cold air at the rate of about 5,000 cubic feet per hour, at a temperature 50° below zero, when working at a speed of 140 to 160 revolutions per minute, which is capable of being continuously maintained, provided the water supply and lubrication are attended to.

The chamber with which this machine is connected is 15 feet long by 20 feet broad and 9 feet high, and in the hottest days of the late summer its temperature was easily reduced to from 30° to 40° Fahr. by six or eight hours' working. There can be no doubt but that this machine will be found exceedingly useful for the preservation of food and other perishable goods in places where steam power is inadmissible, but more especially in the climates where high temperatures prevail.

We are pleased to note this practical advance, which has been made by Mr. J. J. Coleman, who was the first to make mechanical refrigeration a success on board ship, where it is now very extensively employed. Scarcely three years and a half have elapsed since he sent out to New York the first cold air machine successfully used in bringing meat across the Atlantic. At the present time machinery on the lines designed by Mr. Coleman and partners, and known as the Bell-Coleman machines, are fitted up in various parts of the world, their steam cylinders being capable of indicating in the aggregate 4,000 horse power, and their cooling capacity being equal to the freezing of 200,000 tons of meat per annum. These machines are working not only between America and Great Britain, but also between Australia, New Zealand, and India, and this country.—*Iron.*

THE ELECTRIC LIGHT IN SURGICAL DIAGNOSIS.

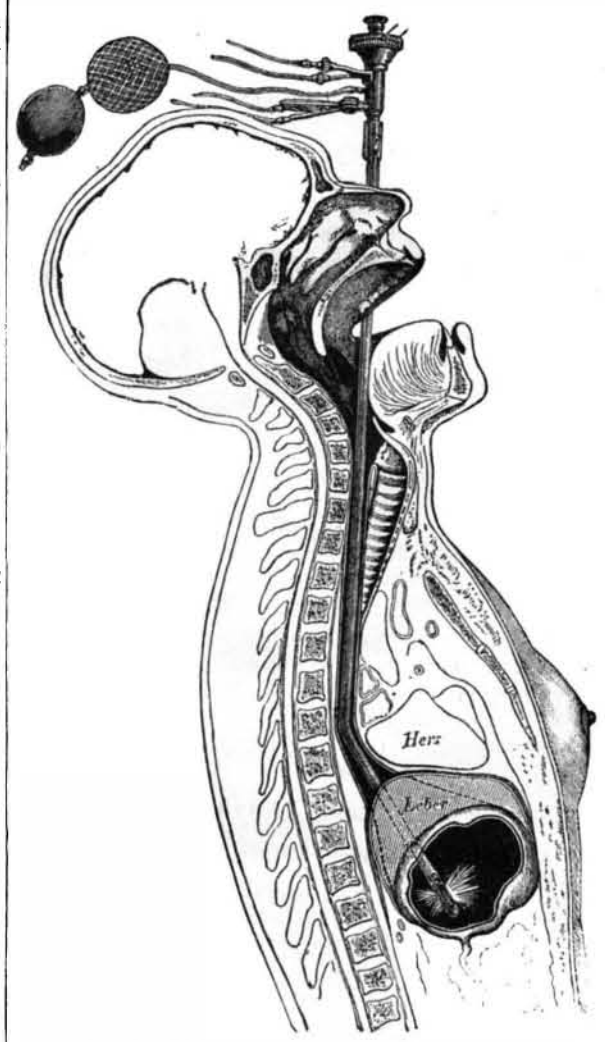
We find in a recent number of *Annals of Anatomy and Surgery* a very interesting contribution by Dr. Roswell Park, of Chicago, in which he describes the most recent applications of the electric light for surgical purposes. It appears that Josef Leiter, a well known instrument maker of Vienna, has at last succeeded in producing electrical instruments by which the interior portions of the human body may be strongly illuminated by the electric light, and thoroughly examined by the eye of the surgeon.

The accompanying engraving shows the application of one form of these new instruments, called the gastroscope, an instrument for the examination of the stomach. It consists of a bent tube, which contains a window at one end, electric wires, tubes for the introduction of a water circulation, by means of rubber bags, for the purpose of keeping the tube cool while the electric light is burning; also for the introduction of water into the stomach, to distend the same. The lower extremity of the tube is provided with a platinum wire, which is made to glow under the electric current, which is produced by a battery. The tube is also provided with reflector prisms and lenses, for directing the light through the tube.

The eye of the surgeon is applied at the upper end of the tube, after it has been inserted in the stomach in the manner indicated in our sketch.

As preparation for the use of the gastroscope, it is necessary that the patient shall have gone for some hours without eating. Half an hour previous to its use a hypodermic dose of morphia, say one-third grain, should be administered. Just prior to the examination the stomach should be washed out. The patient is then laid upon the left side on a table, having a head support, which shall keep the neck in its axial position. A small receptacle is placed under the mouth to catch the saliva which cannot be swallowed. The head is then thrown well back, and the instrument, which has previously been lubricated with vaseline or glycerine, is guided by the finger of the left hand and passed downward with a gentle sweep.

Previous practice on the cadaver with a hard rubber sound of the same dimensions and flexure as the gastroscope will



THE ELECTRIC LIGHT IN SURGICAL DIAGNOSIS.

easily teach the necessary manipulations. The instrument being in place, the stomach is inflated to the desired extent, but not sufficient to distress the patient. The pointer on the rheostat being turned slowly, the metal blind is drawn (at J), and the observer has the field before him.

By the curve in the tube not only is the introduction of the instrument facilitated—it having been found impossible to pass a perfectly straight tube so far as is necessary for this purpose—but it will be seen that with partial rotation of the tube about the long axis of the straight portion, the extremity carrying the window and the light makes quite an excursion, and permits the view of a much more extensive surface than would be possible were no such excursion made.

Moreover, as it is provided with an optical system, it obtains that as the instrument is rotated toward a given point of the mucous membrane its image is enlarged; while as it is further removed the image is diminished, while the field is enlarged. At a distance of two centimeters the image is of natural size. The "definition" of this system is excellent, and, granted a tolerance of the instrument on the patient's part, and the requisite skill on that of the observer, a very satisfactory examination can be made.

A variety of other instruments are made, which are operated substantially in the same general manner as the one described. For example, we have the laryngoscope, for examination of all parts of the throat; the œsophagoscope, for the gullet; the otoscope, for the ears; the urethroscope, for the bladder; the cystoscope, etc. The invention of instruments marks another step in electrical progress. They promise to be of utility and importance to the medical profession, for by their use many parts of the human system heretofore hidden from the eye may now be brilliantly lighted and examined, and their condition in disease and health ascertained.

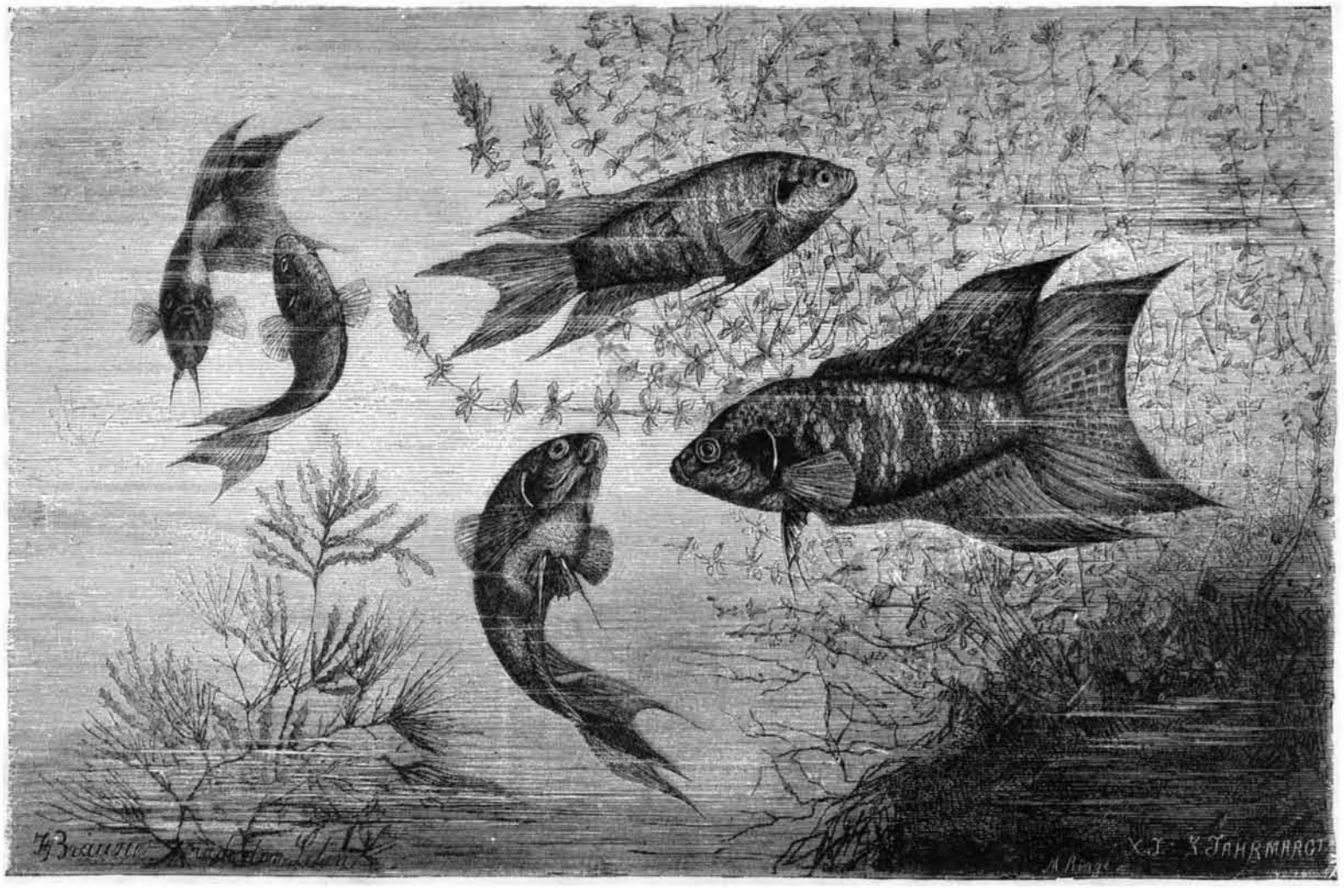
THE PARADISE FISH.

The paradise fish is a representative of the family *Macropus.* These fish have very large fins, less developed in the female. The brownish color of the upper side changes into a greenish gray on the lower side; the markings consist of changeable yellowish green or blue and red cross lines. Their length is from eight to nine centimeters.

Very little is known of these fish in their free life. They are universally kept in captivity in China, and treated as our gold fish, but are more easily propagated in a limited space.

They are better adapted for household pets than other fish of this class, as they can live in a much less quantity of water, and can remain out of the water for twenty minutes and more without injury. Giraud brought one hundred of these fish from China, and although during the tedious journey he was not able to give them sufficient room or the necessary care and nourishment, twenty-two of them lived.

Benecke says that "in May of the year 1878 he obtained a pair of paradise fish. They were placed in a basin containing about forty liters of water. They immediately went to work to devour the small crawfish and larvæ of insects which had been placed in the vessel. After these were consumed two crawfish, water fleas, and mussels were put in. The mussels they had not received before, and evidently had never eaten them, for at first they only took hold of the little animals and then released them with a shake of the head, but after a day or two they only ate the mussels, leaving the water fleas placed in the basin unmolested. One day no mussels could be obtained, and they ate greedily not only small but very large angle worms from five to eight centimeters long and two millimeters thick. They always rejected the intestines of the worms. When the worms were put in the basin, as they were taken from the ground, they would shake them two or three times, then let them go, then throw them around in the water, in order to shake off the dirt before eating them. If the worm struggled, they would sling it against the water plants or the sides of the basin.



THE PARADISE FISH.

About three weeks after the fishes were received the male began to build a nest. For this purpose he would come up to the surface of the water, take his mouth full of air, thrust it under the water, forming small bubbles of film like spittle, and continue thus to build a layer of these bubbles hanging quite firmly together, adding new layers until it was completed.

About twenty four hours after the spawning, the germ may be perceived in the pale yellow yolk of the egg—a day later the heart begins to beat—twelve or eighteen hours after the young, imperfect fish escapes from the egg, it is similar to a small tadpole. In eight months it is full grown. So long as the fish needs parental care the male devotes himself to it. As soon as the young fish starts away he hastens after it, seizes it with his mouth, swallows it, and spits it out into the nest of foam. They care specially for the sick and feeble ones. As soon as the young fish no longer needs his assistance he forsakes it, without appearing to have any interest in its fate, and has no hesitation in devouring it.

The young subsist at first upon the foam of the nest, later upon small animalcules not visible to the naked eye, and finally upon the same food as the parents.—*From Brehm's Thierleben.*

Fire Resisting Doors and Shutters.

Experience has proved that the ordinary iron doors and shutters usually employed in warehouses do not afford the protection from fire (especially if a large one) that might be expected from them. The *Insurance World*, on this subject, mentions many instances where wood incased in tin has proved quite effective in preventing the spread of fires. but the writer also pertinently asks if human ingenuity cannot devise a door or shutter which will be more fire resisting?

Some English writers have expressed a decided preference for solid oak cased with tin or sheet iron over the ordinary rolling iron shutters, and, according to the *Insurance World*, as stated above, tin faced wooden doors have proved to be very efficient in this country. Mr. James Harrison, Superintendent of the Bureau of Surveys in the New York Board of Fire Underwriters, not long ago indorsed on the specification of a building about to be erected, as follows:

"Construction of doors and shutters herein described approved by the Board of Fire Underwriters. Batten doors, covered with metal, have been commended and preferred to iron doors for a long time."

The specification bearing the above forcible indorsement read as follows:

1. "*Iron doors.*—Iron doors are much better than nothing, as they will often check the spread of a moderate fire. In the case of a heavy fire, the heavier the frame the more likely they are to warp. Besides the usual danger of twisting and warping, they are liable to become red hot, and thus to communicate fire to contiguous goods.

2. "*Metal lined doors.*—The experience of underwriters shows that the most desirable doors are those constructed of double thickness of one inch tougued and grooved boards, crossing one another diagonally, well clinched and riveted. Then completely covered on edges and sides by jointed (not soldered) tin of the best quality, and nailed on under each joint with shingle nails. These doors to be hung with wrought iron strap hinges, crossing the width of the door and firmly bolted, and to be firmly latched into the solid wall. In size they should be two inches wider and higher than the passage way, and should be placed on opposite sides of the wall. When thus made, these doors will outlast a fire which would destroy the best of iron doors.

"Window shutters should be of similar construction."

Doors of this construction have not only been approved, but practically tested by fire. The English article approved of oak, which certainly would be better than most iron doors, but, when hermetically sealed in tin, the wood is transformed into charcoal and easily fractures across the grain. The tough yellow pine of this country burns very readily in an open fire, but does not lose its fibrous texture when charred. So our insurance contemporary thinks it may be preferable to a less inflammable wood in the hour of emergency.

Property owners often prefer galvanized iron to tin, but the former presents a greater metallic body to the fire, rises in blisters, and is not as desirable as the non-flexible tin, which is closely nailed at every joint. Human ingenuity may yet devise some better plan for protecting the doors and windows of warehouses; certainly some better fire resisting substance and arrangements than are now employed are very much needed.

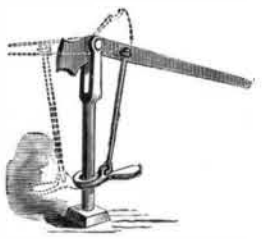
Preservation of Yeast by Cold.

It has already been shown by some experiments of Dr. Lintner's that yeast may be preserved, and yet retain its full vitality by being frozen. A practical confirmation of this on a large scale has just been obtained by H. Von Planitz. A quantity of yeast, which had been badly packed, was consigned to him, and on arrival, during some very severe weather, was found to be completely frozen. The solid block of yeast was broken to pieces by aid of a chisel and hammer, and crushed to a powder under a mallet; it was then mixed with water. and when the yeast had deposited, the ice which came to the surface was removed. Afterward the yeast was used in the usual manner, and yielded very good results, and yeast derived from it was in use for several months without showing the slightest signs of degeneration. Although these results fully confirmed the view that yeast is not injured by extreme cold, the same observer made a further experiment; he submitted a quantity of well-washed yeast to intense cold, and having frozen it into a solid mass, he kept it for four weeks at a temperature just below freezing. This yeast, on being used, gave equally good results. The experiments here referred to were with "bottom" fermentation yeast, but there is no reason to suppose but that similar results would be obtained with "top" yeast.

RECENT INVENTIONS.

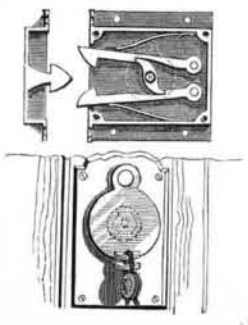
New Wagon Jack.

This a simple and inexpensive jack for use in removing the wheels from the axles of wagons or other vehicles. It consists in a lever combined with a post, and a clutch ring fitted on the post and connected to the lever for holding the latter in any position to which it may be moved in raising the axle. The lever may be reversed to adapt the jack to axles of different heights as indicated in dotted lines in the engraving; the rod of the clutch being loosely connected at both ends to admit of this arrangement. This jack can be readily operated without the necessity of crawling beneath the wagon to put it in place. It is very light and at the same time strong and durable, and can be folded up in a compact shape when not in use. Mr. Alonzo B. Furman, of Strattonville, Pa., is the patentee of this invention.



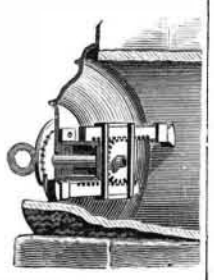
Lock for Sliding Doors.

The engraving shows a novel lock applicable to sliding doors and gates generally, but specially designed for the sliding doors of freight cars on railroads. The lock is provided with movable jaws or hooks pressed by springs and limited in their movement by stops. These hooks engage with a catch of dart-head form, and are separated so as to release the catch by means of a tumbler, which acts on both hooks alike. The tumbler is fitted with a key which will turn it when properly inserted, and the keyhole is provided with an escutcheon that may be sealed, so as to close the lock effectually. This useful invention has been patented by Messrs. Charles S. Rees and Patrick Mills, of Pueblo, Colorado.



Improved Flue Stop.

This is a flue stop that will fit and cover different sized flue or stove pipe holes, and which, although working in connection with the thimble or other lining of the flue hole, is an independent structure, and is capable of being adjusted so that no amount of soot or other dirt or wind will force it out of its place. The invention consists in the combination, with a flue hole plate or cover, of anchoring braces capable of being adjusted in opposite directions by a pinion working in racks on the braces. The braces are fitted with rubber bearing blocks on their outer ends, to insure a firm hold of the braces in the chimney crock or thimble. A spring pawl engaging a ratchet on the spindle of the pinion holds the braces extended, and thus secures the stop. The stop is released by disengaging the pawl from the ratchet, and turning the spindle so as to retract the braces. This useful invention has been patented by Mr. James W. Webster, of Monticello, I .

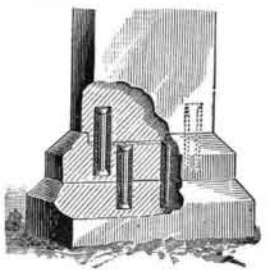


Improvement in Oil Cans.

The object of this invention is to prevent the oil outlet of an oil can from getting stopped up, to enable the operator to see how much oil is given to each hole. and to facilitate the removal of dirt and grease from the oil holes before oiling. The invention consists in the combination, with an oil can, of a wire passing loosely through the nozzle and into a tube secured on the bottom of the can and within it. The outer end of the wire is curved, and part of the wire is finely grooved or roughened. By pressing on the bottom of the can in the usual manner, the wire is moved forward and back longitudinally in the nozzle, and the oil that is spurted out passes in single drops along the wire. It cannot drop from the same until it arrives at the end, for the fine grooves or roughnesses between the points assist materially in preventing the oil from dropping off the wire, and at the same time facilitate the flow of the oil toward the end of the wire. Address the patentee, Mr. J. A. Campbell, care of Wallace & Brooks, Waco, Texas.

Improved Tombstone.

The engraving shows a tombstone, the several parts of which can be united easily and quickly in such a manner that the whole will be very rigid. The base is formed of a bottom section, and an upper section on which the top stone rests. The upper base section is provided with a mortise in its top, into which a tenon formed on the lower end of the top stone is fitted. Two or more holes are bored in the lower end of the top stone, and dowel pins having enlarged or widened ends are passed into them, and then the space between the pins and the sides of the holes is filled with melted sulphur. In a similar way holes for receiving pins are formed in the top of the upper base section and extend through into the top of the bottom base section, and pins with enlarged ends are passed into the holes and fastened as in the first case. This forms a permanent fastening that will last as long as the stone endures. Mr. William Mould, of Saugerties, N. Y., is the patentee of this invention.



On the Action of Certain Metals upon Oils.

Some time since Chevreul, the distinguished investigator of the fats and oils, studied the effect produced upon the drying oils by different metals. (*Memoires de l'Acad.*, xxii.) He found that under certain circumstances metals exerted an influence upon the oxidation of the oils; for example, linseed oil when spread upon a sheet of lead dried immediately.

A. Livache believed that the metals would act more energetically if in the fine state of division in which they are obtained by precipitation from solution, instead of using only surfaces of sheets of metal. His experiments, which are exceedingly interesting, were published in *Comptes Rendus*, xcvi., 260.

Livache tried the effect of tin, copper, and lead on the oils, but only the last named exerted any considerable action. The lead employed in the experiments was obtained by precipitation with strips of zinc from the solution of a lead salt; it was quickly washed with water, then with alcohol and ether, and finally dried *in vacuo*. If this lead is moistened with a certain quantity of oil and then exposed to the air, in a short time an increase of weight is observed, and the more drying the oil the greater this increase. When raw linseed oil is treated in this way, the increase of weight attained its maximum in thirty-six hours, while the same oil, if merely exposed to the air alone, requires several months to reach this state. A solid but elastic substance is formed like boiled linseed oil dried in the air.

Experiments made with different oils show that the increase of weight is nearly the same as that of their fatty acids when exposed to the air for a few months.

Name of oil treated with precipitated lead	Increase of weight in oil. In 2 days.	In 8 days.	Increase of weight of fatty acid. In 8 months.
Linseed	14·3 per cent.	....	11·0
Walnut	7·9 "	....	6·0
Cloves	6·8 "	.	3 7
Cotton seed	5·9 "	....	0·8
Beech nut	4·3 "	...	2·6
Rape	0·0 "	2·9	2·6
Sesame	0·0 "	2·4	2 0
Peanut	0·0 "	1·8	1·3
Rape seed	0·0 "	2·9	0 9
Olive oil	0 0 "	1·7	0 7

Cotton seed oil was the only drying oil that showed a marked exception; the fatty acid from it exhibited a very slight increase of weight. That is probably the reason why this oil can play a double role, as a drying and as a non-drying oil, for it is used to adulterate linseed oil on the one hand and olive oil on the other.

Contact with precipitated lead, then, imparts to oil the property of absorbing oxygen rapidly. In his study of the oxidation of the oils, Cloez has shown that it is always attended with the total disappearance of the glycerine, and in Livache's experiments it was noticed that the glycerine was modified by the precipitated lead. If glycerine is mixed with precipitated lead in a tight bottle free from air, the lead soon vanishes, being oxidized at the expense of a portion of the glycerine, and then dissolved in it. [This may help to explain the action of the new French form of electric accumulator, where the lead plates are placed in glycerine.]

The facts above stated indicate that a rapidly drying oil can be obtained by simply treating linseed oil for some time with red lead or litharge, although the product thus obtained always remains greasy and does not dry as good and quick as boiled linseed oil.

In the arts advantage may be taken of this action of lead toward drying oils, as for example to prove the presence of cotton seed oil in linseed oil as well as in olive oil. Probably boiling may be dispensed with by substituting mere contact of the oils with precipitated lead, or solutions of lead and strips of zinc on which the lead may be deposited in a fine state of division. Oils prepared in this way are always of a lighter color, and retain a greater degree of fluidity. Perhaps the bad smell of boiling oils and the great danger of their taking fire in the operation can be avoided by this treatment.