CHAPTER III.

THE MIXINGS.

THE mixings used in rubber manufacture are in part the results of rule-of-thumb experiments, and in part deductions from theoretical considerations. No generally acknowledged theoretical basis for mixing at present exists. The following are the principal points to be taken into account when devising mixings:—The use to which the article is to be put; the colour desired; the surface, whether it is to be quite smooth, or to have a cloth impression, or whether it is to be a matt or a highly polished surface; the limits of specific gravity, and of cost price. These points being fixed, one may proceed to base upon them a suitable mixing. The first question to decide is what kind of raw rubber will be most suitable. Outsiders often imagine that because Para rubber is the best it should be used by preference for all kinds of rubber goods, and that all other sorts of rubber are in a sense inferior for the purpose, or merely substitutes for Para. This view cannot, however, be altogether upheld. Para rubber is, in the first place, very high in price, and to employ it without just reason in a case where an equally good result could be obtained with a lower grade rubber is, from the standpoint of the rubber specialist, a crime, for the general adoption of this course of action would lead to an unnecessary diminution of the quantity of Para (which, as it is, is barely sufficient) available for purposes for which only Para, or practically nothing but Para, can be used; the demand for Para would consequently increase—that is to say, prices would go up still higher. For best quality air-tubes, elastic bands or rubber thread, practically nothing but best Para comes into the question; indeed, under some circumstances the original lots as delivered have to be sorted, and all the inferior pieces picked out and used for other purposes. For hard-rubber goods which are to be highly polished only such rubber can be employed as can be washed absolutely

clean, for the slightest amount of impurity remaining in the rubber would show itself in a very unpleasant way afterwards.

For "frictions" soft rubbers are the most generally used; for light-coloured, white and red goods, light-coloured rubbers are the most useful; for "floating" goods, naturally only such rubbers can be used as, when mixed with a sufficient quantity of sulphur and the necessary pigment, will still float. At this point we must correct a very widespread notion, which is none the less false, to the effect that every sort of raw rubber, if it be only correctly vulcanised, will float. One can very easily be convinced that most sorts of Aruwimi rubber, the lower grades being naturally the greater offenders in this respect, will not float even when vulcanised with only 10 per cent. of sulphur between the plates of a press. This phenomenon depends in part upon the contraction of the rubber during the process of vulcanisation, and cannot be predicted straight away. The favourite plan of attributing all faults to the wicked rubber resins is in this case also unjust, for as a rule I*a* Borneo, though showing, like Aruwimi, a high resin content, exhibits a medium power of floating after vulcanisation with 10 per cent. of sulphur; Guayule, too, when vulcanised under similar conditions, often floats, in spite of its high resin content. The contraction of rubber during vulcanisation depends to a very great extent, if not exclusively, upon the coefficient of vulcanisation. In some types of goods, which must possess considerable toughness, it is usual to work to a certain degree of contraction, by the addition of suitable ingredients, chiefly litharge, free from peroxide, in black goods, and, more frequently still, magnesia usta in red or light-coloured goods. Magnesia can, of course, be used in black goods, but not, conversely, litharge in red or light goods. Litharge is, in fact, always partially converted, during vulcanisation by heat, into the deep-black sulphide of lead. Now, since no sulphuretted hydrogen is given off during vulcanisation, as far as our knowledge at present extends, it may be that either the temperature employed is too high, or that by-reactions occur between sulphur and other substances present such as oils, certain resins, etc., sulphuretted hydrogen being evolved, or it may perhaps be assumed that on vulcanisation sulphur combines with rubber to form a sulphide-like compound, which then interacts directly with the litharge. The behaviour of mixings of this description when over-vulcanised also supports this view, for the coefficient of vulcanisation decreases as the amount of lead sulphide formed increases. This fact is at the bottom of the comparatively favourable effect on regeneration processes, of the presence in the waste rubber of large quantities of litharge.

There are a number of brands of litharge on the market which are more or less rich in peroxide of lead. Such litharge cannot be recommended for use with rubber, the peroxide having a tendency, under certain conditions which are not infrequent in practice (*cf.* heating tubes for railways, etc.), to burn the rubber. By certain authorities "dry heat" tests are prescribed, and in carrying out this test it is frequently observed that the test pieces from samples of rubber containing much litharge burn with a glow. It is not, however, necessary that the oxidation should be accompanied by visible combustion, for the so-called cold combustion is just as destructive to the rubber as the more apparent kind. The use of red-lead itself should, for these reasons, be entirely forbidden.

The use of litharge is limited by the facts, first of all, that it is only possible in dark goods; secondly, that it increases the specific gravity very considerably; and thirdly, that in many classes of goods it cannot be allowed, owing to its solubility in even dilute acetic acid, combined with the fact that it is injurious to health. It is true that in France and Switzerland wine-tubing is made from mixings containing litharge (or that such tubing is imported from Germany); still, it has not yet been shown that litharge is innocuous in that connection. Besides, there are no real grounds for the use of litharge for such a purpose, since the technical vulcanisation effect which is necessary can be produced equally well, if not better, by the appropriate use of magnesia usta.

Magnesia usta is commercially pure magnesium oxide, and is made by calcining magnesium carbonate. As a rule, however, about 2 to 3 per cent. of carbon dioxide remains obstinately fixed, so that the best magnesia usta of commerce contains only about 96 to 98 per cent. of magnesium oxide (MgO). Besides genuine magnesia usta there are on the market a number of products, also called magnesia usta, which contain considerably less magnesium oxide, together with a certain amount of carbonate or hydrate. The value of a particular sample of magnesia is therefore conveniently determined by re-calcining a weighed quantity and finding the loss in weight. In storing magnesia usta it must be remembered that this product tends to absorb carbon dioxide and moisture from the air, and the most convenient vessel to use for the purpose is a sheet-iron bin, with a closely-fitting lid, and provided with a slide so that the magnesia can be taken out without opening the lid.

The use of lime for the same purpose as magnesia usta has

fallen off, in spite of the enormous difference in price between the two products, in favour of a continually extending use of magnesia usta; from this it must be concluded that the results obtained with magnesia are much more satisfactory. Magnesia usta possesses over litharge the advantage of being innocuous—it is indeed administered internally as a medicine—in addition to the further advantages of not affecting the colour of the rubber, and of not increasing its specific gravity to so great an extent as litharge.

Litharge and magnesia usta are specially suitable for obtaining improved results from the vulcanisation of soft rubbers, which are generally rich in resins. From the same standpoint they are largely used in mixings which contain softening ingredients such as oils, paraffin wax, pitch, etc.

These additions of oils, paraffin wax, pitch, etc., are made principally with the object of helping to amalgamate such mixings as contain considerable amounts of ingredients like barytes, whiting, and especially carbon black, and which are, as a result, rather "dry," and of reducing their micro-porosity by removing from the mass the air which clings round the particles of the powdery ingredients. The solid fats, paraffin wax, ceresin and other waxes are liquefied before being added, and will then mix rapidly and easily with the rubber and other ingredients.

The principal colourings for which there is a demand in rubber goods are black, white, and red, and more seldom green. Other colours are only called for in exceptional cases. Blacks are produced by means of carbon black, lead sulphide, ferrous oxide, and pitch. Asphaltum has only a low covering power; there is practically no advantage in its use as against the use of pitch, and it is therefore hardly ever employed now as a colouring agent.

In addition to these pigments there is litharge itself, which blackens during the vulcanising process. The red pigments used are vermilion, Knapp's golden sulphide of antimony (antimony cinnabar), ordinary golden sulphide of antimony, and a number of mineral colours the basis of which is oxide or hydrated oxide of iron. For whites practically only oxide of zinc, sulphide of zinc, and barium sulphate are used to any important extent, the last two being generally used in conjunction in the form of lithopone. Antimony oxide is only very seldom used. For green one has to rely upon chrome greens, which are to be obtained in a variety of shades. For grass-green pure anhydrous chromic oxide is most suitable, while dark greens are best produced by chromium hydrate green or Guignet's green.

Substances used as fillers are whiting, barytes, and china-clay, in some special cases purified kieselguhr (atmido, atmoid, talite), for eraser-rubber anhydrous silicic acid and ground-glass, ground "galalith" (solidified milk albumen). The substitutes made from fatty oils—white substitutes by the action of chloride of sulphur, brown substitutes by the action of sulphur—which are addition products of these oils, must also be reckoned amongst the fillers.

Finally, the rubber manufacturer has still at his disposal for mixing purposes ground or prepared regenerated waste rubber. For special purposes various fibrous materials are of service, the chief amongst these being asbestos; ground cedar-wood waste from pencil-factories, hair, woollen-waste, graphite, etc., are also used.

In a very limited number of cases shellac and other resins are used. In a few instances talc is also added to mixings—for example, in rubber insulation for cables—but only good amorphous qualities are used for this purpose. Whiting is in many cases replaced by precipitated calcium carbonate, which, though more expensive, is finer, or by magnesium carbonate. A little wax may be added to hard-rubber mixings.

It is obvious that the substances to be added to a mixing must in all cases be selected with reference to the purpose for which the rubber is to be used.

Rubber articles which come into contact with food-stuffs should contain neither lead nor such zinc compounds as are soluble in dilute acetic acid; zinc oxide must therefore not be used in such instances. In this connection it should be mentioned that lithopone often contains considerable proportions of zinc compounds soluble in dilute acetic acid, as a result of the method of manufacture (Abschrecken), for only the zinc present as sulphide is insoluble in acetic acid. Lithopone should, therefore, always be examined by a competent analyst as to the amount of zinc soluble in acetic acid present. And in general a constant analytical control of all raw materials used in rubber manufacture cannot be too strongly recommended. The quantity of material used by a rubber factory in the course of a year amounts to such a goodly figure that it pays well to entrust the supervision of deliveries of material, and the accurate valuation of the supplies to be purchased, to a special member of the staff.

In rubber goods which are to be used in contact with acids, only those ingredients may be employed which are not attacked by acids, viz. barytes, atmoid (etc.), and pumice stone. Whiting must not be employed in tubing which is to be used for conveying wine,

beer, or acetic acid. In rubber which is to come into contact with caustic alkalies, the use of substitutes and of saponifiable oils should be avoided. Qualities to resist the action of oil are produced by the use of pitch in conjunction with litharge or magnesia usta. To minimise the action of bleach-liquor on rubber used in contact with it, additions of earth wax, ceresine, or paraffin wax may be made. Good electric insulation is obtained by the employment of mixings free from substitute and carbon black, and having a high coefficient of vulcanisation, which may be obtained by the use of magnesia usta. Further, in order to render such mixings as impervious as possible to moisture, additions of pitch, paraffin wax, ceresine, or ozokerite may be made. In this connection it should be noted that paraffin wax by itself is not absolutely devoid of the property of absorbing a certain amount of water, yet when it is mixed with rubber and sulphur and vulcanised, the product has an exceedingly low absorptive power. Goods which are to withstand high temperatures should contain no softening ingredients, and where, in addition, they come in contact with steam only limited quantities of substitute should be used.

The following series of *examples* of mixings illustrate the above remarks. No claim is made that these mixings are possessed of any general importance, as they can, of course, be modified in a great variety of ways:—

No. 1.—*Packing-sheet.*

Congo	1,500 gms.
Pontianac mixture	2,000 ,,
Reclaimed rubber	2,000 ,,
Waste rubber	10,000 ,,
Substitute	2,000 ,,
Barytes	10,000 ,,
Lithopone	15,000 ,,
Sulphur	300 ,,

No. 2.—*Packing-sheet.*

Guayule	4,000 ,,
Zinc oxide	8,000 ,,
Barytes	10,000 ,,
Sulphur	750 ,,
Magnesia usta	50 ,,
Canvas waste	7,500 ,,

No. 3.—*Packing-sheet.*

Congo	4,000 ,,
Reclaimed waste	4,000 ,,
Barytes	10,000 ,,
Lithopone	10,000 ,,
Sulphur	750 ,,
Magnesia usta	100 ,,
Waste with canvas	12,000 ,,
Euphorbia mixture	2,000 ,,

No. 4.—*Packing-sheet.*

Guayule	5,000 gms.
Whiting	5,000 ,,
Talite	2,000 ,,
Barytes	6,000 ,,
Litharge	1,000 ,,
Graphite	3,000 ,,
Sulphur	500 ,,
Magnesia usta	200 ,,
Hemp fibre	2,500 ,,

No. 5.—*Packing-sheet.*

Congo	5,000 ,,
Pontianac	3,000 ,,
Asbestos fibre	10,000 ,,
China clay	10,000 ,,
Talite	5,000 ,,
Barytes	10,000 ,,
Japan red (iron oxide)	5,000 ,,
Castor-oil	1,000 ,,
Sulphur	1,000 ,,

No. 6.—*Manhole-packing.*

Guayule	2,500 ,,
Pontianac mixture	5,000 ,,
Waste	25,000 ,,
Reclaimed waste	10,000 ,,
Barytes	15,000 ,,

No. 6.—*Manhole packing—cont.*

Lithopone . . .	15,000 gms.
Canvas waste (proofed)	25,000 ,,
Sulphur . . .	1,000 ,,
Magnesia usta . .	250 ,,

No. 7.—*Water-hose.*

Congo	5,000 ,,
Reclaimed waste . .	3,000 ,,
Waste	15,000 ,,
Pontianac mixture .	2,000 ,,
Substitute . . .	8,000 ,,
Lithopone . . .	6,000 ,,
Whiting . . .	6,000 ,,
Barytes . . .	6,000 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	100 ,,
Vaseline . . .	500 ,,

No. 8.—*Beer-hose.*

Mozambique . .	10,000 ,,
Para waste . . .	10,000 ,,
Brown substitute .	8,000 ,,
China clay . . .	5,000 ,,
Lithopone [1] . . .	5,000 ,,
Barytes . . .	5,000 ,,
Vegetable black . .	1,500 ,,
Pitch	500 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	200 ,,

No. 9.—*Wine-tubing.*

Mozambique . .	10,000 ,,
Reclaimed Para waste .	5,000 ,,
Lithopone [1] . . .	5,000 ,,
China clay . . .	5,000 ,,
Brown substitute .	2,500 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	250 ,,

No. 10.—*Acid-tubing.*

Para	5,000 ,,
Cametas . . .	5,000 ,,
Sulphur . . .	800 ,,
Magnesia usta . .	100 ,,
Ceresine . . .	2,000 ,,

No. 11.—*Acid-tubing.*

Para	2,500 ,,
Cametas . . .	7,500 ,,
Sulphur . . .	1,000 ,,
Magnesia usta . .	50 ,,
Talite	2,500 ,,
Barytes . . .	2,500 ,,

No. 12.—*Oil-tubing.*

Guayaquil . . .	10,000 ,,
Reclaimed waste . .	5,000 ,,
Litharge . . .	2,500 ,,

No. 12.—*Oil-tubing—cont.*

Talite	5,000 gms.
Pitch	500 ,,
Sulphur . . .	800 ,,
Magnesia usta . .	250 ,,

No. 13.—*Alkali-tubing.*

Mozambique . .	10,000 ,,
Waste	5,000 ,,
Pitch	500 ,,
Talite	5,000 ,,
Lithopone . . .	10,000 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	200 ,,

No. 14.—*Hose for latrines.*

Congo	10,000 ,,
Reclaimed waste . .	7,000 ,,
Lithopone . . .	10,000 ,,
Barytes . . .	5,000 ,,
Talite	15,000 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	250 ,,
Vaseline . . .	1,000 ,,

No. 15.—*Heating-tube.*

Mozambique . .	5,000 ,,
Reclaimed waste . .	10,000 ,,
Barytes . . .	5,000 ,,
Lithopone . . .	15,000 ,,
Sulphur . . .	400 ,,
Magnesia usta . .	75 ,,
Pitch	750 ,,
Vaseline . . .	1,000 ,,

No. 16.—*Oil-valves.*

Cametas . . .	5,000 ,,
Guayaquil . . .	5,000 ,,
Reclaimed waste . .	6,000 ,,
China clay . . .	4,000 ,,
Litharge . . .	4,000 ,,
Sulphur . . .	1,000 ,,
Magnesia usta . .	250 ,,

No. 17.—*Para valves.*

Para	5,000 ,,
Cametas . . .	5,000 ,,
Sulphur . . .	800 ,,
Magnesia usta . .	75 ,,

No. 18.—*Acid valves.*

Cametas . . .	10,000 ,,
Ceresine . . .	1,000 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	50 ,,

[1] This lithopone should contain only traces of zinc compounds soluble in acetic, tartaric, or lactic acid.

No. 19.—*White (drab) valves for water.*

Mozambique . .	10,000 gms.
Zinc white . . .	5,000 ,,
Whiting . . .	6,000 ,,
China clay . . .	6,000 ,,
Light substitute . .	8,000 ,,
Vaseline . . .	1,000 ,,
Sulphur . . .	1,250 ,,
Magnesia usta . .	200 ,,

No. 20.—*Condenser valves.*

Mozambique . .	10,000 ,,
Reclaimed waste . .	5,000 ,,
Para waste . . .	5,000 ,,
Brown substitute .	5,000 ,,
China clay . . .	5,000 ,,
Lithopone . . .	2,500 ,,
Talite	2,500 ,,
Litharge . . .	2,500 ,,
Pitch	250 ,,
Sulphur . . .	1,250 ,,
Magnesia usta . .	250 ,,

No. 21.—*Gas tubing.*

Cametas . . .	1,000 ,,
Ikelemba . . .	4,000 ,,
Para waste mixture .	1,500 ,,
Pontianac mixture .	1,500 ,,
Euphorbia mixture .	1,000 ,,
Zinc white . . .	10,000 ,,
China clay . . .	7,500 ,,
Lithopone . . .	7,500 ,,
Talite	5,000 ,,
Reclaimed waste . .	5,000 ,,
White substitute . .	5,000 ,,
Brown substitute . .	5,000 ,,
Castor-oil . . .	1,000 ,,
Vaseline . . .	500 ,,
Sulphur . . .	1,000 ,,
Magnesia usta . .	150 ,,

No. 22.—*Gas tubing.*

Congo	8,000 ,,
Euphorbia mixture .	2,000 ,,
Zinc white . . .	15,000 ,,
Whiting . . .	10,000 ,,
White substitute . .	10,000 ,,
Vaseline . . .	500 ,,
Sulphur . . .	1,500 ,,
Magnesia usta . .	250 ,,

No. 23.—*Gas tubing—red.*

Mozambique . .	10,000 ,,
Brown substitute . .	5,000 ,,
China clay . . .	4,000 ,,
Lithopone . . .	6,000 ,,
Iron oxide . . .	6,000 ,,
Golden sulphide . .	1,500 ,,
Magnesia usta . .	300 ,,
Ceresine . . .	250 ,,

No. 24.—*Gas tubing—black.*

Negroheads . . .	8,000 gms.
Pontianac mixture .	2,000 ,,
Black substitute . .	5,000 ,,
Barytes . . .	5,000 ,,
Talite	10,000 ,,
Litharge . . .	2,000 ,,
Vegetable black . .	2,000 ,,
Sulphur . . .	1,000 ,,
Magnesia usta . .	300 ,,
Pitch	500 ,,
Vaseline . . .	1,500 ,,

No. 25.—*Drainage tube.*

Mozambique . .	10,000 ,,
Brown substitute . .	2,000 ,,
China clay . . .	5,000 ,,
Lithopone . . .	15,000 ,,
Golden sulphide . .	2,500 ,,
Magnesia usta . .	250 ,,

No. 26.—*Mats.*

Niggers . . .	5,000 ,,
Pontianac mixture .	2,000 ,,
Reclaimed waste . .	15,000 ,,
Waste (ordinary) . .	20,000 ,,
Talite	15,000 ,,
Vegetable black . .	1,000 ,,
China clay . . .	5,000 ,,
Canvas waste . .	5,000 ,,
Paraffin wax . .	2,000 ,,
Sulphur . . .	800 ,,

No. 27.—*Bottle Washers.*

Para	4,000 ,,
Columbian . . .	6,000 ,,
Black substitute . .	3,000 ,,
Golden sulphide . .	1,000 ,,
Magnesia usta . .	350 ,,

No. 28.—*Bottle Washers.*

Cametas . . .	10,000 ,,
Black substitute . .	3,000 ,,
China clay . . .	2,000 ,,
Golden sulphide . .	1,000 ,,
Magnesia usta . .	300 ,,

No. 29.—*Bottle rings (Codd's rings).*

Para	5,000 ,,
Mozambique . .	5,000 ,,
Brown substitute . .	3,000 ,,
Talite	3,000 ,,
China clay . . .	1,000 ,,
Magnesia usta . .	75 ,,
Golden sulphide . .	1,500 ,,
Paraffin wax . .	200 ,,

No. 30.—*Buffers.*

Para	5,000 ,,
China clay . . .	5,000 ,,
Soap-stone (Stearin-talkum)	1,000 ,,
Litharge . . .	1,000 ,,
Pitch	250 ,,
Sulphur . . .	400 ,,

No. 31.—*Buffers for insulation.*

Guayule	6,000	gms.
Pontianac mixture	5,000	,,
Reclaimed rubber	25,000	,,
China clay	30,000	,,
Litharge	5,000	,,
Vegetable black	500	,,
Sulphur	500	,,
Magnesia usta	250	,,
Pitch	1,000	,,
Vaseline	500	,,

No. 32.—*Rubber stoppers* (corks).

Negroheads	10,000	,,
Sulphur	800	,,
Magnesia usta	150	,,

No. 33.—*Rubber stoppers* (corks).

Negroheads	10,000	,,
Talite	3,000	,,
Sulphur	1,000	,,
Magnesia usta	100	,,
Ceresin	250	,,

No. 34.—*Rubber stoppers* (corks).

Para	10,000	,,
Ceresin	2,000	,,
Sulphur	1,000	,,
Magnesia usta	100	,,

No. 35.—*Cab tyre.*

Para	5,000	,,
Congo	8,000	,,
Zinc white	10,000	,,
China clay	10,000	,,
Talite	5,000	,,
Reclaimed rubber	5,000	,,
Litharge	2,500	,,
Pitch	500	,,
Sulphur	800	,,

No. 36.—*Washing-machine rollers.*

Mozambique	10,000	,,
Euphorbia mixture	1,000	,,
Lithopone	10,000	,,
Barytes	5,000	,,
Talite	5,000	,,
White substitute	5,000	,,
Paraffin wax	500	,,
Sulphur	1,000	,,
Magnesia usta	350	,,

No. 37.—*Diaphragms, for compressed air.*

Para	10,000	gms.
Pitch	100	,,
Sulphur	1,000	,,
Magnesia usta	150	,,

No. 38.—*Canvas hose.*

Mozambique	5,000	,,
Pontianac mixture	1,500	,,
Reclaimed rubber	5,000	,,
Talite	10,000	,,

No. 38.—*Canvas hose—cont.*

China clay	10,000	gms.
Litharge	1,500	,,
Sulphur	900	,,
Magnesia usta	200	,,

No. 39.—*Sponge rubber.*

Congo	5,000	,,
White substitute	2,500	,,
Talite	8,000	,,
Whiting	4,000	,,
Ammonium carbonate	1,500	,,
Oil of turpentine	600	,,
Sulphur	400	,,

No. 40.—*Hat-box.*

Para	5,000	,,
Cametas	5,000	,,
Brown substitute	2,000	,,
Sulphur	1,000	,,
Magnesia usta	75	,,
Pitch	100	,,

No. 41.—*Billiard-strip.*

Negroheads (pale)	5,000	,,
Substitute (floating)	1,000	,,
China clay	1,000	,,
Golden sulphide	500	,,
Magnesia usta	50	,,
Paraffin wax	100	,,

No. 42.—*Elastic bands.*

Para	4,000	,,
Congo	6,000	,,
Brown substitute (floating)	2,500	,,
China clay	2,000	,,
Golden sulphide	1,500	,,
Vermilion	200	,,
Magnesia usta	50	,,

No. 43.—*Balls.*

Congo	9,000	,,
Brown substitute	1,000	,,
China clay	5,000	,,
Zinc white	12,000	,,
Waste	5,000	,,
Paraffin wax	500	,,
Sulphur	1,000	,,
Magnesia usta	100	,,

No. 44.—*Frictions.*

Upper Congo or Ikelemba	8,000	,,
Reclaimed rubber	7,000	,,
Brown substitute	5,000	,,
Pontianac mixture	1,000	,,
Lithopone	15,000	,,
Whiting	2,000	,,
Canvas waste, proofed	5,000	,,
Sulphur	2,000	,,
Magnesia usta	500	,,

No. 45.—*Asbestos solution.*

Guayule	25,000	gms.
Dead Borneo	1,500	,,
Substitute	750	,,
Barytes	5,000	,,
Zinc white	15,000	,,
Sulphur	1,000	,,

No. 46.—*Insulating tape.*

Guayule	5,000	,,
Flakes	2,000	,,
Barytes	20,000	,,
Vegetable black	2,500	,,
Lithopone	10,000	,,
Tar, thickened	2,000	,,
Castor-oil	1,000	,,
Mica powder	1,000	,,

No. 47.—*Cable rubber.*

Para	3,000	,,
Congo	7,000	,,
Litharge	1,000	,,
China clay	10,000	,,
French chalk	3,000	,,
Pitch	700	,,
Sulphur	500	,,
Magnesia usta	300	,,

No. 48.—*Para sheet for cables.*

Para I*a*, old	20,000	gms.
Sheet Balata	1,500	,,
Sulphur	1,800	,,

No. 49.—*Para sheet for cables.*

Para	20,000	,,
Ozokerite	1,000	,,
Paraffin wax	1,000	,,
Sulphur	2,000	,,

No. 50.—*Cable rubber* (for tube-machine).

Para	2,000	gms.
Congo	6,000	,,
Balata	2,000	,,
Pontianac mixture	2,000	,,
French chalk	6,000	,,
China clay	4,000	,,
Zinc white	5,000	,,
Litharge	2,000	,,
Sulphur	700	,,
Magnesia usta	175	,,
Ceresin	2,000	,,
Vaseline	3,000	,,

No. 51.—*Thread.*

Para I*a*, old, sorted	10,000	,,
Sulphur	750	,,

Preparation of Golden Sulphide.—Bright red rubber goods, in the manufacture of which large quantities of golden sulphide of antimony are used, enjoy special favour, and on account of the importance of this pigment we may here be permitted to give an outline of its method of preparation.

Ordinary golden sulphide is obtained by decomposing sodium sulphantimoniate—Schlippe's salt—with an acid, for which purpose dilute sulphuric acid is generally employed. The Schlippe's salt is obtained by fusing together antimony ore (sulphide), dry sodium sulphate, charcoal and sulphur, extracting the melt with water, and concentrating the aqueous solution until the Schlippe's salt crystallises out. The crystals are centrifugalised in order to free them from mother-liquor, and then dried. An alternative method consists in boiling the black native sulphide with milk of lime, sodium carbonate, and sulphur, filtering and concentrating the filtrate to the point of crystallisation, the crystals being treated as above. The Schlippe's salt, obtained by either method, is then dissolved in water and the solution poured slowly into cold dilute sulphuric acid; the golden sulphide which separates out is allowed to settle in absence of air and light; the supernatant liquid is decanted, and the sulphide is then filtered off, washed free from acid, and dried in the dark, away from the air. In order to prevent the liberation of sulphuretted hydrogen, which is not only unpleasant but harmful,