, in which he gave some results derived from the examination of the United States weather maps, and by Professor Theodore Gill on the number of classes of vertebrates and their mutual relations. Dr. Newberry repeated the paper read by him before the Portland meeting on the circles of deposition of American sedimentary strata, giving a comprehensive theory of the formation of all the sedimentary rocks in this country.

The association then adjourned to meet at the Stevens Institute, where Professor Mayer described a

NEW METHOD OF ANALYSIS OF COMPOSITE SOUNDS.

It is well known that if a surface advance regularly under a point of a body having a pendulum vibration in a plane parallel to the surface, this point will describe on the surface a sinuroidal or (as it is now more generally called) a harmonic curve. Ohm states that such a vibration, and only such, can produce on the ear the sensation of a simple sound —in other words, of a sound which has one and only one pitch. But the point of the sonorous body, whether it be a point of a membrane, of the drum of the ear, of the end of a vibrating rod, or of the air itself, may be actuated by a motion which, when it is caused to describe itself on the above mentioned surface, may depart greatly in its form from the simple harmonic curve. Yet in this case, according to Ohm, the ear will act on this composite motion as the analysis of the mathematician can act on its corresponding curve, and will decompose it into the simple harmonic vibrations which compose it. Therefore the ear will, in this case, perceive several sounds, each having one definite pitch, and with the proper degree of attention can take cognizance of any one of them, to the exclusion more or less of all the other components.

But if Ohm's proposition be true, then there must be a reason for it in the very dynamic constitution of the ear. This Helmholtz saw, and the discovery of the 3,000 chords of corti in the cochlea and of Schultze's bristles in the ampulæ led him to suppose that these bodies effected the analysis of the sound, vibrating sympathetically with its simple components.

If we represent any composite sound by a periodic curve, Fourier has shown and states in his theorem that such a curve can always be reproduced by compounding harmonic curves (often infinite in number) having the same axis as the given curve and having the lengths of their recurrent periods as |, ½|, ⅓|, ¼|, etc.

To decompose into its elementary harmonic vibrations the sonorous motions which such curve represents and indeed reproduces when it is drawn under a slit in a piece of paper which exposes only a point of the curve at once, it is required that only one vibrating point of the body should be experimented on, and that the composite vibratory motion of this point should be conveyed along lines to bodies vibrating sympathetically to the elements of the composite vibration, and that these sympathetically vibrating bodies should be capable alone of giving simple or pendulous vibrations.

It is evidently impossible to subject to experiment the interior portions of the ears of mammalia, and we must therefore study the progress of the change in the position of the inner ear as we descend in the scale of life, so that, if possible, we may at last find animals whose external ear is exposed to view. It appears that, as we descend from the mammalia in the scale of life, the exterior parts of the ear disappear and the interior portions advance toward the surface.

After this introduction Professer Mayer gave an account, illustrated with elaborate experiments, of a recent research on the analysis of composite or musical sounds, and detailed experiments on the organs of hearing of insects, or what are supposed to be organs of hearing.

After having first shown experimentally all the existing methods of the analysis of sound by taking one after another the elementary notes out of a reed organ pipe by the former known methods, he proceeded to analyze the same sound given by the reed organ pipe by his own method which is as follows: A membrane is placed near the sonorous body. Attached to a point of this membrane are several fibers from a silkworm cocoon. Each of these leads to a tuning fork. Now it is known that a tuning fork can only give a simple sound, that is, a sound having only one pitch. Hence if any of the sounds which are given by these forks exist in the sound given by the sonorous body, the forks giving these sounds, and only these, will vibrate. Professor Mayer showed this by placing on the prongs of the forks small pieces of wax. This system of analysis is found to be so delicate that, if the fork is thrown out of tune by the weight of the piece of wax, so that it will give one beat in eight seconds with the sound which it had before it was loaded, it will thus detect this difference in the pitch. According to Weber, of Germany, the most accomplished musical ear can detect a difference of pitch in two notes whose ratio of vibration is as 1,000 to 1,001; but by this method a difference of pitch can be detected in two notes where the ratio of vibration is 4,000 to 4,001.

Professor Mayer then gave an account of experiments, in which he has partly succeeded in measuring the relative intensity of sounds by the quantity of heat that sounds give when the bodies producing them are caused to send their vibrations into india rubber. The rubber is in the form of a very thin sheet, stretched between the prongs of a fork and inclosed on the sides by a thermo battery. Professor Mayer is still conducting researches in this direction. Unless we can measure the intensity of sounds there is no science of acoustics. Last year Professor Mayer made an initial step in that direction by measuring with great accuracy the relative intensity of sounds of the same pitch. But to measure the relative intensity of sounds of different pitch is a much more difficult matter, and has not yet been successfully accomplished. Professor Mayer, however, hopes to succeed in this by converting a certain known fraction of a sonorous vibration into heat.

Professor Mayer now exhibited to the Academy the resultant curve produced by combining the first six harmonics of a musical note. This curve was then drawn in a circular disk of glass by removing from its blackened surface the continuous line of the curve, which returned on itself. This curve was now placed in front of a lantern, and the image of the line was projected on a screen. A slit in a piece of cardboard having been placed in front of the curve, and in the direction of a radius of the disk, and the disk being revolved, caused the spot of light on the screen to vibrate like the drum of the ear when it listens to a musical note.

Professor Mayer then proceeded to give an account, illustrated by experiment, of what he supposes to be the organ of hearing in insects. Placing a male mosquito under the microscope, and sounding various notes of tuning forks in the range of a sound given by the female mosquito, the various fibers of the antennæ of the male mosquito vibrated sympathetically to these various sounds. The longest fibers vibrated sympathetically to the grave notes, and the short fibers vibrated sympathetically to the higher notes. The fact that the nocturnal insects have highly organized antennæ while the diurnal ones have not, and also the fact that the anatomy of these parts of insects shows a highly developed nervous organization, leads to the highly probable inference that Professor Mayer has here given facts which form the first sure basis of reasoning in reference to the nature of the auditory apparatus of insects.

These experiments were also extended in a direction which added new facts to the physiology of the senses. If a sonorous impulse strike a fiber so that the direction of the impulse is in the direction of the fiber, then the fiber remains stationary. But if the direction of the sound is at right angles to the fiber, the fiber vibrates with its maximum intensity. Thus, when a sound strikes the fibrils of an insect, those on one antenna are vibrated more powerfully than the fibrils on the other, and the insect naturally turns in the direction of that antenna which is most strongly shaken. The fibrils on the other antenna are now shaken with more and more intensity, until, having turned his body so that both antennæ vibrate with equal intensity, he has placed the axis of his body in the direction of the sound. Experiments under the microscope show that the mosquito can thus detect to within five degrees the position of the sonorous center. To render assurance doubly sure, Professor Mayer, having found two fibrils of the antennæ of a mosquito which vibrated powerfully to two different notes, measured these fibrils very accurately under the microscope. He then constructed some fibrils out of pine wood, which, though two or three feet long and of the thickness of small picture cord, had exactly the same proportion of length to thickness as the fibrils of the antennæ of the mosquito. He found that these slender pine rods or fibrils had to each other the same ratio of vibration as the fibrils of the mosquito.

President Morton next explained his researches on the

REMARKABLE FLUORESCENCE IN NEW CHEMICAL COMPOUNDS.

The research has consisted in studying at the same time the fluorescence and the absorption spectra of various bodies, including the uranium salts, the organic substance anthracene and some of its derivatives, and a new body which he was fortunate enough to discover by the application of this method to products of the distillation.

As we have already referred to Dr. Morton's brilliant discovery of thallene and the similar substance petrolucene, it is not necessary to repeat his remarks regarding these bodies.

Resins.

The resins best known to commerce and used extensively in medicine and several of the mechanical arts are nine in number, and are known as copal, lac, amber, dammar, common resin, elemi, sandarac, mastic, and caramba wax. All these resins can be reduced to powder, and all can be dissolved by a union either with acids, oils, or alcoholic preparations. Gum copal is the concrete juice of a tree growing in certain sections of South America and the East Indies. The substance when pure is hard, shining, transparent, citron-colored, and inodorous. It is not soluble in water or spirits, but may be dissolved in linseed oil, when submitted to a heat a little less than sufficient to boil or decompose the oil. When the solution is diluted with spirits of turpentine, it forms a beautiful transparent varnish. Shellac, or more properly lac, is a resinous substance obtained mainly from the *ficus Indica*, or banyan tree, on which it is deposited by an insect. It is composed of five distinct but very similar kinds, each of which is united with a small quantity of several other foreign substances, particularly a red colored matter. Stick lac is the compound in its natural state, incrusting small twigs. When broken off and boiled in water, it loses its red color, and is called seed lac. When melted, strained, and spread into thin plates, it is called shell lac. United with ivory black or vermilion, it forms red or black sealing wax. When lac is dissolved in alcohol or other solvents, and submitted to different methods of preparation, it constitutes various kinds of varnishes and lacquers. Lac is really dissolved by a union with caustic soda. Amber is a yellowish resin, and resembles copal. It is found on the seashore and frequently on alluvial soils with beds of lignite. It is capable of receiving a fine polish, and is used for ornamental purposes, to adorn pipes, walking sticks, etc. It is also the basis of a fine varnish. By friction it readily becomes electric. Amber will not dissolve in alcohol, but it yields to the action of concentrated sulphuric acid, which will dissolve all resins except caramba wax. The union with the sulphuric acid gives dammar a brilliant red tint, but to other resins a dark brown color. Dammar is obtained from certain trees indigenous to the East Indies; among others the dammara and the dammer pine. It is principally used for making varnish. Dammer dissolves easily in sulphide of carbon, oil of turpentine, linseed oil, and benzol. Common resin is the product of the southern pine, and is readily soluble in alcohol and the essential oils. Elemi is a concrete substance obtained from several species of trees growing in the tropics, but having much the same appearance and undoubtedly allied in origin. It is used by the medical profession in ointments and plasters, and by mechanics as a base for the manufacture of varnish. This resin dissolves with difficulty in alcohol and linseed oil, but gives way under the action of turpentine and benzol. Mastic exudes from the mastic tree, which grows in the island of Scio in the Mediterranean Sea. It runs freely when an incision is made in the body of the tree, but not otherwise. It is of a yellowish white color, is semi-transparent, of faint smell, and is used as an aromatic and an astringent. It is also used by painters as an ingredient in drying varnishes. Sandarac is the product of a tree growing in Barbary. It is obtained in what are known as transparent tears of a white color, and is used principally for incense and the manufacture of varnish and, when pulverized and mixed with other substances in a pounce, as a perfume. The following resins will become pasty before melting: amber, lac, elemi, sandarac, and mastic; the others will become liquid at once. Ammonia will slowly dissolve copal, mastic, and sandarac; but on the other principal resins, it has very little effect.

Modern Miracles.

Under this heading we recently made mention of the alleged miraculous trickling stone in France, and expressed surprise that scientific persons like the editor of *Les Mondes* should lend themselves and their columns to the maintenance of an imposition so gross and barefaced as this.

Professor J. O'K. Murray, of St. Francis College, near this city, takes up the cudgel in behalf of the new miracle, and knocks daylight into the subject, and into the SCIENTIFIC AMERICAN, in the following heavenly style, which we publish in order that both sides may be heard:

"TO THE EDITOR OF THE BROOKLYN EAGLE:—For a slipshod, threadbare editorial commend us, from time to time, to the SCIENTIFIC AMERICAN. That any journal with such a respectable, high sounding name should make such an exhibition of shallowness, bigotry, and gross ignorance is quite astounding. The following quotations are from one of its recent leaders, headed "Modern Miracles." As a specimen of scant knowledge, obtuseness, and "stump" writing, it is worthy the days of Know Nothingism. Alluding to the justly celebrated shrine of Lourdes, it treats its readers to the following unscientific twaddle:

'A sickly child laboring under a diseased constitution, and a spring, opportunely trickling from a stone, sum up the entire wonder. * * * A peculiarity of this especial mystery is that it is not susceptible of direct test, and is therefore a mere matter of faith. * * * If the editor of *Les Mondes* will visit any negro camp meeting in the United States, he will remark innumerable repetitions of religious ecstasy such as that of Bernadette. He will find both old and young of both sexes launching off into descriptions of golden cities and celestial inhabitants, which they sincerely believe, which will throw the peasant girl story far into the shade.'

This is poor English, but the utter stupidity of the logic is immeasurably below the lingo in which it is clothed. It is wanton and ignorant insult to every intelligent Catholic. The fact is, when the SCIENTIFIC AMERICAN attempts to treat of such matters, it goes out of its proper sphere, and no longer knows 'what it is driving at.' I consider it beneath me to refute language which carries with it its own refutation. It is a sample of the supreme ignorance and gratuitous nonsense which occasionally crops out among certain snarling scoffers and *soi disant* men of science, when they treat of some religious topic. About Catholicity or its miracles, such personages generally know a little less than nothing. A sewing machine or a balloon is a more proper theme for the exercise of their craniums. Pity and indignation alternately arrest the mind in reading the shabby effusions of these scientific upstarts. J. O'K. MURRAY,
Professor in St. Francis College."

Iron and Steel Exhibits of the West.

Conceding the greatness of the Northwest as an agricultural and stock-raising region, people have been content to think that its progress is comprised in the products which its superiority in these respects so generally yields. The prospect of its great cities assuming an importance as manufacturing points has almost been lost sight of by the masses. The displays made by the iron makers at the Chicago Exposition, says the New York *Times*, show what these products are, and indicate to what extent the mining wealth of the West is being taken advantage of by points brought near to the ore regions by rail and lake navigation.

Among the exhibitors was the North Chicago Rolling Mills Company, of which Captain E. B. Ward is president. These mills have an annual capacity of 25,000 tuns Bessemer steel rails, 30,000 tuns railroad iron, and 50,000 tuns pig metal. The samples which the company expose are very fine and extensive, and attract a large degree of attention. The texture of the metal used in them is illustrated by rails twisted, curled, bent double, and subjected to any process which will show the torsion, strength and ductility of the metal. One of the most curious specimens is that of a polished steel rail, about four feet in length, twisted while cold. The test thus given to the quality of the metal is severe, and certain to bring to light any of its imperfections. The rail in question shows not a fracture, flaw, or even the slightest blemish.

A number of broken steel ingots were also among the exhibition. They weigh from 1,100 to 1,400 pounds each, are perfectly solid, and show a texture and density that is not excelled by any Bessemer steel mill in this or any other country. The company claim that they are making as fine an ingot as is manufactured in the world. The quality of the Lake Superior iron is particularly adapted to the manufacture of steel, and it excels the best brands of the foreign market. The company are the owners of vast mining interests in the Lake Superior regions, and they carry on the process of manufacturing through all the details, from mining the ore to turning out the rails. A piece which had been recently tested was on exhibition. It stood the remarkable test of 73,250 pounds to the square inch, with an elongation of sixteen per cent. A sample of chains manufactured of Bessemer steel, at the Wyandotte (Michigan) Rolling Mills, constituted an interesting feature of the display. A comparative list of these chains with those of English make shows the following result:

Size.	Quality.	Strength.
1¼ inch	American	101,750
	English	76,500
⅝ inch	American	28,875
	English	19,000
¾ inch	American	38,000
	English	26,000
½ inch	American	15,825
	English	8,500
7-16 inch	American	10,250
	English	5,750

Reduction of Auriferous Pyrites.

Dr. Ira M. Phelps has devised a process which is described as being of the highest metallurgical importance as well as scientific interest. The sulphur contained in the ore furnishes a large portion of the fuel; it being compelled, in a great measure, to consume itself. Oxygen and mercury, the former obtained from the atmosphere without money and without price, and the latter secured against excessive loss by properly constructed amalgamators, are the only chemicals needed except that furnished by the ore itself. The sulphur, which has hitherto been the most troublesome element, is made to do its duty not only in accomplishing its own destruction, but in effecting the release of the golden treasure it has so long and persistently guarded. That a thorough desulphurization of the ore is a necessary prelude to amalgamation is a conceded fact, and it is the difficulty of accomplishing this desulphurization that has led to so many failures. Dr. Phelps maintains that the cause of all the failures has been an insufficient supply of oxygen, the enormous bulk of air necessary to supply it never having been even approximately estimated or conceived. But in addition to this, there are four other conditions, to secure and maintain which is of vital importance: a supply of oxygen sufficient to meet all the demands of oxidation, a proper and timely regulation of the heat, the constant agitation of the ore, and sufficient time to perfect the chemical changes involved.

The importance of fine pulverization is fully recognized by Dr. Phelps, who takes especial care to point out the enormous difference, in the time required, which variation of size makes, a little variation in its superficies making a very great difference in the time required. Dr. Phelps claims to to have obviated this difficulty by introducing the ore underneath the draft current, and causing it to pass down the terrace floor of the inclined flue in a substratum of atmospheric eddies, without being once brought in contact with the ascending current.

The Defilement of Air by Volatile Vapors.

A paper on this subject was read in the Health Department of the recent Social Science Congress, by Mr. W. J. Cooper. Air, the writer held, to be fit for respiration, ought to be of extraordinary purity; but it was to be regretted that some well meaning workers in sanitary science recommended a course of action which (by adding noxious vapors to the impure air, for disinfecting purposes) not only increased the previous defilement, but prevented clarification, which was the main object to be attained. Air could not be charged with any volatile vapor without detriment, whether it was sewer gas from the drains, carbonate of ammonia from horse droppings, aroma from the dust cart, or the equally vile odor which arose from weak solutions of carbolic acid now used in some towns with the idea that it would destroy the germs of disease. Eminent authorities had proved the fallacy of this notion. Carbolic acid in a concentrated form would arrest decomposition for awhile, but Pettenkofer's experiments had clearly shown that when the acid was further diluted germ development was actually encouraged; Dr. Dougall's recent experiments had exposed the futility of the use of the vapor of carbolic acid upon infective matter; and it was also known that, during the Franco-German war, although hospitals were saturated with carbolic acid, still hospital gangrene prevailed. With these facts before them, it was intolerable that the air of our public places, our dwellings, and our towns should be daily defiled by the volatile vapors arising from this objectionable substance with the vain expectation of preserving the public from infection, the effect being to encourage a rather expensive method of creating a nuisance.

Where carbolic acid was used, it could not be always ascertained whether the stench operated upon was removed or not, but they know that when applied to urinals the sickly, ammoniacal odor was not affected; the twofold atmospheric defilement of the carbolic and ammoniacal vapors being distinctly and separately distinguishable. There was much evidence to show that the air could not be impregnated with a vapor sufficiently powerful to destroy germs or infectious matter without damage to the tissue of the lungs. Liebig had stated that lung disease was produced by the use of chlorine as a disinfectant in hospitals. In the last published number of the proceedings of the Chemical Society, it was related that Mr. Ernest Theophron Chapman, an eminent chemist, who recently lost his life by an explosion in a chemical manufactory in Germany, had suffered in health for many years from the effects of the inhalation of chlorine, which brought on hemorrhage from the lungs, a complaint which would frequently occur when he was under the influence of any excitement. It was also known that the strong Highland workmen, employed at the St. Rollox Works in Glasgow, were rapidly destroyed by the chlorine vapor given off from the bleaching powder manufactured there. Bromine, iodine, and ozone were equally mischievous in their action. Before they could use enough iodine to have any effect upon germs, it would produce the well known iodine catarrh. Bromine would overpower the senses with its suffocating stench long before it could disinfect; and if the atmosphere were to be overcharged with ozone, it would be productive of equally deleterious consequences.

Recent investigations had fully exposed the futility of several methods practiced with the intention of destroying the germs of disease by attempting the impossible task of disinfecting air. These delusive theories had been based upon the fallacious supposition that a chemical re-agent retained its destructive power when very dilute. Experience has shown, however, that the very reverse happens in many instances. Strong sulphuric acid will set fire to wood shavings, and so destroy them. Dilute sulphuric acid will transform shavings into grape sugar, which is susceptible of fermentation. This was an illustration which held good throughout organic chemistry. Professor Rolleston informs us that unless so much sulphurous acid be put into the air of a room that no one could exist in it for a minute, all fumigation is abortive. Professor Wanklyn, in a recent paper on disinfectants, observes that the wisdom of the physician who places his little saucer with bleaching powder and muriatic acid in the chamber of his patient is comparable with that of the Cattle Plague Commissioners who tied carbolic cloths to the horns of the cattle to disinfect the air of the agricultural districts.

If the air of a room be foul, the obvious remedy is to open the window to let in the external air as the best possible purifier. If the room contains germs, they will probably find surfaces to rest upon, and it is by cleansing all surfaces that the room is to be purified, and not by futile attempts to disinfect an ever changing atmospheric current. As germs of disease must be looked upon as a dangerous enemy, they must be treated as an invading army and deprived of every possible feeding and resting place. As they are fostered in filth and putridity, all filth and decaying matter should be carefully removed, and decomposition should be arrested in sewers, on road surfaces, and in all holes and corners where putrefying matter of any kind is deposited. For the purpose of arresting decomposition, chemical substances should be used which do not by their nature defile the air, and are not dangerous, destructive or offensive; for it is of the utmost importance to make disinfection popular, and it is contrary to human nature to delight in substances which are irritating and obnoxious to the senses, and which have a tendency to cause a positive evil in the attempt to prevent a possible one.

In the discussion which followed, Dr. Carpenter expressed general agreement in the novel and striking ideas promulgated by Mr. Hooper, as did also Dr. Shrimpton, while Dr. Hardwicke fully corroborated the statements regarding the state of some of the hospitals during the Franco-German war. As an instance of the mischievous effect of carbolic acid as a disinfectant, Dr. Hardwicke stated that, finding the milk supplied to him, when mixed with tea, had an unpleasant taste, he made enquiries of the milkman, and found he had been using carbolic acid to disinfect a drain in his dairy, the milk had absorbed the vapor of carbolic, and so made the milk unfit to drink. He had also known many cases of fatal accidents occurring from its use.

THE addition of a small quantity of boric acid to milk retards the separation of cream, and the milk does not become sour when kept several days. Beer also, to which boric acid has been added, does not so quickly become hard. —*A. Hirschberg in Arch. Pharm.*

SCIENTIFIC AND PRACTICAL INFORMATION.

PREPARATION AND PRESERVATION OF MUSHROOMS.

Dr. Remsch, in *Les Mondes*, proposes to cover the fungus with a film of collodion and place it in an airy position. He states that the contraction of the mushroom is equal in every way, and that the chemical and anatomical constitution remains the same. An exact form, preservative against the destructive action of oxygen, and also against insects and germs, and the keeping of the substance for future experiment, are the advantages obtained.

THE SPECTROGRAPH.

The name is given to a simple little device for copying drawings, exhibited in the French department of the Vienna Exposition. It consists of a board, near the middle of which is a piece of window glass fastened at right angles to it by means of two grooved wooden uprights. When placed near a window, with a drawing or copy on the end of the board nearer the window, its reflection in the glass causes it to appear upon a sheet of white on the opposite side of the glass. In this way quite an accurate tracing can be made by one who is no draftsman.

THE OXYHYDROGEN LIGHT.

Dr. John Nicol describes, in the *British Journal of Photography*, a new mode of making lime cylinders as follows:

Four parts of precipitated chalk are intimately mixed with one part of ponderous carbonate of magnesia, and the whole made into a stiff paste with mucilage of gum arabic. The mass should be well beaten in a mortar, or in any other way to ensure thorough incorporation, and made a little stiffer than glazier's putty. It may then be rolled on a slightly oiled marble or porcelain slab, or smooth board, till it assumes the form of an ordinary ruler, and then cut into suitable lengths. The holes are easily made with a wire of the proper thickness; and if the wire be "olive ended," like those used for piercing tobacco pipe stems—that is, having a tiny bulb or button at the end to be inserted—it will penetrate straighter and easier. The cylinders thus finished only further require drying, which may readily be done in the kitchen oven; and as they must be thoroughly dry, they may be left there for two or three days.

THE VALUE OF SEWAGE.

Commenting on the sewage question and notably with reference to the utilization of the waste soil from Liverpool sewers, a writer in *Iron* estimates that a town of 100,000 inhabitants produces fertilizing material to the value of $250,000 per annum. In the above mentioned city, it is considered that the sewage, if properly utilized, would be worth fully $750,000 a year. The entire population of Great Britain, with all her colonies, is about 75,000,000 souls, and each person produces annually about two and a half dollars worth of valuable material. Hence the aggregate amount is valued at $187,500,000, a sum equal to the joint annual yield of the Australian and Californian gold mines. Applying this vast total to agricultural purposes, it would produce fully ten times its value in breadstuffs, beef, milk, butter, and all kinds of vegetable and animal food. The United States contain about 40,000,000 people, and hence $100,000,000 worth of useful substance is yearly wasted: a sum, it is hardly necessary to say, which, if added to the finances of the country, would lessen the chances of future panics and aid materially in paying off the national debt.

MEAT FROM AUSTRALIA.

A cargo of Australian meat has recently been sent to England, and its preservation during the voyage is effected by a new process, in which no antiseptic materials of any kind are employed. The beef and mutton is brought on board directly from the slaughterhouse and thrown into an iron tank, no particular care being exercised in arranging the pieces. The reservoir is placed within another and larger receptacle, and ice, produced by artificial means, is packed upon the cover of the inner vessel. The water due to melting runs over the upper surface and down the sides of the latter; and it is collected at the bottom, to be returned by tubes to the ice, to be again refrigerated. The apparatus is built in a kind of well, made between the upper deck and hold of the vessel, about amidships, and is protected by layers of sawdust and other non-conducting material. It is said that meat thus treated has been kept on shore for eighty-five days without losing any of its properties or becoming in anywise decomposed.

THE VIENNA EXHIBITION---AUSTRIAN COURT HONOR TO AN AMERICAN CONTRIBUTOR.

Telegrams to the New York Herald.

VIENNA, Nov. 1, 1873.

The Emperor of Austria has conferred the "Imperial Order of Francis Joseph" upon Hon. Nathaniel Wheeler, President of the celebrated Wheeler & Wilson Sewing Machine Company of New York.

More Distinguished Honors.

BALTIMORE, Md., Oct. 31.

The Maryland Institute has awarded Wheeler & Wilson the gold medal for the new No. 6 Sewing Machine. Other sewing machines received nothing.

Recent American and Foreign Patents.

Improved Middlings Separator.

Robert L. Downton, Collinsville, Ill.—This invention has for its object to furnish an improved apparatus for separating middlings into grades, so as to enable a larger per cent of first grade flour to be made from the wheat by mixing with the first grade or grades of the middlings. The unsorted middlings pass through a spout against a disk which distributes them centrifugally upon inclined aprons, whence they pass down, the heavier portions to an incline and the lighter into a cylinder. The latter are drawn by a suction fan through one pipe, and discharged through another into a chamber. Here the air blast is regulated to cause a deposit of a second grade, while the lighter passes on to another chamber. This operation is continued until as many grades are obtained as may be desired.