cers and cavalry regiments followed; then came the supreme moment for which the many millions had been waiting. Field Marshal Lord Wolseley, Commander-in-Chief of the British army, rode by alone, and then there were seen the cream colored horses which were famous throughout the empire drawing the carriage in which sat the sovereign. The enthusiasm knew no bounds. It could, perhaps, be described adequately by saying it was an avalanche of sound. It was difficult to believe that seventy-eight eventful years had passed over the Queen's head. Her Majesty was seated opposite the Princess of Wales and the Princess Christian. The Prince of Wales, the Duke of Connaught and the Duke of Cambridge were by her side as outriders; behind followed the royal standard, grooms and equerries. Last of all came the Royal Irish Constabulary and a squadron of the Horse Guards. When the Queen's carriage reached Temple Bar the Lord Mayor was waiting to receive Her Majesty to render official homage and to present a pearl sword of state. She spoke a few words in

No eye could bear more gorgeousness; no more gorgeousness could there be, unless princes are to clothe themselves in rainbows and the very sun.

"The prelude was played, and now the great moment was at hand. Already carriages were rolling up, full of the Queen's kindred, full of her children and children's children; but we hardly looked at them. Down there through an avenue of eager faces, through a storm of white, waving handkerchiefs, through roaring volleys of cheers, there was approaching a carriage drawn by eight cream colored horses. The roar surged up the street, keeping pace with the eight horses. The carriage passed the barrier; it entered the churchyard; it wheeled left and then right; it drove up to the very steps of the cathedral.

"We all leaped up. Cheers broke into screams, and the enthusiasm swelled to delirium. The sun, watery until now, shone out suddenly, clear and dry, and there and there and there was a little, plain, flushed old lady, all in black, with a silver streak under her

gone before—all the soldiers and sailors, the big limbed colonials, and the strange men from unheard of islands over sea.

"We know now what that which had come before all stood for. We knew as we had never known before what the Queen stands for. The empire had come together to revere and bless the mother of the empire. The mother of the empire had come to do homage to the one Being more majestic than she.

"There were the archbishops, bishops and deans in gold and crimson caps and white, orange and gold embroidered vestments waiting on the steps. There, through gaps in the pillars and scaffoldings, you could see all her ministers and great men, a strange glimpse of miniature faces as in some carefully labored picture, where each face stands for an honored name.

"All stood, and the choir sang the 'Te Deum.' Next rose up a melodious voice intoning prayers. The Queen bowed her head and then the whole choir and the company outside the cathedral and the whole company in the stands, at the windows, on the house-tops, and away down the street, all standing, all uncovered, began to sing the One Hundredth Psalm, 'Come ye before Him and rejoice.'

"The Queen's lips were tight, and her eyes, perhaps it was fancy, looked dim; but then 'Three cheers for the Queen!' and the dean, pious man, was wildly waving that wonderful crimson cap, and the pillars and roofs were ringing as if they must come down. Then 'God Save the Queen,' a lusty peal till you felt drowned in sound.

"The Queen looked up and smiled, and the Queen's smile was the end and crown of it all, a smile that broke down the sad mouth, a smile that seemed half reluctant, so wistful, yet so kind, so sincere, so motherly."

The colonials fell in behind the royal procession after leaving St. Paul's. A brief stoppage was made at the Mansion House by the Lord Mayor's wife, who presented a bouquet to the Queen, and here Her Majesty dispensed with the attendance of the Lord Mayor, who had accompanied her from Temple Bar. The procession then continued to London Bridge, and thence along the streets on the southern side of the Thames. It reached Buckingham Palace at 1:40 P. M., twenty minutes before the programme time. Before the return of Her Majesty to the palace, she lay down for an hour, and spent the rest of the afternoon in the garden. She bore the fatigue exceedingly well. The enthusiasm of the British people for several days was unbounded, and the splendid display of sea power—the greatest the world ever saw—on June 26, at Spithead, was the other crowning feature of this memorable occasion.

Our engravings, for which we are indebted to L'Illustration, represent the military tattoo at Windsor before the departure of the Queen, and the colonial soldiers in the procession, and the procession passing through Whitechapel.

INCREASE OF THE DRYING POWER OF OILS.

By A. LIVACHE.

THE principal factors which increase the power of fixing oxygen of a siccative oil such as linseed are, first, the degree of purity of the oil; secondly, the time which has elapsed since its extraction; thirdly, the conditions under which it has been kept; fourthly, heat; fifthly, the addition of certain substances.

1. The Degree of Purity of the Oil.—When the oil has been extracted by the press, it contains water and impurities, and it is evident that in order to have an elastic and even mass, it is an advantage to extract these substances. This is done either naturally, allowing the clarification to proceed by simple deposit, or by a direct treatment by means of filtration or a chemical. This last means, which generally consists of treating the oil with sulphuric acid, frees it from substances which do not play any part in its drying qualities, as they do not fix oxygen. As a matter of fact, in a comparative test by exposure to the air of a recently pressed oil and the same oil treated with sulphuric acid, then freed by washing from all trace of the acid, it is seen that in the second case the oil absorbs a greater quantity of oxygen. Moreover, it is evident that the final product will be the whiter, as the oil, to begin with, is less colored, which suggests the necessity of the bleaching operation.

2. Age of the Oil.—Oil preserved from the action of the air absorbs oxygen the better the older it is. It is thought that it is due to the formation of new compounds in the oil. Dr. Fahrion believes that the non-saturated fatty acids enter into combinations among themselves to form new and complex bodies.

3. Method of Preservation of the Oil.—Outside the question of age, if the oil has been kept in such conditions that it has been in contact with the air, it has already absorbed a certain quantity of oxygen. Experience shows that even if to begin with the oil only slowly absorbs oxygen, once this absorption has begun, it proceeds much more rapidly. In any given oil, therefore, the absorption of the oxygen will take place much more rapidly when it has been exposed to the air.

4. Action of Heat.—The temperature at which an oil is exposed to the air has influence upon its drying powers. Chevreul showed that linseed oil dried much more quickly at a temperature of from 25° to 28° C. than at a temperature of from 15° to 18° C. Moreover, if crude linseed oil and the same oil which has first been submitted to the action of the heat are exposed to the air under the same conditions of temperature, a difference in their drying powers will be found. If, for instance, linseed oil is heated for three hours, so that it only disengages a few gaseous bubbles from time to time, the oil becomes much more siccative, as Chevreul has shown. It takes about half as long a time to dry. Dr. Fahrion explains this by saying that, under such conditions, boiling in a deep vessel to which little of the oxygen of the air can gain access, the combination of the non-saturated fatty acids among themselves is accelerated, and complex products are formed capable of absorbing oxygen more rapidly.

Chevreul, in continuing to heat the linseed oil under the same conditions, proved, on the other hand, that the oil heated for five hours is at the end of this time less siccative than the oil heated for three hours only. It is probable that under the influence of this pro-

THE QUEEN'S JUBILEE—COLONIAL TROOP PASSING THROUGH WHITECHAPEL.

reply to the address of the Lord Mayor and the procession moved on to St. Paul's.

As the Queen approached St. Paul's Cathedral the Archbishops of Canterbury and York, with a numerous train of clericals, emerged from the west front and stood upon the steps, where they awaited the arrival of Her Majesty. Immediately, as the Queen's carriage was drawn up, the choir intoned the "Te Deum," after which the Bishop of London offered a prayer. The Archbishop of Canterbury then pronounced the benediction, after which the choir sang the Hundredth Psalm. This service is an interesting contrast to that which occurred when the girlish Queen had been anointed in Westminster Abbey, sixty years before. The ceremonies at St. Paul's were so interesting that we cannot refrain from giving Mr. G. W. Stevens' pen picture of the event which he gave in the Daily Mail.

"Riding three-and-three came a kaleidoscope of dazzling horsemen, equerries, aides-de-camp, attachés, ambassadors, and princes, all the pomp of all the nations of the earth—scarlet and gold, azure and gold, purple and gold, emerald and gold, white and gold—always a changing tumult of colors that seemed to list and gleam with a light of their own. It was enough.

black bonnet, and with a simple white sunshade, sitting quite still, with the corners of her mouth drawn tight, as if she was trying not to cry. But that old lady was the Queen, and you knew it. You did not want to look at the glittering uniforms now, nor yet at the bright gowns and young faces in the carriages, nor yet at the stately princes, though by now all these were ranged in a half circle round her.

"You could not look at anybody but the Queen, so very quiet, so very grave, so very punctual, and so unmistakably every inch a lady and a Queen.

"It was almost pathetic, if you will, that small, black figure in the middle of these shining cavaliers, this great army, this roaring multitude, but it was also very glorious.

"When other kings of the world drive abroad, an escort rides close at the wheels of their carriages. The Queen drove through her people quite plain and open, with just one soldier at the curbstone between her and them. Why not? They are quite free. They have no cause to fear her. They have much cause to love her. Was it not all for her—gala trappings of the streets, men, horses, guns, and the living walls of British men and women? For the Queen summed up all that had

longed heat a part of the glycerine is destroyed, as a certain acid smell indicates, and the linoleic acid is set at liberty, and it is known that linoleic acid dries less quickly than linolein. It is probable for the same reason that Mulder has found that linseed oil heated only to from 70° to 100° C. dries less well than crude oil. We can sum up, therefore, as follows: First, that a moderate temperature assists the drying of the crude oil; secondly, that exposed to the same temperature the crude oil dries less quickly than if it had first been submitted to the action of heat, with this reserve, that the action of heat has been such that the oil has not commenced to decompose, with the result that a certain quantity of linoleic acid has been set at liberty.

5. The Addition of Certain Substances.—Long experience has shown that the addition of certain substances, such as white lead, litharge, oxide of manganese, etc., assists the drying of a siccative oil. In certain cases these substances are mixed directly with a cold oil, in other cases heat is used in making the mixture.

Let us first consider the plumbic compounds which have been employed for a long time as driers. The commonest process consists in heating the oil with these plumbic compounds, and the increase of drying power has been attributed sometimes to the formation of linoleate of lead, at the same time that linoleic acid is liberated by the heat, and sometimes to the oxidation produced by the oxygen of the oxide of lead, pointing out as a proof of this that at the end of the operation there is a deposit of a certain quantity of metallic lead.

This double explanation does not seem exact, for the following reasons: In the first place, experience teaches that linoleate of lead gives only factitious drying power, since the product quickly becomes brittle and friable. On the other hand, linoleic acid dries less quickly than linolein. Nevertheless, it is indisputable that an oil heated with oxide of lead has a drying power greater than a crude oil, or oil cooked without the addition of the oxide. It may be asked, therefore, if it is not owing to the oxygen of the oxide of lead that the drying power is augmented. If it is remembered that a linseed oil of good quality, exposed to the air, absorbs 16 to 18 per cent. of its weight on turning into a solid and perfectly dry substance, and if, on the other hand, we reflect that in practice the quantity of oxide of lead used is not more than 3 to 8 per cent. of the oil, it will be seen that the oxygen that the oxide of lead could furnish is less than 1 per cent. of the weight of the oil, whereas from 16 to 18 per cent. are necessary, and that, therefore, it cannot play anything more than a secondary part from the point of view of direct oxidation, the more so that a part of this oxide of lead does not give up any of its oxygen, since it enters directly into combination to form a plumbic soap. Nevertheless, the presence of a certain quantity of metallic lead at the end of the operation proves that a corresponding quantity of oxygen has been at liberty to commence the oxidation of the oil, and, as we have seen in studying the effect of oxygen on crude oil, the drying proceeds more rapidly after the oxidation of the oil has reached a certain degree. In any case, this reaction seems to be a secondary one, in view of the notable increase of the drying power. The same objections and the same explanation might be made on the subject of the augmentation of the drying power by the use of manganic compounds.

However, a more acceptable explanation may be given, based upon a very important observation made by Chevreul, who showed that if linseed oil were spread on a sheet of lead entirely freed from all trace of oxide, the drying power of the oil notably increased. It is evident in this case that the oil cannot absorb any oxygen, except that which is furnished normally by the air. The augmentation of the drying power is due really to nothing else than the presence of the metal. This experiment may be carried further. If a crude siccative oil is shaken up in a bottle, with very porous lead, obtained by the precipitation of a salt of lead by another metal, it will be seen that without the necessity of any elevation of temperature the siccative oil has a much greater drying power than before this treatment, and in this case it is certain that the oil has not been furnished with any oxygen. The only certain modification is that after the treatment with precipitated lead the oil contains a small quantity of the metal, and we are led to conclude that the augmentation of the drying power is due uniquely to the presence of this small quantity of lead.

The same experiment cannot be made directly with the manganic compounds, but indirectly the oil can be placed in the same conditions with regard to manganese. To do this it is merely necessary to stir up the oil treated with the precipitated lead with a salt of manganese, the sulphate, for instance, which by double decomposition gives a salt of lead insoluble in oil and at the same time manganese as a substitute for the lead. Following out this experiment, it is shown that the oil thus "manganated" has a very great drying power, superior even to that obtained by heating crude oil with a manganic compound. It is by experimenting upon this manganated oil thus prepared that it is possible to find an explanation of the augmentation of the drying power. If this oil is spread in a thin coat in contact with the air, it is seen to take a brown tint, due to the oxide of manganese present passing to a superior degree of oxidation, by taking oxygen from the air. But as the oil becomes more viscous the brown tint is seen to disappear; finally this coloration disappears completely, the oxygen of the peroxide of manganese having served to oxidize the siccative oil, and finally a solid mass without color is obtained.

This brown coloration, followed by a complete loss of color, shows that the oxide of manganese has served as an intermediary, itself oxidizing easily by contact with the oxygen of the air, and then giving up this oxygen to the oil.

The action obtained with oxide of lead is very probably similar to this, but with a smaller degree of energy. In an oil to which litharge or manganese has been added, the lead and the manganese play a part of intermediaries, robbing the air of its oxygen to give it up in a continuous manner to the oil, which is thus oxidized more rapidly than it would be without these intermediaries.

It was natural to try if other metals were capable of playing the same part as lead and manganese. The simplest way of experimenting in this direction is to take an oil to which litharge has been added and stir

it up with salts of the different metals, to find out which will give with the lead a salt insoluble in the oil. Operating thus, we have proved that if the oil prepared with litharge spread in a thin coat on a plate of glass dries in twenty-four hours, the oil in which the lead is substituted by manganese dries in six hours; by substituting copper, zinc, or cobalt for the lead, the oil takes from thirty to thirty-six hours to dry; and, finally, the oils obtained by substituting nickel, iron, chrome, etc., for the lead are not completely dry until forty-eight hours have elapsed. A very important point to note is that a manganated oil got by substituting manganese for the lead of an oil prepared with litharge dries much more quickly than an oil manganated directly.

In practice, in addition to the oxides of lead and of manganese, certain salts of these oxides are used, but their choice seems as if it should be subordinated to their degree of solubility in the oil and the manner in which they behave when heat is employed. In practice, moreover, of all the salts proposed, none other than the acetate of lead and the borate of manganese have been retained, and the explanation of this is easy. It is that these two salts submitted to the heat decompose and give finally either the oxide of lead and very finely divided lead or the oxide of manganese. To take the case of the acetate of lead, it is known that this salt melts in its water of crystallization at about 75° C.; at a temperature higher than 100° C. it loses water and a little acid, giving a sesqui-basic acetate, which is completely decomposed at about 280° C. Carbonic acid and acetone are freed, and as a residue very finely divided lead is obtained, of which we have already seen the important role as a drier.

In the case of borate of manganese we have to deal with a very unstable salt, as most of the borates are. The affinity of the boric acid for the oxide of manganese being very weak, under the influence of heat the latter is set at liberty. The use of this salt is, therefore, simply an advantageous way of introducing the oxide of manganese.

As experience has shown that metallic lead in a very porous state augments the drying power of the oil, it was interesting to study the action on the oil of other metals easy to obtain by precipitation. In operating, however, with precipitated copper and tin, it was found that the drying power of the oil did not sensibly increase. This result was to be foreseen, for Chevreul had shown that linseed oil spread on a well cleaned sheet of lead dried much more rapidly than that spread on sheets of copper, brass, zinc or iron. With these metals the drying power was not much more rapid than if the oil had been spread on porcelain, glass, or plaster.—Vernis et Huiles Siccatives; from the Western Painter.

RECENT IMPROVEMENTS IN ACETYLENE GAS GENERATING APPARATUS.

THE means for producing acetylene gas are constantly being improved in Paris. Low pressures alone are favorably considered. A very important industrial exhibition just closed in that city showed that inventors are not idle in devising apparatus for giving better results.

The superproduction of gas after the cessation of consumption has met with the most attention in recent appliances. This inconvenience was combated in Trouvé's generators some eighteen months since by glass rings dividing the carbide into parcels, and so, in some measure, preventing a too rapid attack upon the whole of the chemical. In the newest machines the water is fed to the carbide automatically by the movements of deflation of the gas holder. The higher the elevation of the holder, the less the quantity of water allowed to the carbide. As an example of this type of machine, that by the Compagnie du Gaz Nouveau, 64 Rue de la Victoire, Paris, is one of the simplest for the purpose of illustration. G G are two cast iron pots, readily slid out from under their covers for the pur-

pose of refilling. H H' H'' connect the generators to the gas holder, A, to the top of which is attached a chain, D, acting upon a stop plug, N, within the water reservoir, B, so that the water therein is opened to or cut off from the two supply pipes, F F, feeding the carbide holders. The supply is commenced automatically by means of two spring catches, S S, attached to the sides of the gas holder, pressing back the lever cocks, O O'. A little water poured in at one of the funnels starts the holder. K is the gas supply pipe from the gasometer. V is a safety valve, as a precaution against any hitch with the holder; and as the generator pots are closed by the cocks, R R', when the apparatus is not in use there would be a chance of

these cocks being left shut through a forget when they should be open, so each pot is fitted with a water siphon, the seals of which would naturally be broken by any excess of gas in the generators.

Only one generator is used at a time under ordinary circumstances, and as soon as the charge in one is exhausted the other is started, so that the gas supply can be kept up indefinitely.

The smallest apparatus made contains about one pound of calcium carbide in each generator, or one kilogramme in all. This charge is good for ten hours

with three burners going, each burner using ten liters per hour. The price of the machine complete (and which is well made) is 140 francs. The size of the gas holder is 10 1/4 by 19 1/2.

Another apparatus, by V. Daix, 72 Rue Louis Blanc, Paris, has the same system for feed water supply, but, instead of using taps in his connecting pipes, this inventor uses water siphons throughout as being less liable to cause errors of working; and, still more important, he divides the carbide into a number of small lots, each of which is preserved from the action of water or vapor until the supply calls for its use. Superproduction of gas is thus reduced to a minimum, as will be readily understood. The inventor estimates that as much as thirty-five per cent. is lost by superproduction in apparatus in which the carbide is not subdivided and preserved from the action of vapor.—Photography.

FOOD TABLETS.

NOT long ago an American chemist, evidently a disciple of Prof. Berthelot, of France, stated that the time was near at hand when hot water and food tablets would be the sole accoutrements of a kitchen; that the essential food elements of a twelve hundred pound steer can be put into an ordinary pill box, and that a single concentrated soup tablet the size of a pea will make a large bowl of soup of full nourishing strength. A ration case weighing eight ounces was planned. It contained the following supply: Three tablets of concentrated soups, equal to three quarts; four beef tablets, equal to six pounds of the meat; one milk tablet, equal to one pint; two tablets wheaten grits, equal to two pounds; one tablet egg food, equal to twelve eggs.

Viewed from a chemical standpoint, it may seem possible to reduce, by condensation, the bulk of man's food almost indefinitely, and thus furnish in a thoroughly portable and convenient form nutriment for the body which will remain unchanged through long periods of time and in spite of the influence of varying conditions of temperature and climate; but from a physiological point of view may be seen serious obstacles to the successful consummation of such a proposition. That condensed and concentrated foods have a direct sphere of usefulness will not be denied, but that food tablets and similar products are well adapted to constitute the sole food of healthy men for any length of time is an undeniable fallacy. Combined with fresh foods they may yet prove of service; for, like the particles of yeast added to the dough, the necessary principle contained in the ordinary food may leaven the whole lump.

But practical experimental evidence is always most convincing and hence we append the following dispatch which recently appeared in a reliable periodical: "A dispatch from Denver was published stating that the troops at Fort Logan have made the first test of the new emergency ration. One company went out for three days of forced marching in the foothills of Denver, loaded with coffee tablets and compressed soup that was supposed to contain all the advantages of hard tack and coffee. On the night of September 11, the medical officer charged with weighing and watching the men rode into Morrison for assistance. He reported that thirty-six out of the fifty men are down with griping pains resulting from the non-assimilation of the scientific ration. The order could not be revoked, and the men in the field were informed that they would have to remain on the march for two days longer."—Dietetic and Hygienic Gazette.

A TRAVELING NURSERY.

AND now comes the traveling nursery to take its place alongside the barber shop, bathroom, etc., on our fast trains, says the Railway Review. The traveling nursery is to take up about the same amount of space as the private stateroom of the ordinary sleeping car. There will be a saving of a space of several feet, however, as the wide seats on the sides of the stateroom below the berths are not needed in the nursery, being replaced by ottomans and tiny easy chairs scattered over the floor. In this way any danger from sudden starts or sharp curves is obviated. As a further protection against injury to the little ones, the walls of the nursery are heavily padded and the floor thickly carpeted, so that bumps and bruises will be altogether avoided. At each end of the compartment, and firmly secured, are two cozy cots in which the smaller children may lie and watch the games of the older ones. Each car containing the nursery attachment will carry a matron or nurse, who will be selected with special re-