Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year, postage included.....$3 20
One copy, six months, postage included..... 1 60

Club Rates.

Ten copies, one year, each $2 70, postage included.....$27 00
Over ten copies, same rate each, postage included..... 2 70

☞ By the new law, postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written, and also state at which time they wish their subscriptions to commence, otherwise the paper will be sent from the receipt of the order. When requested, the numbers can be supplied from January 1st, when the volume commenced. In case of changing residence, state former address, as well as give the new one. No change can be made unless the former address is given.

If any of our readers fail to receive their numbers regularly; if the direction is not plainly written; if premiums are not received; or if there is fault of any sort at this office, we will thank our friends to send us postal card complaints, and repeat the same, if need be, until the remedy is effected. *Do not hesitate to complain.* We desire to keep all matters between ourselves and patrons right and satisfactory.

VOLUME XXXIV., No. 4. [NEW SERIES.] *Thirty-first Year.*

NEW YORK, SATURDAY, JANUARY 22, 1876.

Contents.

(Illustrated articles are marked with an asterisk.)

THE SCIENTIFIC AMERICAN SUPPLEMENT.
No. 4.
For the Week ending January 22, 1876.

TABLE OF CONTENTS.

The SCIENTIFIC AMERICAN SUPPLEMENT is uniform in size with the SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

COMBINED RATES.

The SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT will be sent together for one year, postage free to subscribers, on receipt of $7.00.

Remit by postal order. Address

MUNN & CO., PUBLISHERS,
37 Park Row, New York.

☞ Single copies of SUPPLEMENT sent to any address on receipt of 10 cents.

WORKING MEN'S VISITS TO THE CENTENNIAL.

According to present indications, the cost of living in Philadelphia during the Centennial is going to be high. It is but natural that the citizens will avail themselves of the golden opportunity offered by the immense influx of transient visitors, and hold temporary accomodations at prices which will severely tax the average purse. While this state of affairs may not work as a hindrance to the visits of those living within a moderate distance of Philadelphia, and who will therefore avoid heavy traveling expenses, it doubtless will be the means of keeping away a large number of others residing in more distant parts of the country, and especially working men, who will probably be the most appreciative visitors but whose funds to spare for the occasion will be closely limited. It seems to us that, of all classes which, it is expected, will be benefited by the Exposition, the working men stand first. We do not believe that any intelligent workman can examine the display without being improved thereby, and that even the dullest individual will leave the grounds with his ideas widened and with some useful knowledge of the skill and progress of others, in at least his own trade.

The tendency of the present time is to dignify labor, to convince men that to work is not degrading, and that the educated worker with hands is the peer of the educated worker with brains. Mr. Gladstone in a recent admirable address on Science and Art, says to working men: "Blend the beautiful with the useful, and the distinction between what is manual and what is mental will be lost, to the manifest gain of your class, to the unspeakable benefit of all." "Ennoble your work, and it will ennoble you" is the translation of the above into shorter terms: but to ennoble or improve work without education is impossible; and in that subtle and most effective form of education which instructs by arousing the desire to strive and do likewise, the education afforded by the museum of art, and the exposition of other men's consummate skill, this country has been sadly lacking. With the Centennial, however, begins our greatest attempt to supply this need, and by the Centennial is offered to working men of every class such an opportunity to study and to emulate as no other exposition heretofore held has ever paralleled, even in point of magnitude. We need not argue further to show that what elevates and raises the working men likewise affects the whole community, and that, by benefiting the one, we indirectly, though none the less surely, benefit the other.

To come back to the practical side of the subject, it must be admitted that, if excessive prices at Philadelphia are going to act as a prohibition to working men visiting the exposition, and thus act as a bar to their acquiring the benefits referred to, then it is not only in the interest of the men themselves, but of those who directly gain by the work, to devise means of avoiding unnecessary expenses. And here we think is an opportunity for the unions and trade societies to come forward and benefit their members. Some of the unions have large and influential memberships and possess considerable funds. A small tax would greatly augment the latter, and perhaps in this way a sum could be raised to put up and maintain buildings especially devoted to working men's accommodation. These edifices need be but temporary structures on rented ground, and the charges for occupying them should be but slightly above actual cost of maintenance. If the large unions would each erect their own structures, and the small ones club together and build, all the trades would be represented, and working men of all classes would be provided for. For non-union men a slight extra charge, equal to the tax imposed on the society men, might be made, and thus in the end the unions, besides benefiting all workmen, would profit pecuniarily by the operation.

It would be a wise plan for large employers and societies to confer with railroads and other transportation companies, and arrange special rates for transporting working men at prices below the reduced excursion tariff offered to the general public, and to issue special working men's tickets, to be bought through employers and societies. In the same way the unions or any association of individuals may erect workmen's accommodations and issue tickets for a certain number of days' board and lodging.

As regards the action of employers themselves, we presume that nearly all will see the benefit of affording their men as much opportunity as possible to visit the Centennial. Where it is out of the question to afford holidays sufficient for all to go, the privilege might be granted to the most deserving, or held out as a reward for special effort. It might be well for those who approve such a course to notify their men now that the two workmen in each department of the works, for example, who should show the best record for attention to duty, etc., between the present time and, say, July 1, would then be furnished with tickets to and from Philadelphia, and lodging tickets while there, and given as many holidays as the employer might fix upon. A report from these men might be requested on their return, or they might be given to understand that each would be desired to explain before his comrades whatever he had seen of interest in their especial branch of trade. Another suggestion we have to make is that an employer should, when he is likewise an exhibitor, and displays some object which, like an engine or steam pump, requires attention and care, instead of keeping one man at that duty, if it be anywise possible, send a different one from the works every week, or every three days. In this way a large number of working men may see the Exposition without the employer's incurring any considerable expense.

THEORY AND PRACTICE.

We published an article on page 8 of our current volume, in which we showed how the results obtained in practice, in regard to the effects of expansion of iron in bridges, did not agree with those of the theoretical calculations; and this is only one instance in which theory and practice appear to disagree. Some persons go so far as to assert that they never agree, while others even say that they cannot agree. We, however, maintain that they must invariably accord, and that, if this is not apparent, the practice is defective or the theory incomplete. This opinion is founded on an experience of many years, by carefully investigating all cases where such disagreement appeared to exist; and our faith in theory has proved to be well founded in every case in which the theory was complete, and the practice, if not perfect, at least of such a nature that the imperfections could be ascertained.

A case wherein an incomplete theory was taken as the basis of a calculation is found in the article already mentioned, in regard to the effects of expansion of the iron in bridges. The data, on which the theoretical calculations was founded, were obtained from experiments concerning the expansion of metals by heat while the specimens were not under compression, and their contraction by cold when not under strain by extension. In order to use such data as the base for calculating the effects of expansion and contraction in iron structures, it will be necessary that the experiments be repeated, and new coefficients of expansion and contraction be obtained by experiments in heating and cooling metals while under great strain; in this way we may ultimately ascertain the law which modifies the figures now in use, which must be varied according to the compression or extension which is brought to bear on the expanding or contracting metals. Notwithstanding that this expansion and contraction are exceedingly powerful and able to overcome very great resistances, it cannot be maintained that such resistances are without any influence on the amount of expansion and contraction, and it is for the determination of these amounts, for different degrees of resistance, that new experiments are required. This is only a single instance of the great work which yet has to be done by engineers in settling the data for calculations as to the strength of materials, calculations on which depend the success, scientific as well as economical, of the labors of the many great men in the profession of civil engineering.

DRAWBRIDGE INCONSISTENCY.

It has always seemed to us that no one could stand by the great bridges which span the Hudson river at Albany, and witness the immense fabrics slowly swing their huge draws open to admit the passage of some puffing little tug not a hundredth part of the size of the whole structure, without being struck with the incongruity, if not absurdity, of the proceeding. A passenger train may be delayed on each bank of the river, and crossers innumerable may wait as patiently as they may on each approach of the bridge: all this is of less consequence than the passage of a tow of slow canal boats, or of some solitary sloop or schooner. The Albany bridges are, however, but a sample of drawbridges in general, and the question why draws should exist in a great number of instances, or why should vessels have the right of way, applies to the entire class. Once upon a time, when railroads were not, and the principal traffic of mankind was done by water, it was important that the path of vessels carrying on commerce should not be barred. Public policy gave them a right of way over the stage coach, and bid the latter wait until the more important conveyance had passed. The law recognized this, and courts in their decisions wisely sustained the law in its strict interpretation. But as the times changed the law did not, and justice, proverbially blindfold, was especially so in this regard, and entirely failed to perceive that the railroad had supplanted not merely the stage coach, but the freight vessels as well, and that rapid transportation was and has been for some time past the last thing expected by those who ship their goods *via* river schooner or canal. Consequently justice or law has stupidly persisted in making the railroad train at forty miles an hour give way to the sailing craft at four knots, that is to say, cars loaded with perishable freight perhaps, or impatient passengers to whom time is money, or the fast mails of the public, must stand a longer or shorter time on the brink of a river and wait the passage of a schooner load of brick or lumber. Why? If there be any sound reason for the preference, we confess our inability to perceive it.

Nor is this all. Although it presumably may be supposed that, for the protection of their own property, railroad companies will avail themselves of the most approved means of avoiding disaster and accidents, the fact nevertheless remains that, despite such means especially adapted to warning trains approaching drawbridges, trains have run headlong into the open gulf again and again. On most roads engineers are cautioned to bring their locomotives to a full stop at a certain point just before reaching the bridge; but here is delay again, coupled with the probability of the rule, like every other based on human fidelity or prudence, being slighted or neglected.

If a bridge barred a great harbor, like that of New York for example, or even a less port, where the commerce by water was of major importance, it would be wise to give vessels the right of way; but such a condition of affairs practically negatives the existence of a bridge as a means of crossing, since the repeated interruptions to travel would speedily cause a resort to tunneling or other means, as a cheaper and far more convenient alternative. It is, therefore, very rarely that we find the railroads blocked by drawbridges for really important causes. In the case of Albany, no ocean vessels ascend so far up the river, and nothing larger than the regular river steamers for Troy have occasion to go under the bridges. On scores of railroads, there are draws which serve no more useful purpose than the admission of a chance schooner into some short arm or inlet. It would be a much better policy to abolish drawbridges altogether wherever the condition of affairs is such that a steamer by knocking down her funnel, or sailing vessels by lowering their upper masts, can pass under: or else to alter the laws to conform to those now in existence in Holland, which forbid any vessel approaching a drawbridge when a train is due. It is a very easy matter to house topgallant masts in large ships, or to lower topmasts in a fore-and-after; as for dropping funnels, it is done, by every penny steamer that plies along the Thames at London, dozens of times daily. Bridges without draws

moreover, are very much cheaper to build and maintain than those with them; and in cases where the draw is unavoidable, it is very much easier to signal and warn off a slow sailing vessel, or even a steamer, than a lightning express train.

THE CENTENNIAL EXHIBITION.

"The prospects of the Philadelphia Exhibition are so gloomy just now that its friends are filled with alarm. Every effort has been made to stimulate the people of the United States to enthusiasm in its favor, but there is a very widespread feeling across the Atlantic that exhibitions are a nuisance; and the requisite funds cannot be obtained for the completion of the undertaking from a people who refuse to respond to the most pressing invitations for subscription. As a last resource, the Exhibition promoters are going to Congress for a vote of $1,500,000, or, say, £300,000. The applicants state very plainly that it is their last resort, having failed to get what they need from the people directly, and that without this aid their enterprise may be limited and delayed. There appears thus far to be no party feeling upon this measure, and probably there will be none. The want of money is, moreover, not the only trouble in store for the management.

It will be remembered that foreigners refused to send their goods to America, unless they were permitted to affix the prices at which they could be sold if admitted duty free. This point was conceded without much opposition at the time, but the native manufacturers now find that they cannot possibly compete with foreigners in price, and they are now beginning to utter indignant protests against the publication of any prices. In a word, the protectionists are afraid that the people of the United States will learn so much at the Exhibition that they will rise *en masse* and crush the party. Already it is rumored that, if the price rule is adhered to, many of the leading houses in the States will not exhibit, while, on the other hand, if the rule is broken, foreigners will not put in an appearance. Altogether things do not look well for the Centennial; and if we may be allowed to use an expressive Yankeeism, it is not impossible that the whole thing may end in a gigantic 'fizzle' after all."—*The Engineer.*

Our esteemed cotemporary is evidently not posted in respect to the "hard pan" of the Exposition. He does not realize that all the buildings are nearly done, that all will be ready before they are actually wanted, that all the arrangements are complete to ensure the success of the Exhibition, and that there is not the remotest possibility of its becoming a "great fizzle."

The Exhibition Company has, it is true, applied to Congress for a grant of $1,500,000, which, if allowed, will be a convenient plum for the managers, ought to augment the greatness of the affair, and add to its renown. But whether the payment is granted or denied will not materially affect the fact of the success of the Exhibition, since that is already assured.

In applying for this grant, it has been necessary, we presume—it is always necessary in such cases—to make use of a little special pleading. Our cotemporary has probably allowed his ideas of the state of the enterprise to be more affected by this pleading than by the astonishing magnitude of the works and labors that have been actually realized, and which, as stated, place the final success of the Exhibition beyond question.

We regret that our British friends have thought it unadvisable to take any very prominent part as exhibitors; but we feel sure that they will flock here in thousands as visitors, and we shall welcome them most cordially. We hope to surprise them by the extent and extraordinary novelty of the display. If good old England is not a great contributor, her people, when they come, will find that her descendants have not been lacking, and that they have appreciated the glorious industrial lessons which she taught them in 1851.

BAMBOO AS A SOURCE OF PAPER STOCK.

The steadily increasing demand for fiber for papermaking has driven our manufacturers to the ends of the earth in search of new fibers. Not a few have looked with longing eyes upon the wealth of raw material going to waste, the world over, in bamboo thickets; and many attempts have been made to convert such fiber economically into paper stock.

Mr. Thomas Routledge, a progressive papermaker, claims that the slow progress made with this plant has been due not to any inherent unfitness of the bamboo, but to the fact that insufficient attention has been paid to age of material used.

Like the asparagus plant, the bamboo is succulent and tender when young, but rapidly becomes hard and woody with age. When mature, it is, as all know, exceedingly dense, and in most varieties the outer part is so hard and silicious that it will strike fire like flint. To convert stems at this stage into pulp, they must be subjected to long-continued boiling in strong solutions of caustic alkali, at high temperature, under a pressure of ten or eleven atmospheres; a process at once difficult, costly, and dangerous.

Mr. Routledge finds that these objections may be obviated, and the bamboo made to furnished excellent fiber cheaply, simply by using the plant when young and green. Before the stems become indurated and woody, a very mild treatment of alkaline baths, at atmospheric pressure, suffices to dissolve the mucilaginous and extractive compounds combined with the tissues, so that the fibers may be readily separated pure and free.

For many years Mr. Routledge has devoted much time to the investigation of new fibers for papermaking, testing both chemically and practically as a papermaker nearly every known fibrous material; and he does not hesitate to say that no other fiber can approach the bamboo in economy of production, and very few if any in the quality of the stock it yields for the manufacture of paper. And it has the further advantage of being practically inexhaustible in quantity. The bamboo is of extremely rapid growth, and it flourishes in every tropical country. Grown under favorable conditions of climate and soil, it excels every other plant in amount of available fiber to the acre, and there is no plant which requires so little care for its cultivation and continuous production. The estimated yield is twenty times that of flax, hemp, jute, or cotton.

In view of the threatened exhaustion of the supply of esparto, owing to the greed of the native collectors, the utilization of the bamboo promises to be a great public advantage, even if the paper produced from it falls far short of Mr. Routledge's anticipations. The sample furnished—Mr. Routledge's pamphlet on "The Bamboo Considered as a Paper-Making Material" being printed on bamboo paper—shows it to be fully equal, indeed superior, to much of the common and cheap news paper in use. In fineness and strength it surpasses any made use of by our great dailies, and in color all but the *Herald.* It has, however, the serious fault of semi-transparency, the letterpress showing through.

As an essential point in the proposed plan of utilizing the bamboo for papermaking consists in the use of young and preferably freshly cut stems, it will be necessary to have the fiber prepared where the bamboo grows, thus adding a new industry to tropical regions.

OUR WATER SUPPLY.

In 1870 the average daily consumption of water in New York city was 85,000,000 gallons; in 1871, 87,000,000 gallons; in 1872, 90,000,000 gallons; in 1873, 100,000,000 gallons; in 1874, 102,000,000 gallons; in 1875, 107,000,000. As the Croton aqueduct is now used to nearly its full capacity, the demand for water threatens to exceed ere long the amount which the aqueduct can deliver.

About 340 square miles of territory are drained by the Croton river above the dam. On this area the rainfall is sufficient to furnish an average daily supply of 300,000,000 gallons. The actual yield of the river is very much greater, showing that many of the springs which supply its tributary streams are fed from without the Croton water shed. Croton lake, which covers some 400 acres, has a storage capacity of 500,000,000 gallons. The old reservoir in Central Park holds 150,000,000 gallons; the new reservoir, 1,000,000,000, and the distributing reservoir on Fifth avenue, about 20,000,000 gallons: making a total of about 1,670,000,000 gallons. At or near the sources of the tributaries of Croton river, in Putnam county, there are many small lakes, some of them of great depth, which have been converted into natural reservoirs by lowering their outlets. Of these, Lake Glenida covers 182 acres, and will supply 168,000,000 gallons, when drawn down 3 feet; Lake Gilead, 122 acres, drawn down 12 feet will supply 396,000,000 gallons: Lake Mahopac, 603 acres, drawn down 3 feet will supply 584,000,000 gallons; Lake Kirk, 101 acres, lowered 20 feet will supply 528,000,000 gallons; Lake Barrett, 70 acres, lowered 10 feet will supply 198,000,000 gallons; Lake China, 50 acres, lowered 10 feet will supply over 132,000,000 gallons: a total of over 2,000,000,000 gallons.

Besides these natural reservoirs, there is an artificial reservoir at Boyd's Corners having a storage capacity of 2,700,000,000 gallons, and an unfinished reservoir on the middle branch of the Croton which will have a storage capacity of 4,000,000,000 gallons. Thus the supply of storage water amounts to the enormous quantity of nearly 6,000,000,000 gallons, to be increased by the new reservoir to 10,000,000,000. In 1868 there were 9 days when the daily flow of Croton River did not furnish a full supply of water for the city; in 1869, 80 days; in 1870, 107 days; in 1871, 35 days; in 1872, 30 days; in 1873, 109 days; in 1874, 85 days; in 1875, 39 days.

SCIENTIFIC AND PRACTICAL INFORMATION.

THE LARGEST GLASS CYLINDER IN THE WORLD.

Mr. Thomas Degnan, of the Union Glass Works in Somerville, Mass., recently made an enormous glass cylindrical shade or cover for a statue which is to be exhibited at the Centennial. The process began by inserting a long hollow iron tube into the pot of molten glass, and by careful manipulation about 75 lbs. of the latter was caused to adhere to the tube. This was then taken to a wooden mold of semi-circular form, in which it was rolled a few times by three men, and thus brought to a white heat. It was then taken to a wooden cylinder placed beneath the floor of the factory; and after it was placed therein, Mr. Degnan began the work of fashioning the cylinder to its proper proportion, which he did by blowing through the iron tube and into the body of the glass; while at the same time, two men, guided by a wave of his hand, raised and lowered the glowing cylinder gently but quickly until it came forth finished, and measured 5 feet in hight and 74 inches in circumference.

CLEANSING WATER MAINS.

It frequently happens in iron water mains that deposits of rust are formed, sufficiently thick to reduce materially the diameter of the pipe. To clean the interior, Mr. E. Dodds, an English engineer, has lately devised a pipe scraper, which operates as follows: The pipe is cut, the scraper is inserted, temporary joints are made, and the water is turned on at highest pressure, which drives the scraper on at great speed. In the first experiment, a distance of 300 yards of pipe was thoroughly cleansed in 2 minutes and 20 seconds.

CONDENSED MILK FOR CHILDREN.

Dr. Edward Smith, author of an excellent work on "Foods," thinks that condensed milk is not a suitable food as a substitute for pure milk for infants. It is more fattening but less nourishing, and greatly reduces the child's power of resisting diseases. Dr. Smith states that children brought up on impure London-fed cows' milk will resist an attack of acute disease better than children fed on condensed milk.

A NEW REFRIGERATOR CAR.

Very good success has been obtained in preserving grapes by means of a new refrigerator car which has been recently tested on the Union Pacific road. A fan blower attached to one of the axles forces air through ice, and the blast subsequently passes into the car through a perforated pipe at the bottom. After circulating among the fruit, the current returns to the blower and is again cooled. The advantage is the uniform temperature of about 40° Fah., which is maintained inside the car.

JADE.

A number of sales of Japanese and Chinese curiosities have recently taken place in this city, in which were included objects made of a material little seen in this part of the world, and about which little is here known. It is a precious stone, valuable not on account of its scarcity, because in China and Burmah large mines of it exist, but for the great difficulty encountered in cutting and carving it, necessitating an amount of patience and manual dexterity rarely found save among the inhabitants of the celestial kingdom. It is a silicate of alumina called jade, and is obtained in Tartary, various parts of China, and in the Mogoung districts of North Burmah. The true jade is hard enough to cut glass or quartz, and the most valuable pieces are of an intensely bright green hue, the ordinary material being pink and yellow. As many as 1,600 men are engaged in the jade mines of Burmah, and the substance is sometimes found in huge blocks, which three men can hardly move. The crude fragments are cut by means of thin copper disks, used in conjunction with fine silicious grit, composed of quartz and little particles resembling ruby dust. The boring of earrings and bracelets is effected by a revolving cylinder tipped at the free end with the same silicious mixture. The Chinese, with their proverbial ingenuity, make an almost perfect imitation of jade out of rice, the quality of hardness alone being absent.

AN EXPLOSIVE COPPER COMPOUND.

It has long been known that acetylen copper is a very dangerous explosive, detonating on the slightest percussion, and, worse than all, forming spontaneously on the copper pipes formerly employed to convey illuminating gas.

Recently another salt of copper has been prepared, which forms, when mixed with chlorate of potash, an explosive which may be used to fill percussion caps, torpedoes, etc. To a solution of sulphate of copper is added enough hyposulphite of soda in solution to entirely destroy the blue color. Tetrathionate of the suboxide of copper is formed, and dissolved in excess of hyposulphite of soda. To another portion of the blue vitriol solution, aqua ammonia is added until the blue precipitate, at first formed, dissolves to a dark blue solution of ammonio-oxide of copper. The two solutions are now mixed; and after long standing, a violet-colored salt crystalizes out of the beautiful blue liquor, and it is this salt which becomes explosive when mixed with chlorate of potash. The *Polytechnisches Notizblatt*, from which we obtain the above, does not state the composition of the violet salt above referred to, or the probable reason of its explosiveness, whether due to the nitrogen imparted to it by the ammonia, or to the large excess of sulphur, which latter substance, it is well known, when in a free state forms with chlorate of potash a mixture that detonates by percussion.

DEEP RED GLASS.

Pettenkofer, who analyzed the intense red glass used in antique mosaics, proposed to make it by fusing lead glass with about 9 per cent of oxide of copper and 3 per cent protosesquioxide of copper as a reducing agent. In this case, however, some of the lead is also reduced, giving a dark brown or black color to the glass, and hence Dr. Kayser employs borax as the flux. The following proportions are taken: Clean quartz sand, 60 parts; oxide of copper, 10 parts; protosesquioxide of iron, 3 parts; calcined borax, 10 parts; calcined soda, 10 parts. A high temperature should be employed during the fusing and reduction, and then it should be moderated to a dark red and kept there some time. When cold, the red glass will be covered with a thin layer of green copper glass.

ACTION OF PROTOCHLORIDE OF TIN ON CHLORATE OF POTASH.

When 2 parts by weight of stannous chloride and 1 part of potassic chlorate, both in powder, are triturated together in a porcelain mortar, the mass becomes heated in a few minutes very strongly. Beside chloric acid, large quantities of vapor of water are given off, and a yellowish white residue remains, which, when dissolved in boiling water and allowed to cool, deposits hypochlorite of potassa in splendid brilliant crystals, while the supernatant opalescent, milky mother liquor contains oxychloride of tin.

TUNGSTATE OF ZINC AS A WHITE PIGMENT.

When a solution of tungstate of soda is mixed with a solution of some zinc salt, the tungstate of zinc is precipitated as a snow-white pigment, that covers well and is recommended to artists that work in oil colors as deserving the preference over all other white pigments.