PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCE.

We continue our abstracts of the papers read before the National Academy of Science at its recent session in Washington. Dr. E. Bessels gave some further scientific

RESULTS OF THE POLARIS EXPEDITION.

It is probable, he thinks, that Smith's Sound must be regarded as the best of the three gateways to the pole. A channel, of almost 300 nautical miles in length and in some places scarcely twenty-five miles in width, separates Greenland from Grinnell Land and the archipelago south of it. This separation, as the nature of the land between 81° and 82° latitude demonstrates, took place in a south-north direction. The speaker then proceeded to explain various phenomena which tend to confirm this view, and pointed out the truth that the southern end of the strait is the older as is apparent from the fact that the southern portion of it is evidently broader than the northern; and also the fiords on the south-west coast of Greenland are by far more numerous and deeper than further north. According to the theory, a warm current must have moved along the east coast of America, and must have entered Baffin's Bay, having the full strength of an unweakened current in washing the end of that bay. Thereby considerable atmospheric precipitation as rain was occasioned, accelerating the growth of the glaciers, which moved on toward the valleys, and then formed spurs. The fiords we must consider as the former beds of these spurs.

What was the agency which caused the separation, we can only surmise. There are two probabilities: either the channel is a fissure which gradually widened because of the influence of the current, or it has been eroded by the action of a glacier, the south end of which gradually melted down. The latter hypothesis seems the more probable of the two, and we may regard the channel itself as formerly an immense fiord. But we know that the soundings of fiords are usually shallower at the mouth than at the head, while with Davis's Strait and its continuation exactly the reverse is true: the greatest depths are found at its entrance.

In reality, nothing else could be expected. We know that the bottom of the North Atlantic is slowly but continually sinking, and has been ever since the miocene period. Among other evidences is the fact that the Bermudas rest on a coral foundation. This motion reaches far north and includes a part of Greenland.

Professor Wm. Ferrel of the United States Coast Survey spoke upon

THE TIDES OF TAHITI,

the peculiarity of which is that the solar tide is for the most part greater than the lunar tide, although the force producing the latter is more than double that producing the former. There is only one other case of the sort in the world—at Courtown, Ireland. It is not, however, due to any exception in the general theory of the tides. Certain constants in the tidal expressions, which have to be determined by observations, are unusually large in this case. It is yet impossible to specify, however, what are the irregularities of ocean bottom and of coast outline which occasion the phenomena in this particular instance.

In a paper on

METAMERISM IN ORGANIC CHEMISTRY,

Professor Wolcott Gibbs, of Harvard, presented a novel and valuable discovery regarding metamerism, which has never before been observed in organic substances. Bodies are said to be metameric when they are of the same composition and atomic weight, but differ entirely in their properties in consequence of different molecular constitution. Professor Gibbs has discovered six such bodies, bearing such a relation to one another and to a seventh. The substance with which the series begins was discovered by Dr. Eidmann and is an exceedingly stable compound denoted by the formula: $CO_2(NH_3)_6$, $(NO_2)_6$, or two equivalents of cobalt, six of ammonia, and six of nitric oxide. In the following formula, the ammonia is represented by A and the nitric oxide by X, for the sake of abridgement:

First series—Eidmann's discovery:

$$\text{..... .....} \quad Co_2A_6X_6$$

Second series—Dr. Gibbs' discovery:

$$(Co_2A_4X_8) \quad \overset{II}{(Co_2A_8X_4)} \quad = \quad 2.\ Co_2A_6X_6$$

$$(Co_2A_4X_8)\ 2\ \overset{II}{(Co_2A_{10}X_2)} \quad = \quad 3.\ Co_2A_6X_6$$

$$(Co_2A_4X_8)\ 3\ \overset{II}{(Co_2A_{12})} \quad = \quad 4.\ Co_2A_6X_6$$

Third series—Dr. Gibbs' discovery:

$$\overset{VI}{(Co_2X_{12})} \quad \overset{VI}{(Co_2A_{12})} \quad = \quad 2.\ Co_2A_6X_6$$

$$(Co_2X_{12}) \quad \overset{VI}{(Co_2A_8X_4)_3} \quad = \quad 4.\ Co_2A_6X_6$$

$$(Co_2X_{12})\ 2\ \overset{VI}{(Co_3A_{10}X_2)_3} \quad = \quad 5.\ Co_2A_6X_6$$

As each of the salts thus obtained is beautifully crystaline and perfectly well defined, and each salt of the second and third groups gives the reactions of each constituent with perfect distinctness, no doubt can exist as to their real chemical structure.

Professor Alexander, of Princeton, gave some brief remarks on the

COMPARATIVE VELOCITY OF LIGHT IN AIR AND IN VACUO,

relating to a small correction of the velocity of light as deduced from experiment. This, according to the undulatory theory, must be less in atmospheric air than in vacuo, in the inverse ratio of the index of refraction of atmospheric air to 1, that is, as 1 to 1·000294. The velocity then, as ascertained by experiment, under the air should be increased by just about 0·000294 of itself to be equal to that in vacuo; that is, to the extent, almost exactly of 55 miles per second, a very small quantity indeed in comparison with the whole velocity of 185,000 miles per second; and yet, small as it is—and so small as to be below the limits of error of the experiments in question,—it is yet very closely equal to three times the velocity of the earth in its orbit.

Professor Hayden presented a general account of scientific explorations in the west and gave a brief summary of the forthcoming seventh annual report of the expedition under his charge. Professor Silliman described the

TELLURIC ORES OF COLORADO.

The mineral is found on the side of a dyke some fifty feet in thickness, and was introduced by a plutonic invasion of this formation. The speaker had found that, in many instances, telluric ores were associated with gold, and the association was very unfortunate for the gold miner, as in one instance $3,000 worth of gold thus associated was thrown away (through ignorance), while the yield of the rest of the ore was only $40 or $50 to the tun. Professor Silliman asked Professor Endlich to perform an experiment, showing the presence of tellurium by using concentrated sulphuric acid. A bright purple color was rapidly obtained when the ore was thus treated with heat in a test tube. In one specimen of these telluric ores, there was $55,000 extracted from a tun.

With reference to

THE LAWS OF CYCLONES,

Professor Ferrel reviewed the theories of Espy and of Redfield, Reid and others, and re-enunciated his own views published several years since.

Concerning

THE GREAT TELESCOPE AT WASHINGTON,

Professor Newcomb gave some interesting facts. The question is frequently asked, how does the new instrument compare with other telescopes? This is difficult to answer, since there are no refracting telescopes in this country of comparable dimensions. The question as to the comparative efficiency of refracting and reflecting telescopes is frequently raised. It must be admitted that great reflecting telescopes give very variable results and are very apt to prove unsatisfactory. As an instance of this, if we examine the record of Herschel's work, we find that nearly the whole of it was done with his two foot reflector; we shall almost arrive at the conclusion that all the work accomplished with the four foot reflector might have been done with the smaller instrument. The same comparison of results leads us to a similar conclusion with regard to the four foot reflector of Lassell—probably the largest ever constructed. He had under the clear skies of Malta made many important observations; but when he took his four foot reflector there, hoping with it to verify his discoveries, it does not distinctly appear that he succeeded. Struve, after looking through the four foot telescope, wrote that it was not in any remarkable degree more powerful than his 15 inch instrument at Poltava. The only exception to this generalization is the fact that the four foot instrument of Lassell did really discover the two inner satellites of Uranus. Professor Newcomb having rediscovered these with the new instrument, and thus verified Lassell's discovery, thinks that they could never be seen with a 15 inch refractor. In the new telescope the outer satellites of Uranus look as if of about the size that *Ursæ Minoris* appears to the naked eye. The smaller satellites, strange to say, have been best seen when the moon was shining, and its light was plainly apparent in the telescope; the first of these appears about half as bright, and the second about one third as bright, as Titania.

Our friends have asked whether there is difficulty in the Washington telescope on account of spherical aberration. This proves to be a very small factor; its total amount is less than that produced in the lens by ordinary atmospheric variations of temperature—an effect which is noticed when work is first begun with the instrument of an evening, but which rapidly wears away as the glass acquires the uniform temperature of the rest of the instrument. It seems to be only the rays near the edge of the glass which are thus affected. Professor Newcomb has looked through many other refracting telescopes, by way of comparison, and after full consideration believes the new instrument to be a great success.

PLANETARY SATELLITES,

Professor Alexander said, are claimed to resemble our moon in the coincidence of their times of rotation and revolution; and that in consequence every satellite presents always nearly the same side to its primary. One occasion for this belief is found on observing the special vicissitudes which the light of the satellites exhibits, each specified change recurring when they have again arrived at the same position in their orbits around their respective primaries. Another evidence is found in the remarkable phenomena of their apparent loss of light on certain occasions.

The loss of atmosphere is one of the supposable consequences of those stringent conditions, as indeed M. Laplace has intimated, when, after stating the distance at which the attractive force of the earth is in equilibrium with that of the moon, he adds: "If at this distance the primitive atmosphere of the moon had not been deprived of all elasticity, it would be carried to the earth, which would thus draw to itself. This is perhaps the reason why the moon's atmosphere is nearly insensible." We may fairly inquire whether this has not been the case with all the satellites, and their common experience.

Professor Loomis, in a paper on the

LAWS OF STORMS,

explained the process by which he computed the relative velocities of the winds, etc., at high altitudes, such as that of the signal service stations at Mount Washington, coming to the conclusion that, at the hight of 6,000 feet in the western quadrant of a storm, the velocity of the wind is more than double that of the storm. By another series of computations he obtained the forms of the isobaric curves in at least 200 cases. In 55 per cent of the whole number of cases, the major axis of the isobar exceeded its minor axis by half its length; in 30 per cent the major was double the minor; in 3 per cent the major axis was at least four times the minor. The storms of the United States are mostly of an oval form, with the longer axis most frequently in a direction about N. 40 E. About three quarters of the great storms originate in the extreme west. In a case of which the details were particularly reviewed, it seemed probable that the first development of magnitude in a storm began with the collision of moist air from the Pacific Ocean against the peaks of mountains in Oregon, resulting in heavy rainfall. But the most remarkable fact elicited was that the storm, once originated and organized, traveled over the highest mountain ranges without indicating sensible obstruction, proceeding eastward across the whole continent of North America.

An exceedingly interesting and valuable paper on the mode of formation of the earth, its condition as to interior fluidity, and the probable limits within which it was reduced from a fluid state to its present condition, under the title of "A Criticism on the Contractional Hypothesis of the Earth's Surface Changes," was read by Captain Clarence Dutton of the Ordnance Corps, U. S. A. Mr. James D. Warner of Brooklyn read a technical paper on a new set of Bernouilli's numbers, which are a mathematical invention for shortening certain processes by their application to the coefficients of development of expanding series.

At the conclusion of this paper, Professor Henry simply remarked "The Academy is now adjourned," and thus the session ended without the passing of resolutions or any other of the usual formalities.

Correspondence.

Freight Cars.

To the Editor of the Scientific American:

I notice, in your issue of April 11, an article headed "A Chance for Inventors," which article attracted my attention. Bearing as it does upon a matter of great importance, it ought to be called to the attention of car builders generally; and while I am compelled to differ with the author very widely in many respects, I fully concur in the belief that there is a need of improvement in this direction.

But where is the inventor who is able to overcome the the numberless difficulties that stare him straight in the face at every turn? We wait for him to appear. The author of the article referred to seems to exhibit a wonderful lack of knowledge in regard to the difficulties which must be met, when he supposes that the strength for carrying of a country wagon is to be placed in comparison with the strength for carrying of a freight car, and that its paying weight should be, in proportion, equal to the former.

For the past seventeen years, I have been a practical car builder, and have tried a great many experiments in building very light cars, both for passengers and freight, and every experiment has proved a failure. Some fifteen years ago, box freight cars weighed only from 15,000 to 16,000 lbs. and would carry 10 tuns. These cars proved to be sufficiently strong and durable at that time, when the railroads were doing only a local business, running short trains and resting them at almost every station (a car requires rest as well as a man, if it is to last long). Then every railroad had its cars under the master car builder's care, who watched over them as carefully as over his children; and if they did not return when they ought, they were looked after in the same way. Our repairs were then very light. But since that time, the world has not only been revolving, but moving in other directions; and today freight cars, formerly simply local carriers, are interchanged by nearly every railroad in the United States, and are drawn (in tremendous trains) thousands of miles, with but short stops and no rest from their loads.

It has been said that the steam engine is subject to fits and starts, and, when attached to one of these long trains, must of necessity test the strength of the most workmanlike and thoroughly built car to its utmost capacity, which would not be the case if only a few cars were taken. Couple even twelve or fourteen country wagons together, and I doubt very much if they will carry the load referred to (3,000 lbs. to a wagon) for very long, successfully.

Box freight cars have and can now be built to weigh not over 12,000 lbs., and I will guarantee to build them, not to exceed that weight, so that they will carry successfully 10 tuns to the car. But they must be taken in very short trains, as they would be likely to receive injury by sudden starts and stops if taken in long trains. Consequently, as the rule and not the exception is long trains, we are placed under the necessity of building our freight cars about three times as strong as they were built fifteen years ago; but the weight has not increased in that proportion, being only one or two thousand lbs. more: we therefore have reason to be thankful for this improvement already made.

Freight cars are subjected to very rough usage; for example, an engineer couples his engine to a train of forty cars, and undertakes to start gently; he finds that this makes no impression on his train; he therefore backs up with as much force as possible, and then, putting all the force of the powerful machinery to work, starts up again, and perhaps may repeat this several times before succeeding. In view of these

severe tests that our freight cars are called upon to encounter, I think every engineer will say that the fault is not in their strength, but rather in their weakness. Wood or iron of a certain dimension has a capacity of overcoming a certain resistance; and when it is forced beyond its capacity, it breaks. Now the question is: In what form will a certain dimension of wood or iron resist the greatest force? This can only be settled by constant experiment.

How long would a train of country wagons stand the pressure above named? I am very anxious to learn how to build a lighter car than I am now building, to give me the same strength or power of resistance; and have therefore written this for the purpose of drawing out information.

Our box freight car bodies weigh 9,785 lbs., truck with brake, 4,445 lbs., truck without brake, 4,140 lbs., total weight of box freight car, 18,370 lbs. Our passenger car bodies weigh 27,330 lbs., trucks weigh 13,200 lbs., total weight of car, 40,530 lbs. The car will seat 72 passengers with a saloon and 76 without a saloon.

NEW ENGLAND.

Patent Affairs at Washington.

To the Editor of the Scientific American:

The past winter has probably been one of the busiest ever known in the Patent Office, and the work is still increasing, as will be seen by the fact that the number of fees of all kinds paid in during the first three months of this year is 19,528, being an increase of five hundred and twenty over the corresponding period of last year.

With this increase of business and the constant accumulation of material, such as files, drawings, models, etc., there is a great necessity for more space, especially in the model halls. The cabinets for exhibiting the models being full and running over, most of them having their tops covered, in some cases the models are piled, one on another, until the lower ones are broken with the superincumbent weight. Unless something is done soon, the models will be in such a terrible confusion that it will be almost impossible to examine them. The machinist is doing his best to make room by putting the models closer together, but this is a mere temporary expedient, and gives but little space. If the galleries in the South Hall were completed, a large number of cabinets could be added, but these, it is stated, cannot be built for want of money, although enough has probably been wasted in building a private conservatory over the roof of the West Hall to complete the galleries and have money to spare.

From the number of applications before Congress, it would appear that the lobbyists are endeavoring to run another Patent Office in the Capitol, as the following list of cases now before the Committee on Patents will show:

THE CONGRESSIONAL PATENT OFFICE.—LIST OF APPLICATIONS FOR EXTENSIONS OF PATENTS NOW BEFORE CONGRESS.

A. B. Wilson, Sewing Machines.
McClintock Young, Harvester.
J. Fritz, Rolling Iron.
J. Hazeltine, Water Wheel.
L. Ketchum, Harvester.
J. Nock, Inkstands.
T. W. Mitchell, Finishing Brush Handles.
C. W. Williams, Canal Locks.
J. Wyman, Setting Blind Staples.
Vinton & John, Furnaces.
Moses Marshall, Knitting Machine.
J. Lilley, Surveying Instrument.
A. Dillman, Corn Shellers.
Rollin White, Fire Arms.
Akin & Felthausen, Sewing Machines.
Rudolph Eickemeyer, " "
Reynolds, Power Loom.
A. J. Hathaway, Converting Motion.
L. C. Chase, Buckles.
J. Haines, Harvester.
H. L. Cake, Coal Screens.
Ward, Bullet Machine.
" Molding Shell.
W. W. Burrell, Corn Sheller.
H. G. Bulkley, Kilns.
A. Attwood, Car Wheel.
T. R. Crosby, Wiring Blind Rods.
A. G. Batchelder and others, Car Brake.
J. Young, Washing and Wringing Machine.
J. A. Pickering, Boot Straps.
J. H. Butterworth, Bank Locks.
J. C. Cook, Webbing.
R. A. Marcher, Enameling Moldings.
Eliza Wells, Forming Hat Bodies.
A. S. Macomber, Straw Cutter.
S. Wetteredd, Carding Machines.
J. W. Marsh, Sewing Machine Attachment.
W. Wickersham, Sewing Machine.
A. J. Vandergrift, Grain Separator.

In addition to these cases, I find the following names of parties who have applications filed, but the records do not show the inventions protected by their patents: S. H. Hodges, Henry Lill, N. Whiteball, Alpha Richardson's widow and heirs, T. & L. Winans, J. Kirby, E. P. Torrey, J. G. Perry, and G. Wellman.

One of the most conspicuous of these jobs is the case of the Wilson sewing machine, which is up before Congress for the third time. This patent covers up every "roughened surface," "four motion" or "wheel feed," and the sewing machine rings have controlled it now for twenty-one years, thereby shutting off all competition, which has enabled them to wring millions yearly from the people; "and yet they are not happy," but want this pretty little privilege for seven years longer. It is rumored among the knowing ones that the promoters of this extension expect to dispense something nice among those who are disposed to help them, and that $50000 has already been sent down here as an earnest of the good things to come. The plan proposed at present, as near as I can learn, is to get Congress to pass an act directing the Commissioner to examine and decide the case in the same manner as a first extension, and then bring their whole force to bear upon him to decide favorably. At the two previous attempts, the application has been kicked out, the Congressmen being afraid to face their constituents with the additional discredit such a palpable job would give them—the Credit Mobilier and "back pay grab" being as much as they could hope to carry comfortably—but, by turning the matter over to the Commissioner, they hope to be able to oblige their good friends of the sewing machine ring, and yet throw the blame on the former should their constituents make trouble about it. The ring hope to succeed with the Commissioner by means of a pretended sale of the first extension for $50,000, so as to make out that this was all the benefit that Wilson received from it, and that he should therefore have another term of seven years as a compensation for being such a fool as to sell a patent worth millions for such a paltry sum. By means of this sale, and by tales of the hardships, sickness, and other troubles which Wilson encountered in his early days, they hope to work on the benevolent heart of the Commissioner and induce him to grant another extension. There are some persons who even go so far as to say that the same *weighty reasons* are to be employed with the Commissioner that are found so efficacious with the lobby, but, of course, people who know him will not believe a word of this; yet, in view of the rumor, it would give an ugly look to the matter to those unacquainted with him, should this extension pass.

In addition to this there is the Akin & Felthausen case, which, if extended, will also cover up the sewing machine business completely; but these parties, although formerly connected with the combination, appear to be—and I believe they are—working against them. They want Congress to extend their patent so that every one shall have the right to manufacture by paying them a small royalty. Such an extension, however, would have to be very carefully worded, or otherwise it would fall into the hands of the ring who bought of them the last extension, the assignment being so worded as to carry with it any future extension.

Besides these extension bills and the bills reorganizing the Patent Office, several bills have been introduced into Congress, affecting inventors and patentees. One of these authorizes the payment of $100,000 yearly for ten years as premiums for meritorious inventions, in the sums of from one to ten thousand dollars. Another bill proposes the extension of any patent for seven years on the payment of $100 by the inventor. Both of these, I believe, have been reported unfavorably. A third bill provides, first, that there shall be no more extensions; and, secondly, that any person or corporation shall have the privilege of manufacturing patented articles by paying a certain percentage (not yet fixed) on the selling price.

OCCASIONAL.

WASHINGTON, April 30, 1874.

Steam on the Canals.

To the Editor of the Scientific American:

If a man, using a lever, were to place his fulcrum on water when he had a chance to place it on dry land, he would not be considered fit for a juryman. But this is what inventors are doing in the Erie canal problem. If they would take one of the engines out of a boat which they are trying to run with a 200 tun cargo at three miles an hour, and put it on the tow path, it would take eighteen boats of 230 tuns each (4,140 tuns) two miles in an hour loaded, and go back light at four miles an hour, averaging on the round trip three miles.

Trains of boats could be drawn in this way, of such a length and so frequently that the capacity of the canal would be equal to the number of boats that could be got through the locks. A train every six hours would do a business of nearly 4,000,000 tuns in the season, at a cost of about one dollar per tun, including river and harbor expenses.

Highland, Iowa. WILLIAM SLOAN.

The Mercurial Telescope.

To the Editor of the Scientific American:

On page 20 of the present volume of the SCIENTIFIC AMERICAN may be found a communication on this subject from Mr. John Linton, of Baltimore. In reply let me state that if, on account of the instability of the mercury at the center of the revolving vessel, it is desired to dispense with a portion of the center, the loss will be only in point of illumination; in fact, if the mirror is large, there will be enough reflecting surface remaining. A diameter of three feet in the center of a ten foot mirror might be dispensed with, and at the same time the efficiency of the mirror would not be impaired; for we should lose only one eleventh of the entire reflecting surface.

One plane mirror would suffice for keeping the beam of light, from objects out of the zenith, always vertical upon the mercurial surface. Its width must be equal to the diameter of the mercurial mirror; and its length must be greater as the altitude of the object is greater.

By actual calculation, it is found that, when the latitude of the object is 30°, the plane mirror must be 19·99 feet long, in order to reflect vertically a beam of rays ten feet in diameter. If the object is 60° above the horizon, the length of the mirror must be 38·64 feet. Of course it is impracticable at present to construct an accurately plane mirror of these dimensions; consequently the great mercurial concave can be used only for the examination of objects when in the exact zenith. Nevertheless, its use would secure important results. At many available latitudes in the United States there are interesting celestial objects which culminate in the zenith; and even during the short time of their passing the field of view, the distinguishing features of each object might be noted. That an object may pass through the zenith of any place, its declination—which may be found in the star catalogues—must be equal to the latitude of the place.

The concentration of light, also, would greatly facilitate an examination, by the comparison method, of the spectra of celestial objects whose illumination is feeble. These few facts are presented with the hope that Mr. Linton may continue the experiments he appears to have begun. Let him communicate to the SCIENTIFIC AMERICAN at some future time a few details of his method, whether the results attained were successful or otherwise.

Amherst College, Mass. D.

The Reclamation of the Colorado Desert.

To the Editor of the Scientific American:

The possibility of the project of reclaiming the Colorado desert by turning the Gulf of California, or the river, into it, will be more readily understood when it is known that the whole desert is interlaced with high mountain ranges, leaving the valleys between them generally at considerable elevations above the level of the sea. The most traveled route from San Bernardino to Fort Mojave, nearly along the 35th parallel, shows this. After crossing the sierra at an elevation of about 5,200 feet, we steadily descend to and along the Mojave river, to about 1,100 feet above the level of the sea; we then rise until, at Marl Spring, it is above 4,000 feet; and it remains at or above 4,000 feet for fully 40 miles, when, after crossing Piute creek and the Mount Newberry range, it descends rather rapidly to the Colorado river, at about 500 feet elevation. Except part of the Armagozza region and Death Valley, north of said route (said to be the only spot in the United States actually below the level of the sea—by about 120 feet), the whole vast extent hardly shows a depression below 2,000 feet. The lofty unbroken Wahsatch mountain range seems to prohibit, pretty effectually, any attempt to turn the waters of the Colorado from above the Big Cañon of the Colorado into the desert.

A government grant, ostensibly for that purpose, will no doubt benefit some interested parties speculating upon the monopoly of the mines embraced in the region in question; but it is more than questionable whether the alleged object will be accomplished.

R. D'H.

Fayetteville, N. C.

The Relative Attraction of the Earth and Sun.

To the Editor of the Scientific American:

In your issue bearing date March 14, I find an article from the pen of Mr. Ericsson, in which the subject of the relative attractions of the earth and the sun is presented in a most happy and satisfactory manner. Mr. Ericsson is right. The centrifugal force, as a factor in the calculation, was overlooked by me. I acknowledge my obligations to him for the correction.

W. B. SLAUGHTER.

Brownville, Neb.

Transparent Paraffin.

The paraffin of commerce is a colorless, translucent substance, perfectly inodorous and tasteless. It floats on water, and has a density of about 0·870, and melts at about 113° to 149° Fah., forming a colorless oil which, on cooling, again solidifies into a crystaline mass. It boils at about 698°, and volatilizes without decomposition. Paraffin does not absorb oxygen from the air, and is only slowly attacked by sulphuric acid, even at the boiling point of water. It is not at all attacked by dilute nitric acid, and only by the strong acid after prolonged boiling. In fact, chlorine or any part of our most energetic chemicals but slowly acts upon this curious substance, which may be considered to be as neutral to the general run of chemicals as our glass vessels. Lately it has been discovered that if paraffin be heated for some considerable time in a tube sealed up, the result is a more fusible paraffin, exactly similar in its apparent chemical composition, but much more soft and fusible—that, in fact, if the heat be continued for a considerable time, the paraffin being still under pressure, we obtain ultimately a perfectly transparent liquid paraffin.

Ascent of Sap in the Bark of Trees.

M. Faivre has recently performed a series of experiments on the mulberry, hazel nut, and cherry laurel, which he considers goes far to prove the fact that the substances which supply the food of plants have an ascending motion in the bark. For this purpose, he made perfect or imperfect annular incisions through the bark, or detached pieces of the bark, to which buds were attached, or removed entire cylinders of bark from the trunk. The result of the experiments was that the buds always continued to develop when the communication remained uninterrupted with the lower portion of the trunk; while when this communication was completely destroyed, the buds invariably withered away. If the bud was separated by a perfect annular incision, it withered the more slowly the greater its distance from the incision; and in these cases the starch disappeared entirely from the portions of the wood above the incision between it and the bud. When entire cylinders of bark with buds on them were removed, the buds continued to develop, and even produced branches bearing leaves.

A CHECK for $60,000 was recently handed the inventor of metallic tips for childrens' shoes, in payment of his share in a reissue of the patent, which he had originally sold for $100. And now, with such encouragement as this, suggests the *Commercial Advertiser*, why can't he win the everlasting gratitude of mothers by inventing some kind of brass knee plates for little boys' trousers?