ELECTRO-METALLURGY.

GOLD DEPOSITS.

In the practice of electroplating with gold the bath employed is usually heated, as the deposits obtained in such a bath are more homogeneous, tenacious, and durable, and of a better color, besides which recommendation a greater quantity of the metal may be deposited satisfactorily from it in a given time than from a cold bath.

Owing to the cost of the metal to be deposited very large surfaces are rarely required to be electroplated, and as these baths become worn out and must be replaced by fresh solutions after a short time, they are usually, as a matter of economy and convenience, used in as small a vessel as the circumstances will admit of. These vessels maybe of glass, porcelain, or porcelain-enameled iron. The latter serve the purpose admirably (if the enamel is good). They should be heated over the water bath or by means of steam.

The same bath does not answer very well for all metals—either the bath must be modified to suit the metal or the latter must be previously coated with another metal to suit the conditions. Gold deposits are obtained with the greatest facility upon silver or copper, their rich alloys, or other metals coated with them. With these a hot bath (at about 170° F.) and a moderately strong current give good results. With alloys, such as German silver, the best results are obtained with a weak bath, barely warm. Steel and iron, when not coated with copper, require an intense current and a very hot bath. Lead, zinc, tin, antimony, and bismuth alloys of, or containing much of these, are preferably coated with copper before electro gilding.

HOT BATHS.

For silver, copper, or alloys rich in these:

Distilled water	1 gallon.
Phosphate of soda, cryst	9½ ounces.
Bisulphite of soda	1⅗ "
Cyanide of potassium, pure	½ "
Gold chloride	160 grains.

Dissolve in a portion of the water, heated, the phosphate of soda. Dissolve in another portion of the water the bisulphite of soda and cyanide of potassium.

Dissolve the gold chloride in the remaining water, stir the solution slowly into the cold phosphate of soda solution, and finally add the solution of cyanide and bisulphite. The bath, now ready for use, should be colorless.

The cost of this bath is about $5 a gallon, and the metal can be deposited from it profitably at $2 per dwt. Used at a temperature of from 120° to 175° Fah.

BATH FOR IRON AND STEEL—UNCOATED.

Distilled water	1 gallon.
Phosphate of soda, cryst	7⅘ ounces.
Bisulphite of soda	2 "
Cyanide of potassium, pure	⅗ drachm.
Gold chloride	160 grains.

Dissolve as before. Heat to 175° or 180° Fah. Pass the second metal through the hot potash, then through dilute muriatic acid (acid 1, water 15), brush, and connect at once. Requires a very intense current at first.

The following baths work well with bronze and brass, but are not suited for direct gilding on iron or steel:

Distilled water	1 gallon.
Phosphate of soda, cryst	6⅖ ounces.
Bisulphite of soda	1⅗ "
Bicarbonate of potash	⅕ "
Caustic soda	⅕ "
Cyanide of potassium, pure	⅕ "
Gold chloride	⅖ "

Dissolve all together, except the gold chloride, in the hot water; filter, cool, and gradually stir in the gold chloride dissolved in a little water. Heat from 120° to 140° Fah. for use. It requires an intense current.

Distilled water	1 gallon.
Ferrocyanide of potassium	5½ ounces.
Carbonate of potash, pure	1¾ "
Sal ammoniac	⅔ "
Gold chloride	⅔ "

Dissolve as in the last, boil for half an hour, replace the evaporated water, and the bath is ready for use.

Distilled water	1 gallon.
Cyanide of potassium	2½ ounces.
Gold chloride	1 "

Dissolve the gold chloride in the water, then add the cyanide, and stir until solution is complete.

Baths of this kind are commonly used, and with little regard to temperature. They are simple in preparation, but are, unfortunately, not very uniform in their working, ungilding one part while another is gilding, and producing a variety of colors, especially when freshly prepared. They improve by use, however.

COLD ELECTRO GILDING BATH.

Water, distilled	1 gallon.
Potassium cyanide, pure	3½ ounces.
Gold chloride	3⅕ "

Dissolve the cyanide in a part of the water, then gradually add the gold chloride dissolved in the remainder. Boil for half an hour before using. (Use cold.)

The cold bath is kept in a gutta percha lined, wooden, or (if small) porcelain tank arranged as for brass plating. The anodes are thin plates of laminated gold, wholly suspended in the liquid (while in use) by meansof platinum wires, from clean brass rods joined to the copper or carbon pole of the battery, the rods supporting the work being in connection with the zinc. When in proper working order the color of the deposit is yellow. If the deposit becomes black or dark-red, add more cyanide (dissolved in water) to the bath, or use a weaker current.

If the cyanide is in excess the plating will proceed very slowly or not at all; or, as sometimes happens, articles already gilded will lose their gold. In such cases add a little more gold chloride or increase the intensity of the current.

Cold electro-gilding must be done slowly, and requires a good deal of attention to secure good work. The articles must be frequently examined to detect irregular deposits or dark spots (which must be scratch-brushed and returned). It is also frequently necessary to add to or remove an element from the battery, especially when adding or taking work from the bath. With too much intensity of current the deposit is black or red; if too weak those portions opposite the anode only get covered. In coating German silver it is necessary to use a weak bath and a small exposure of anode. The best results with this alloy are obtained when the bath is slightly warmed.

MANAGEMENT OF THE HOT BATH.

The articles should be kept in agitation while in the bath. They should be placed in connection with the battery before or immediately upon entering the bath. A foil or wire of platinum is in many cases preferable to a soluble gold anode when electro-gilding by aid of heat. It suffers no alteration in the liquid, and by its manipulation the color of the deposit may be materially altered. When it is removed so as to expose only a small surface in the bath a pale yellowish deposit may be obtained; when the immersion is greater, a clear yellow; with a still greater exposure, a red gold color. The strength of the hot baths may be maintained by successive additions of gold chloride with a proper proportion of the other salts and water; but it is preferable to wear out the bath entirely and prepare a new one, as it soon becomes contaminated with copper or silver if much of these metals have been gilt in it. In a nearly exhausted bath containing dissolved copper the electro deposit will be what is called "red gold;" if it contains an excess of silver a "green gold" deposit will result. The gold and copper or gold and silver are deposited together as an alloy, the color of which depends upon the relative proportion of the metals, battery strength, etc.

Dead luster gilding is produced by the slow deposition of a considerable quantity of gold, by giving the metallic surface a dead luster before gilding (by means of acids), by first preparing a coating of frosted silver or by depositing the gold upon a heavy copper deposit produced with a weak current in a bath of copper sulphate.

In order to secure a good deposit of gold it is absolutely necessary that the work should be perfectly freed from any trace of oxide, grease, oil, or other impurity. Articles of copper and brass may be cleansed by first immersing them in a strong boiling solution of caustic potash or soda, and, after rinsing, dipping momentarily in nitric acid and immediately rinsing, or scouring with pumice stone moistened with a strong solution of cyanide of potassium in water.

Other metals require a somewhat different treatment, which we will have occasion to refer to in a subsequent article.

The bichromate battery is commonly used in connection with hot electro-gilding baths. See article on nickel-plating, p. 153, No. 10, vol. xliii.

As gold chloride procured in the market cannot always be depended on for purity and strength, it is preferable to purchase the gold and make the chloride. A pure gold chloride may be prepared as follows:

Put coin gold, in small pieces, into a glass flask with about five times its weight of aqua regia (nitric acid 1, hydrochloric acid 3), and heat gently, with small additions of aqua regia if necessary, until the gold is dissolved and the silver remains behind as white chloride. Let it settle, decant the clear solution, wash the residue several times with water, adding the washings to the gold solution. Evaporate off excess of the acids in a porcelain dish over a water bath (nearly to dryness). Dilute with ten parts of water, and gradually add a strong aqueous solution (filtered) of sulphate of iron. Let stand until the dark powder (gold) settles; gently decant the liquid, wash the gold with hot water, and redissolve it in a small quantity of warm aqua regia and evaporate the solution, with constant stirring, to dryness in a porcelain dish over the water bath. One ounce of pure gold equals about 1⅝ ounce of this chloride.

The Work of the Patent Office in 1880.

The annual report of the Commissioner of Patents for the year ending December 31, 1880, gives the business of the year as follows: Applications for patents for inventions, 21,761; applications for patents for designs, 634; applications for reissues of patents, 617; total, 23,012. Patents issued, 13,441; patents reissued, 506; patents expired, 3,781; trade-marks and labels registered, 533.

Of the 13,441 patents issued during the year, 12,655 were to citizens of the United States, and 786 to foreigners.

There was received during the year for patents, copies of records or drawings, and from other sources, an aggregate of $749,685.32. The total amount expended was $538,865.17, leaving a balance of $210,820.15. On January 1, 1880, there remained $1,420,806.56 to the credit of the Patent Fund, which, added to the surplus of 1880, makes the amount to the credit of the Patent Fund on January 1, 1881, $1,631,626.71.

Our Export of Breadstuffs.

The official report of the exports of breadstuffs in 1880 shows the largest movement ever recorded, both as to quantity and as to value, except during the fiscal year which embraced the first six months of 1880. Reducing flour and meal to wheat and corn, at the approximate rate of five bushels to the barrel, the quantities exported for the last two years may be stated thus:

	Quantity.		Average Price.	
	1880.	1879.	1880.	1879.
Flour, barrels	6,545,920	5,885,831	$5.82	$5.53
Meal, barrels	384,177	340,969	2.93	2.60
Wheat, bushels	134 701,146	137,975,715	1.20	1.16
Corn, bushels	105,717.215	83,144,845	55	49
Rye, bushels	2,346,995	4,445,030	92	69
Barley, bushels	1,246,640	1,103,514	65	61
Oats, bushels	544,294	1,048,934	45	34
Wheatand flour, bush'ls	167,430,746	167,404,870		
Corn and meal, bushels.	107,638,100	84,849,690		
All grain, bushels	279,206,775	258,852,038		

Correspondence.

The Sun Dogs of Colorado.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN, dated January 22, appears a letter from Jerseyville, Ill., written by F. S. Davenport, in which, after describing the remarkable sun dog phenomena of December 30, 1880, he inquires if any one had ever seen the like before. Colorado was almost wild over such a phenomena, December 23, 1876. In this case it began at sunrise. The thermometer indicated all the way from ten to twenty-two degrees below zero. The atmosphere was suffused with a myriad of crystalline particles. The horizontal rays of which Mr. Davenport speaks encircled the entire horizon, and had in it four additional sun dogs the greater part of the day, and at times eight. Instead of being one circle around the sun, we had two, the inner one bright, the outer one fainter. The upper arc of the outer one touched the arc of the brilliant prismatic crescent in the zenith. This crescent was brighter at that time than the sun, and could be looked at only a short time on account of its extreme brilliancy. The sky within the circle which the crescent would have formed, if complete, was a deep blue and very beautiful. Full descriptions were given in all of the Colorado papers, while the Denver *Tribune* gave a cut representing it partially.

The spectacle lasted until three o'clock, though it was brightest at about eleven. An additional halo, somewhat like a rainbow, was visible in the western heavens at about sunset.

A similar phenomenon, though not near so bright, was witnessed some time last December.

Boulder, Col. OTTO H. WANGELIN.

Corundum Localities of Georgia.

The corundum outcrops of Georgia are widely separate. In the northwest part of the State, in Towns County, and southwest of the corundum locality in Clay County, North Carolina, is an outcropping of corundum, a portion of which is of reddish color. Here a good amount of work has been done, with what success I am unable to say. The matrix of this corundum is smaragdite, called by some distinguished mineralogists kokscharoffite. The composition of the two are similar, except that smaragdite contains the oxide of chromium, which is probably the coloring matter of the corundum. The matrix of corundum is usually some one of the varieties of chlorite; that of the precious gems, the ruby, sapphire, etc., is ripidolite. I doubt whether the colored varieties can be found only in connection with chrome. Southwest of this are several outcrops of corundum extending nearly to the line of Alabama; also one or two in the eastern part of the State, none of which are at present mined.

The only outcrops of corundum in Alabama are found lying between the waters of the Coosa and Tallapoosa rivers in Tallapoosa County. These mines are worked by the Hampden Emery Company, of Chester, Mass. The annual yield is small.

Throughout the United States, as yet, no localities have been discovered with the corundum disseminated through the spinel, making emery like that of Naxos and Turkey.

Geologically considered the corundum seems to occur in belts associated with the magnesian minerals, and is usually found in the outcrops of serpentine and crysolite. From Dudleyville, in Alabama, it extends northeast through the northwest part of Georgia into the mountains of North Carolina, where the largest development occurs. Passing through the Blue Ridge it continues in a northeastern course through the State, similar to the gold and other metalliferous and mineral belts. There is another belt passing through the eastern part of Georgia into South Carolina.

Judging from the present development of corundum, no sufficient quantity can be had to take the place of emery.

(MRS.) H. A. BURDICK.

THE *Victorian Review*, the leading monthly of Australia, published at Melbourne, and one that compares favorably with our best home magazines, after mentioning a number of illustrated industrial subjects which had attracted the editor's special attention, concludes as follows:

"In fact, nothing rare, or curious, or useful, in the worlds of nature or of industry, seems to escape the conductors of the SCIENTIFIC AMERICAN."

The Machinery of the Future and the Well-being of Society.

Mr. C. C. Coffin has completed his course of six lectures before the Lowell Institute, and to the Boston *Advertiser* we are indebted for the following extract from the closing lecture of the interesting series:

The topic under consideration was: "The Machinery of the Future and the Well-being of Society." In his opening remarks the lecturer alluded to the value of the patent law, and showed how it had stimulated invention to a high degree, and claimed that invention is an educator, and the American mechanic is a thinker. His superior intelligence is acknowledged abroad. Gladstone fells his trees with an ax of American manufacture, not because its edge is any keener than those of English make, but because of the adaptability of the implement in lightness and effectiveness. In the opinion of Mr. Coffin China will not cease to be a market for our manufactures, although the Chinese may establish manufactories. Continuing, he said: Great as has been the advance of the last fifty years, it is within the bounds of probability and reason to expect greater progress during the years immediately before us. As yet we know very little of the energy of nature—what it is—its convertibility, gravitation into chemical affinity, magnetism, electricity into light and heat, and all into motion. It is thirty-eight years only since Joule made the discovery that they are one and the same. How great the progress! Yet we may confidently expect that discovery and invention will be quite as marvelous in coming years.

Five years ago the *telephone*—now the photophone, sending oral messages along a ray of light, with clear and distinct enunciation! The next application of the energy of nature for the promotion of our comfort, happiness, and general well-being promises to be the utilization of the electric light. The lecturer traced the history of its development, and said the cheapness of the machinery will allow of its adoption in a great number of country villages—requiring only a small steam engine, a generator, and the extension of the wires. Especially will this be the case in our New England manufacturing villages, where the power is derived from the streams, the erection of a water wheel and a generator being all the machinery required. It is one of the marvels of science that Lowell, Lawrence, and Manchester may be lighted by the water of the Merrimac—by gravitation—with no consumption of any material, no loss of energy! Think of a wire extending from this hall to Niagara, and ourselves sitting here in the radiance generated by the energy of that torrent! It is not fancy, but altogether practicable. In the future sewing machines will be worked by turning a button or pressing a spring, taking the power from the same mill which is to furnish light, and we shall use magnetic elevators. It is quite probable that the introduction of the electric light will be followed by the use of gas for heating and cooking.

Referring to science, in its application to war, the lecturer said: I am not sanguine in any expectation that there is to be any immediate disbanding of great standing armies in Europe; but rifled cannon, repeating small arms of long range, effective a mile away, the multiple gun, have revolutionized warfare. What is beyond we do not foresee, but on land as well as the ocean we may confidently expect that science and invention will in time bring about a new order of things, and men, instead of shouldering the musket during the best years of their life, as in France and Germany they are now compelled to do, will give their strength and energy to the arts of peaceful life. The lecturer next alluded to the growth of population and wealth during the last fifty years, and proved that the poor man of to-day has vastly more than it was possible for the poor man of 1830 to obtain. He may not be in possession of any riches when he reaches the end of life, but his burden through life is not so weighty as it was a half century ago. We cannot foresee what discovery may yet develop of nature's energy in other directions, but at the present, and probably for many years, the human race will use the forces imprisoned in coal as the most available. The coal area of the world is thus divided: Europe aggregates about 3,500 square miles, Great Britain 5,400, while North America has an area exceeding 300,000 square miles! That of England is less than the area of Massachusetts. It is estimated that at the present rate of consumption there is coal enough in England to last 1,000 years. If with 5,000 square miles of coal lands Great Britain has such an extended lease of life, what shall we say of this continent, with between three and four hundred thousand square miles of coal? We gauge the future by what we know of the past and present. Five thousand square miles of potential energy in the coal fields of Great Britain; one thousand years her lease of life! Three hundred thousand square miles of potential energy on this continent, and our expectation of life—who can tell us what it is? We are fifty millions to day; ten years hence we shall number seventy, and at the close of the century ninety millions. What shall we be one hundred years hence? what one thousand years?

Cement for Leather.

One who has tried everything, says that after an experience of fifteen years he has found nothing to equal the following as a cement for leather belting: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat and add pure tannin until the whole becomes ropy or appears like the white of eggs. Buff off the surfaces to be joined, apply this cement, and clamp firmly.

The Improvement of Erie Canal.

After speaking at length of the successful operation of the Erie Canal during the past year, and the importance of the canal to the prosperity of our State, the State Engineer recommends the following means for improving that water way and saving the trade we now owe to it. He says:

The British are so confident that they will wrest the trade of the West from us that they have nearly completed works that will cost more than $30,000,000. This is in addition to about $20,000,000 spent in early improvements, making about $50,000,000 paid out to gain the great prize they seek—the control of the carrying trade from the heart of our country to the markets of the world. They do not fear our railroads. While we are neglecting our water routes they spare no cost to perfect theirs. This is the greatest danger that threatens our commerce. It concerns all classes of citizens and all methods of transportation.

In view of this great danger it is our duty to consider how we can save the commerce New York has so long held. We should see first how we can cheapen transportation by the American water route, consisting of the great lakes, the Erie and Oswego Canals, and Hudson River. The larger the vessel the less the cost of carrying. If our waters admit of vessels drawing even a single foot more than can pass the Welland Canal we shall have a great advantage over the British route. By removing the obstructions in the natural channels between the great lakes, and by deepening Buffalo Harbor, twenty feet of water can be gained, while the locks on the Welland Canal will only admit of vessels drawing thirteen and one-half feet. The United States Government is engaged in deepening these channels, and our representatives in Congress should see to it that this work is accomplished in time to offset the advantages which the British will gain from the enlarged Welland and St. Lawrence Canals. The State of New York does not ask of the United States Government any assistance in maintaining or enlarging its canals. It only asks that the tide waters of the Hudson River and the natural channels between the great lakes shall have the consideration which is due to them as the great channels of commerce of our country. That large vessels can carry their cargoes cheaper than small ones is seen by the fact that vessels carry grain from Chicago to Buffalo for one-half the cost of carrying it from Buffalo to New York, although the former distance is twice the latter. It is four times as expensive to transport grain upon the Erie Canal as it is upon great bodies of water.

In order to cheapen transportation upon the Erie Canal the boats must be able to carry larger cargoes, and to bring this about we should make the canal deeper. If one foot of water is added to the depth of the canal by raising its banks, the present boats can carry fifty tons additional load, and the relation between the size of the boat and the size of the canal will not be disturbed. This increase in depth would enable the boats to carry one-fifth more cargo. At the present rate of carrying it would cheapen transportation one cent a bushel, which would be equivalent to removing tolls. This plan of deepening the canal recommends itself to the boatmen, because it requires no outlay on their part, the boats now in use having a capacity for fifty tons more than the present depth allows them to carry. If no additional load was carried this increase of depth, with the application of power to the locks for operating the gates and drawing the boats in and out, such as is in use in New Jersey on the Delaware and Raritan Canal, would enable boats to make thirty-seven hours better time in a round trip from Buffalo to New York. This gain in many instances would allow boatmen to make another trip a season. There is no sentiment in trade. Business goes where it can be done the cheapest, and the route that can carry for a few mills less per bushel than any other will command it. The average freight (not including tolls) a bushel of wheat from Buffalo to New York during the past season has been five and a half cents. If this charge could be reduced to four and a half cents the Erie Canal could offer such economical transportation that there would be very little danger from its northern rival. I have had careful surveys made for the raising of the banks of the canal one foot and for furnishing the necessary water; these show that the work can be done for about $1,000,000. The gain that this improvement would have made in transportation during the past season would be equal to the cost of the work.

Walls and Beams.

One precaution that is very seldom taken with high buildings is so supporting the timbers of the floor that, in case they break or fall, they shall not pry the wall over inward, and that in case they expand they will not push it over outward. As ordinarily constructed, holes are left in the walls, into which the ends of the joists are set, the holes being about the size of the ends of the joists, so that in case the floor falls the timbers are apt to tumble the walls inward on the contents of the building. The *Paper Trade Journal* suggests two ways of getting around this. One is to set the end of the joist upon a corbel or projection from the face of the wall, so that the joist clears the face of the wall entirely, and in case it falls it exerts no influence upon the wall. The other method has the same object in view, and accomplishes it in a simpler way. The holes made to receive the joists are made about twice as high as the joists, so that in falling the joist has no prying effect upon the wall. These remarks apply to iron as well as wooden beams; but for iron beams there should be observed the additional precaution to leave a greater space between the end of the beam and the wall, so that the inevitable expansion of the beam from fire shall cause no thrust outward, tending to overthrow the walls. It would perhaps be as well if all external walls were held together by anchor bolts with external plates, which, although not very sightly, yet often tend to hold the wall up when otherwise it would topple and fall outwards. Of course, if the beams are properly cased below with some fireproof material or by some heatproof method, their expansion will be very much less than if they are left naked to the action of the heat.

The "Jumpers" of Maine.

Dr. George M. Beard, in a paper read before the American Neurological Association, records some curious facts in regard to a singular class of persons whom he met in the region of the Moosehead Lake, Maine, and who are known in the language of that region as "Jumpers," or "Jumping Frenchmen." These individuals are afflicted with a peculiar nervous affection which manifests itself by sudden and explosive movements of the body under the influence of external excitation, by a passive submission to orders authoritatively given them, and by an irresistible desire to imitate the action of others. The person thus afflicted jumps at the slightest sudden touch, and when an order is given him in a loud, quick tone he repeats the order and at once obeys. If, for instance, on the shore of a river he be ordered to jump into the water, he exclaims "Jump in," and at once executes the order. If he is told to strike one of his companions he exclaims, "Strike him," and the act follows the words.

Dr. Beard made the following experiments with one of these persons, who was twenty-seven years of age: While sitting in a chair with a knife in his hand, about to cut some tobacco, this man was struck sharply on the shoulder and told to "throw it." Almost as quick as the explosion of a pistol the knife was thrown and stuck in a beam opposite; and at the same time he repeated the order, "Throw it," with a certain cry as of terror or alarm. A moment after, while filling his pipe, he was again slapped on the shoulder and told to "throw it." Immediately he threw the pipe and tobacco on the grass, at least a rod away, and with the same suddenness and explosiveness of movement as before. Whenever this man was struck quietly and easily, and in such a way that he could see that he was to be struck, he made only a slight jump or movement; but when the strike was unexpected he could not restrain the jumping or jerking motion, although the cry did not always appear. Like experiments were made on other individuals of different ages with the exhibition of the same peculiar phenomena.

Dr. Beard classes this "jumping" as a psychical or mental form of nervous disease, of a functional character, its best analogue being psychical or mental hysteria—the so-called "servant-girl hysteria," as known to us in modern days, and as very widely known during the epidemics of the Middle Ages. Like mental or psychical hysteria, the jumping occurs not in the weak, or nervous, or anæmic, but in those in firm and unusual health; there are no stronger men in the woods, or anywhere, than some of these very "jumpers." Dr. Beard regards the disease as probably an evolution of *tickling*. Some, if not all, of the "jumpers" are ticklish—exceedingly so—and are easily irritated when touched in sensitive parts of the body. It would seem that in the evenings, in the woods, after the day's toil, in lieu of most other sources of amusement, the lumbermen have teased each other by tickling and playing and startling timid ones, until there has developed this jumping, which, by mental contagion, and by this practice, and by inheritance, has ripened into the full stage of the malady as it appears at the present hour. The malady is fully as hereditary as insanity, or epilepsy, or hay fever. Dr. Beard in four families found fourteen cases, and by the study of these it was possible to trace the disease back at least half a century. The malady seems to be endemic, confined mainly to the north woods of Maine and to persons of French descent, and it is psycho-contagious, that is, can be caught by personal contact, like chorea and hysteria.

A Large Order for Locomotives.

Recently the Baldwin Locomotive Works received from the Denver and Rio Grande Railroad Company an order for 144 locomotives, an increase of equipment made necessary by the southern extension of the road. This is said to be the largest order for locomotives in one block ever placed. The cost of the locomotives will be over $1,000,000. The work will be done during next summer and fall.

New Explosive Compound.

This compound, by J. M. Lewin, Paris, said to possess more explosive force than all other explosive materials, and which will not explode when a flame is applied to it, or in consequence of an ordinary blow, but only by means of a cartridge or capsule, consists of the ingredients given below in or about the proportions specified; *i. e.*, nitro-glycerine, 60 parts; nitrate of potassium, sodium or ammonia, 16 parts; palmitic acidulated oxide of cetyl (cetoceum), 1 part; carbonate of lime, 1 part; lignine, 1 part; and wood or animal charcoal or peat moss (sphagnum), 16 parts.

The Growth of New York City.

As shown in the statistics of the Department of Buildings the growth of New York was more rapid last year than in any twelvemonth since 1872, when the speculative building mania reached its height. That year the expenditure on buildings was not less than $27,000,000. In 1877 it was less than half as much. It increased to sixteen and a half millions in 1878. The figures for 1880 show an expenditure of $24,000,000 for new buildings.