

our country, it is hopeless to expect this interesting branch of the textile industry to be introduced among us in the way it is carried out by the German firm, who, we understand, are at present executing a larger order for the Italian Court, including carpets at £150 and £250 each.

Proofs of Progress.

Joseph Nimmo, Jr., Acting Chief of the Bureau of Statistics, has issued a special report on the foreign commerce of the United States, from which it appears that the total foreign commerce of the United States—imports and exports—during the year ending June 30, 1878, was larger than during any year prior to 1873. The exports of domestic merchandise from the United States, during the year ending June 30, 1878, were larger than during any previous year in the history of the country. From the year 1863 to the year 1873, the net imports of merchandise into the United States largely exceeded the value of the exports of domestic merchandise from the United States, the excess of imports ranging from \$39,000,000 to \$182,000,000. During the years ending June 30, 1876, 1877 and 1878, however, the exports of domestic merchandise from the United States greatly exceeded the net imports of merchandise into the United States, the excess of imports increasing rapidly from year to year.

The principal commodities showing an increase in the quantity exported are:

Articles.	1868.	1878.	Increase.
Agricultural Implements	\$613,381	\$2,575,198	\$1,901,817
Living Animals	733,395	5,844,653	5,111,258
Bread and Breadstuffs	68,980,997	181,774,507	112,793,510
Coal	1,516,220	2,359,467	843,247
Copper and Brass, and Manufs. of	939,250	3,078,349	2,139,099
Cotton Manufactures	4,871,054	11,435,628	6,564,574
Fruits, all kinds	406,512	1,376,969	970,457
Iron, and Manufactures of	6,040,961	10,696,970	4,656,009
Steel, and Manufs. of, ex. Firearms	348,468	1,389,078	1,038,610
Leather, and Manufactures of	1,414,372	8,077,659	6,663,287
Oil Cake	2,913,448	5,095,163	2,181,715
Coal Oil and Petroleum	21,810,676	46,574,974	24,764,298
Provisions	30,278,253	123,549,986	93,271,733

What the Reaping Machine has Done.

An exchange says: "When the reaping machine—that *bête noir* of the tramp who sits in the shade and listens to the man who tells him that he ought to ride in his carriage—was introduced to the country in 1850, the number of farmers and agricultural laborers in the twelve States in which it is now chiefly used was 1,301,863, and in 1870, 2,641,830. The difference in wages was still greater. In 1850, farm hands were paid \$9 a month, and harvesthands from 80 cents to \$1.50 a day; while in 1870 the wages of the former were \$30 a month, and of the latter from \$2 to \$3.50 a day. This year farmers willingly paid harvest hands from \$1.50 to \$2.50 per day, while the manufacture of reaping machines is giving employment to thousands of skilled workmen. The same remark is applicable to all kinds of machinery, the hands employed during the last twenty years having more than doubled, and the wages quadrupled, while the population increased only 67 per cent. Comment on such a change of things is superfluous."

American Locomotives for Australia.

The Baldwin Locomotive Works, of Philadelphia, whose advertisement has for some time past been published in the SCIENTIFIC AMERICAN Export Edition, has lately shipped to Australia, by the clipper ship Colorado from this port, three powerful locomotives for Sydney, New South Wales, where they will be used on the railways owned by the Australian Government. The shipment comprises one passenger locomotive and two freight locomotives. The passenger locomotive has cylinders 18 inches by 24 inches, four driving wheels, 63 inches in diameter, and a four wheeled swinging bolster truck, with wheels 30 inches in diameter. The tender is on four wheeled trucks, in accordance with the usual American practice. All the truck wheels are steel tired. The two freight locomotives are of the "consolidation" type. These engines are of the largest and most powerful freight locomotives constructed. They weigh in working order, exclusive of tender, 102,000 pounds each. Their dimensions are: Cylinders, 20 inches by 24 inches; they have eight driving wheels, four feet in diameter. On one occasion, on the Susquehanna Division of the Northern Central Railway, where the grades are very light, one of these engines drew a train of 160 empty cars. The total length of the train was one mile. The usual work of engines on that division of the road is from ninety to one hundred loaded cars each trip.

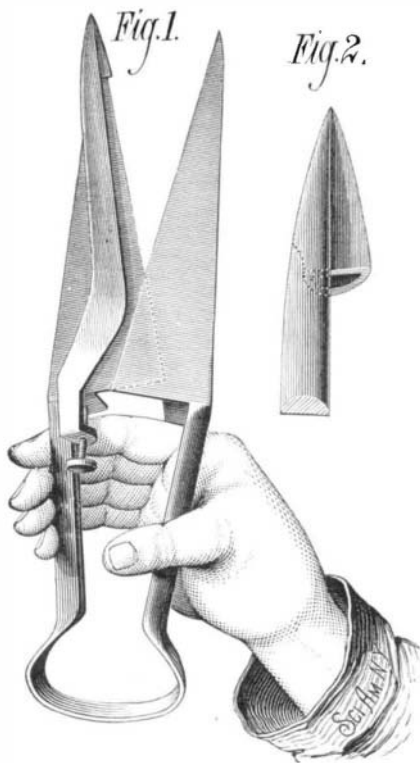
American Electro-Plate in England.

On first appearances it seems somewhat strange that American manufacturers should be successfully competing with Sheffield houses in the manufacture of silver-plated goods. Yet really it should not be a matter for surprise, for in America there are some of the best workmen whom Sheffield ever sent across the Atlantic. This, of course a great advantage in itself, is heightened by the large employment of labor-saving machinery, and the result of the combination is that the American goods have a smarter and more perfect appearance than have those made here. That American electro-plate, however, should find a market in England is certainly somewhat singular; but such is the fact. We hear of one or two large export houses that are buying American plate almost exclusively, and who have well nigh discarded the goods of Sheffield houses. That the trade is developing is evident from the fact that American travelers

in this line visit England three or four times a year, and that their pattern books are freely distributed.—*British Mercantile Gazette.*

NEW GUARD FOR SHEEP SHEARS.

With sheep shears of the ordinary form the experienced shearer is liable to cut the sheep in the operation of shearing, and in the hands of the unskilled the common shears are sure to work injury to the sheep.



HELMECKE'S GUARD FOR SHEEP SHEARS.

To facilitate the operation of shearing and to render it perfectly safe, Mr. Frederick A. Helmecke, of Round Top, Fayette Co., Texas, has devised the improvement shown in the accompanying engraving. It consists in a guard applied to one of the shear blades, and arranged nearly parallel with its cutting edge, and at such a distance from it that the opposite blade may readily pass into the space between the guard and the blade.

The guard has a socket for receiving the point of the shear blade, and a binding screw which engages the heel of the blade.

It is obvious that the blade thus protected cannot come into contact with the skin of the sheep. It will also be seen that when the guard is employed the shearing can be more closely and thoroughly done than without it.

For further information address the inventor as above.

NEW MEASURING STOPPER.

In the accompanying engraving is represented a little device, the invention of Mr. W. L. Keller, of Baltimore, Md., which must prove of great utility to druggists and chemists.



MEASURING STOPPER.

It will be readily understood from the cut. Upon the inner end of the stopper is formed a small graduated measure, which is similar to those commonly used. The stopper has a flat head that forms a stable base for the measuring glass. This invention obviates all loss of liquid, as it is returned to the bottle after the stopper is replaced. The glass need not be cleaned, as it is always used in the same liquid.

Labor in Massachusetts.

A few weeks ago Carroll D. Wright, Chief of the Massachusetts Bureau of Statistics, was called as a witness before the Congressional Labor Committee, and testified as follows:

"In my official capacity I have given special attention to labor statistics, and am the author of the recent report which has been given to the public through the newspapers and otherwise. I have compared that report with the census of 1875, and find the two entirely in harmony. The number out of employment is about the same as in 1875, though the census of 1875 does not take into account the laboring men out of employment. In it there is a column of those never employed—persons of leisure. Both reports exclude those in almshouses; it may be that there are a few more now than in 1875; but the difference is very little. After the panic of 1873, there was an increase in the number of paupers all through the country; this has since been decreasing steadily; I have made very extensive inquiries throughout the United States, and have found no such condition of things as has been represented before this committee; I have no doubt the reports of destitution in the coal region are correct, but it is diminishing; I cannot tell the causes of this any more than I can tell how an apple grows; I have found as great difficulty in accounting for periods of prosperity as of suffering; I do not believe that the relief has come very greatly from the removal of the unemployed to other places; you cannot make a State prosperous by depopulating it."

Mr. Wright said that the shoe manufacturers of Massachusetts were enlarging their works, and the Amoskeag Print Works, at Worcester, N. H., was putting in 900 extra looms. Mr. Crompton, the loom manufacturer, had more orders than he could fill. The same improvement appeared in other States, and in all branches of trade, except the iron industry.

"Last year the work of laborers in Massachusetts on boots and shoes averaged eight hours a day; that of operatives in cotton mills from nine to ten hours a day; and that of carpenters and joiners about nine hours a day. Machinery does not take the place of labor; it calls for a higher class of labor. The wages of carpenters have increased from \$1.75 in 1859 to \$3.50 in 1868, and thence have fallen to \$2 in 1878. The purchasing power of the wages is not quite so great now as it was in 1859. The wages and the moral, intellectual, and physical condition of the workmen have been steadily improved during the last 100 years by the use of machinery. In Massachusetts it would require a population of 9,000,000 to do the work without machinery, which is now done with a population of 1,650,000; the accumulated property of the State would be used up by this extra population in less than two years, and the condition would then be worse than in China and India now."

Labor and Trade in Italy.

Mr. Charles McMillan, United States Consul-General at Rome, reports that in that part of Italy labor is in excess of demand. The wages of woolen, cotton, and silk spinners and weavers have not increased during the last 10 years. There has been a slight increase in the wages of masons, bricklayers, blacksmiths, and servants. Carpenters' and joiners' wages have increased 40 per cent.; tailors', shoemakers', and stonecutters', 20 per cent.; machinists', 15 per cent. A day's work is 10 hours, with half an hour for dinner in winter, and one and a half in summer. The advance in wages since 1873 is slight, and bears no proportion to the advance in the cost of living. When Rome became the capital of Italy, owing to the great influx of people, rents advanced from 75 to 100 per cent, where they still remain. Articles of food advanced in price 25 per cent, and have not yet sensibly decreased. Wages also increased at the same time—in some cases 40 per cent. The commerce of Italy has fallen off in imports and exports during the last five years, owing to the Eastern war, overstocked markets, and uncertainty as to the ratification of a commercial treaty with France. As regards Rome, there has been a slight improvement in its commerce and in its exports to the United States. Its principal articles of export are wool, cheese, hides of small animals, statuary, and other works of art. Manufactures of wool, cotton, silk, and leather are absorbed at home and in the neighborhood. The expenditures of the large number of visitors to Rome form a considerable part of its trade. The United States is now represented in Rome by 17 sculptors and 18 painters. The imports from the United States consist almost wholly of petroleum, cotton goods, sewing and agricultural machines.

MR. J. E. MONTGOMERY, United States Consul at Geneva, Switzerland, reports to the Department of State that he is constantly receiving letters from the United States upon the subject of introducing goods and products into Europe. He recommends generally, as the most effectual, if not the only method of increasing our trade with Europe, that manufacturers, producers, and others, should forward samples of their respective goods to responsible firms in the chief cities, with explicit statements as to the cost of importation of said goods to wholesale dealers in Europe.

THE rage for exhibitions has now spread even to Central Asia. The latest news from Tashkend states that an agricultural and industrial exhibition is about to be held there. Great preparations are being made for it at Samarcand, and the government has promised gold and silver medals to the exhibitors, as well as—honorary caftans!

Natural History Notes.

Spontaneous Combustion of Wasps' Nests.—A correspondent of *Nature*, writing from Caracas, says that some time ago the dwelling of Gen. P. M. Arismendi (now Consul of Venezuela, in Port-of-Spain, Trinidad), in that city, had quite a narrow escape from being set on fire by the spontaneous combustion of the large paper-like nest of a wasp (a species of *Polistes*) in a closet under the roof. The day was exceedingly hot, but this was thought to have slight connection, if any, with the outbreak of smoke from the nest. In that country roofs are constructed of tiles supported by a thick layer of compact earth, which rests on the usual lath work of dry canes (stems of *Gynerium saccharoides*, or arborescent grass), both being bad conductors of heat. The source of heat must therefore have been in the nest itself. In beehives the temperature rises sometimes as high as 38° C. (*vide* Newport). It may be supposed that something similar occasionally happens also in wasps' nests. Such a heat might be caused by an alteration beginning in the wax, hydrocarbons being formed, which, on being absorbed by the paper-like porous substance of the cell walls, must become still more heated, so that a comparatively small access of oxygen would be sufficient to set the whole nest on fire. It has been asserted that the spontaneous combustion of wasps' nests is a well known occurrence in the interior of Venezuela, and it would be interesting to know whether a like fact has been observed in other parts of the world.

Inability of Birds to Distinguish Eggs.—A writer in the *Zoologist* states that this year he met with the nest of a blackbird, in which he found two misshapen three-cornered flints (evidently from the road), upon which, in addition to an egg laid that morning, the hen was complacently sitting. A week or two later he found the nest of a spotted flycatcher, containing three eggs, which he exchanged for hazelnuts, completely filling up the bottom of the nest. Upon returning a day or two later, he found one of the eggs ejected, and a fourth egg laid in its place; the bird was sitting when he approached it. Since birds evidently do not distinguish either stones or nuts from their eggs, it is easy to exchange the egg of one bird for that of another. A blackbird having built in a plum tree in the garden, and laid two eggs, the same observer having noticed that each evening she regularly left the nest at 7:45 P.M. for about a quarter of an hour, added an egg of the song thrush. She never noticed the addition, but sat on the three until the same time next evening, when, seeing that she had laid a third egg, he exchanged it for a second egg of a song thrush. This was repeated the next day, and had it not been for a cat, she would undoubtedly have laid her last egg, and reared an equal number of thrushes and blackbirds. Like experiments with the linnæ and greenfinch were followed by the same results.

The Fruit of the Strawberry Shrub.—Mr. Thos. Meehan remarks (*Proceed. Phila. Acad. Sci.*) that though the sweet-scented or strawberry-scented shrub (*Calycanthus floridus*) has been under cultivation for many years, the fruit was very rarely seen. In correspondence with a leading author, it had been suggested that the plant might be incapable of self-fertilization, and that, being so far from its native place (Virginia and the Southern States), the special insect arranged to be the agent in fertilization had not followed it. Since that time Mr. Meehan had obtained seeds from the Cumberland Mountains, in Tennessee, and plants from these had flowered in his grounds, many of them producing fruit in the greatest abundance, while the old plants still remained as barren as they ever were. It was therefore clearly a case in which insects had no agency one way or the other. There was, he said, in plants two distinctive forms of force—the vegetative and the reproductive—the one growing out of and dependent on the other, and yet, to a certain extent, antagonistic; and that these forces had their lines especially in the petaloid and staminoid verticils, and this resulted in producing some individual plants abundantly productive of fruit, while others were almost or wholly barren. This was the case with most species of plants. The lines were never exactly drawn between these forces. In the case of the calycanthus, the earliest individual introduced to culture happened to be the one that favored the vegetative side, and in which the reproductive had but little power, and this individual, as often happens in nurseries, had been propagated from by cuttings or offsets and widely distributed. It was in this direction that we had to look for the explanation of many similar experiences, and not merely to the necessity for cross fertilization.

Notes on the Gall-making Plant Louse.—The life history and organic multiplication of the plant lice (*Aphidæ*) have always excited the interest of entomologists, and even of anatomists and embryologists. The life history, however, of the gall-making species belonging to the *Pemphiginae* group has baffled the skill of observers more than that of any other. All of the older writers, in treating of the different gall-making *Pemphiginae* of Europe, have invariably failed to trace the life history of the different species after the winged females leave the galls; and, with few exceptions, have erroneously inferred that the direct issue from the winged females hibernates somewhere. In a recent paper "On the Gall-making Plant Lice affecting the Elm," by Dr. Kessler, of Cassel, Germany, the author concludes, after a series of ingenious experiments, that the insect hibernates on the trunk, but he failed to discover in what condition they so hibernate. Professor C. V. Riley, led by his previous investigations into the habits of the grape *Phylloxera*, discovered in 1875 that some of our elm-feeding species of *pemphiginae* produce wingless and mouthless males and females,

and that the female lays but one solitary impregnated egg. Continuing his observations, especially this summer, he has been able to trace the life history of those species producing galls on our own elms, and to show that they all agree in this respect, and that the impregnated egg produced by the female is consigned to the sheltered portions of the trunk of the tree and there hibernates, the issue therefrom being the stem mother which founds the gall inhabiting colony the ensuing spring. Thus the analogy in the life history of the *Pemphiginae* and *Phylloxerinae* is established, and the question as to what becomes of the winged insects after they leave the gall is no longer an open one. They instinctively seek the bark of the tree, and there give birth to the sexual individuals, either directly or in one species, through intervening generations. These as yet unpublished facts were laid before the American Association in August, it being Professor Riley's intention to publish shortly some new biological discoveries relating to this family of insects, in connection with a descriptive and monographic paper by Mr. J. Monell, of the St. Louis Botanic Gardens.

The Ulikon, or Candle Fish, of Alaska.—The ulikon has long been an ichthyological curiosity, and has attracted the attention of every traveler who has visited the coast of British Columbia and Southern Alaska. It is a small silvery fish, averaging about fourteen inches long, and in general appearance resembles a smelt. They are the fattest of all known fishes, and afford a superior oil when tried out. Dried, they serve as torches, and when a light is required, it is only necessary to touch the tail to the fire, when they will burn with a bright light for some time. No description can give an adequate idea of their numbers when ascending the rivers from the sea. The water is literally alive with them, and appears to be boiling. These fisheries have not been utilized except by the natives. The most important of the native fisheries is on the Nasse river, near the southern boundary of Alaska. The spot is named "Kit-lak-a-laks," and a Catholic mission was situated there. Many tribes come to these fisheries, which begin about the 20th of March. The first fish caught is addressed as a chief, and many apologies are made to him by the Indians for the necessity which compels them to destroy his kindred for the supply of their own wants. A feast is given, with appropriate songs, speeches, and dances, in his honor, and after that the fishing proceeds. The fishes are caught in wicker baskets, and are dried or smoked as much as their oily nature will allow. The fishing lasts a fortnight or three weeks, and supplies many hundred aborigines with food for a considerable period. The ulikon is described by Girard under the name of *Thaleichthys pacificus*.

Snake Incubation.—A remarkable characteristic of the anaconda is that, like the sea snakes (*Hydrophidæ*), it produces its young alive. We have long been accustomed to think that only vipers produce live young—and hence their name—and that all non-venomous snakes lay eggs. But snakes, at least those in captivity, are constantly doing what is not expected of them. Several important zoological facts have recently been established at the London Zoological Gardens, to the surprise of the naturalists of England. In 1862, the then but slightly known non-venomous snake *Coronella lewis* gave birth to a family of six live young ones in a cage in London; and several other harmless snakes in the London ophidarium have also afforded cause for surprise, not only in producing live young, but in manifesting a very decided care for them. Some New World species have furnished examples of this; for instance, the garter snake, chicken snake, and the yellow boa of Jamaica, the latter on several occasions, and sometimes at the same time producing eggs which proved bad. Mr. Philip H. Gosse had a boa which was with eggs. For a long time it manifested discomfort and restlessness, being savage and irritable, till at length it produced a family of young ones. Knowing it was the habit of this snake to incubate its eggs, Mr. Gosse was greatly surprised at the event; and the startling question occurred to him, When circumstances are unfavorable for the deposition of eggs, could a snake retain them until the young are hatched? Mr. Gosse's surmises have been confirmed by similar occurrences at the Zoological Gardens and by other writers, who, in the subsequent interval, have also given careful attention to the habits of ophidians, and have produced valuable scientific works on the subject. The fact is now well ascertained that not only *Ahlobothrus*, but several other oviparous species may at pleasure be rendered viviparous by retarding the deposition when circumstances are unfavorable for them. In fact, we find that we must almost discard those old distinctions of "oviparous" and "ovoviparous," which German authors tell us are not founded on any other ground than a greater or less development of the fœtus in the egg at the time of laying; or on the nature of the exterior covering of the egg, which is thicker and leathery in those which take some time in hatching, and slighter and membranous in those which are hatched either before or on deposition.

American Jute.

From a circular by Mr. Samuel C. Brown, of Trenton, N. J., it would appear that jute is likely to take its place in this country as a new and valuable agricultural product.

Mr. Brown says that it grows spontaneously in New Jersey, and suggests that it be cultivated in those districts especially adapted to its growth. In stating the importance of jute as a factor in commercial products, Mr. Brown says:

"Jute is now chiefly produced in India, and in that country to the extent of 1,000,000,000 lbs. annually, and about

20,000,000 lbs. are imported every year into the United States. If we can make jute a domestic product, its uses can be vastly multiplied, and the East Indian Government is already apprehensive that our country will not only produce this fiber for its own consumption, but become exporters of it. It is believed that this can be done with the India seed, at least in the more southerly States. But we feel assured that there is a jute-producing plant, familiar to all of us, growing spontaneously in sections of New Jersey, if not throughout its breadth, and the object of this circular is to acquaint the agriculturists of the State with its existence and possible value.

"I have experimented this summer in my garden with the seed both of the India and American plants, and a stalk from the American seed grew six feet high. But the average, as it will be found in most sections, will probably be from two to four feet."

A Probable Cure for the Cotton Worm.

Early last summer the Entomological Commission, consisting of Professors C. V. Riley, A. R. Grote, and J. H. Comstock, began a study of the cotton worm which is likely to result in the easy extinction of the pest. The cotton plant is peculiar in having a gland on from one to three of the larger ribs of the more mature leaves, and a still larger gland at the base of each of the three lobes of the involucre. As soon as Professor Riley learned that these glands secreted a sweetened liquid he inferred that the plant would be found to furnish nourishment to the moth as well as to the larvæ, and drew attention to this belief in the *Atlanta Constitution*. Subsequently, in company with Professors Comstock and Willet, he was able to prove his anticipation correct by studying the normal habits of the moth with a dark lantern at night. The moth is attracted to the cotton plant by the sweets which the leaf affords; and as these sweets are first produced when the plant begins to flower and fruit, we have here a possible explanation of the well known fact that the worm is never noticed on the young plants, but first appears about the time of fruiting. It was also discovered that the cotton moth feeds on the honey secreted from glands occurring on the cow pea, extensively grown through the South as a forage plant.

By taking advantage of the moth's love of sweets Professor Riley believes that it will be no hard matter to prevent the ravages of the worm. He is now having experiments made to test the effects of different poisons, mixed with sweets, to use as bait. These baits may be applied to the trunks of the dead pine trees that occur in so many cotton plantations, or to the trunks of any other trees, or they may be used in pans upon which perforated platforms of wood or tin are made to float.

After the eggs are laid and the worms hatched the most effective cure is Paris green.

New Agricultural Inventions.

Mr. Armondos Frank, of Howell, Mich., has patented an improved Hay Fork that takes up the load of hay or grain with great facility, and retains the same during the time that the fork is traveling to the point where the load is to be deposited, the tines being then opened in convenient manner, and the fork returned to the place of charging.

Mr. Charles Van Houten, of Marion, Ohio, has patented an improved Grain Binder, which consists in the arrangement of the rake, which is carried by an extensible lever made in the form of the lazy tongs, and pivoted upon an independent horizontal fulcrum, so as to give the rake a compound movement, due partly to the extension and retraction of the same from the movement of the lazy tongs, and partly to the integral oscillation of the lazy tongs upon their outside pivots. It also consists in a peculiar slotted spool for twisting the two ends of wire around the sheaf, and its arrangement with respect to the devices for carrying the wire. The invention also has other features, which cannot be properly described without an engraving.

Mr. Daniel O. Fosgate, of Red Wing, Minn., has patented an improved Sulky Plow of light but durable construction, that may be easily controlled and operated by the driver. It consists of a plow frame that is supported on angular axles, and capable of adjustment for being leveled by means of a sliding and slotted axle and suitable mechanism operated from the driver's seat. The plow frame is made with a bend at the rear part for holding the plow firm and steady at any height.

Mr. William G. Reid, of Rock Hill, S. C., has patented an improved Plow. This invention relates to a means for adjusting the standard of a plow nearer to or further from a vertical line, in order to regulate the depth of the furrow.

Mr. Charles K. Conner, of Camp Point, Ill., has patented an improved Machine for Husking Corn from the stalks while standing in the field; it is simple, convenient, and effective, removing the ears from the stalks and husking them as it is drawn forward through the field, husking one row at a time.

An improvement in Oscillating Steam Valves has been patented by Mr. Charles J. Van Depoele, of Detroit, Mich. The object of this invention is to simplify the construction of the valves of steam engines, and to reduce the friction and wear to a minimum.

HYDROGEN gas, the lightest of all ponderable substances, may, when cooled to 220° Fah. below zero, be then condensed, by a pressure of 9,750 lbs. to the square inch, into liquid form. To produce this great reduction of temperature and enormous pressure in combination is a difficult experiment.