

OBSERVATIONS ON THE EFFECT ON VULCANISATION OF THE LIPIN OF HEVEA LATEX.

BY

B. J. EATON, E. RHODES & R. O. BISHOP.

Some preliminary vulcanisation tests which have been made with the Hevea lipin (vide this journal p. 125) are described.

As already shown by one of the authors (1) the rubber derived from alcohol coagulated latex exhibits a much faster rate of cure than crepe prepared by the orthodox method of acid coagulation. In the present investigation it has been found that the alcohol coagula on pressing and drying give a rubber which shows an optimum cure at 60 mins. compared with 90 mins. for plantation crepe vulcanised under the same standard conditions in a mix consisting of 100 parts of rubber plus 10 parts of sulphur cured in a steam autoclave at 148°C. It is thus somewhat slower in rate of vulcanisation than "slab" rubber and approximately equivalent to "Fine Hard Para."

It has been found that the rate of vulcanisation of this alcohol coagulated rubber prepared from different days' crops of latex shows practically no variation. Differences in detail of preparation, such as length of time of soaking in alcohol, dilution of alcohol, and period of drying of the coagula are insignificant.

The tensile strength and other properties of the vulcanised product are normal.

All preparations of alcohol coagulated rubber to which the separated lipin has been returned show a definite acceleration in cure. An addition of 1 per cent. of lipin is proportionately more effective than 2 per cent., and 2 per cent. is proportionately more effective than 3 per cent., but there is acceleration in all cases which is of the same order as that exhibited when the lipin is added to slab rubber (Fig. III).

When the separated lipin is added to simple mixes containing only sulphur and normal plantation rubber its effect varies according to the rate of cure of the rubber. With fine pale crepe, which under our standard condition of vulcanisation has an optimum cure of 100 minutes, the addition of Hevea lipin in the proportion of 1 per cent. on the rubber causes no appreciable acceleration while the addition of 2 per cent. accelerates by 10 minutes (Fig II).

By contrast if 1 per cent. of the Hevea lipin is added to normal "slab" crepe, which under our standard conditions has an optimum cure of 40 minutes, an acceleration of 10 minutes is produced. (Fig. III).

Mixes containing 5 parts of zinc oxide per 100 parts of rubber show a greater acceleration for the addition of 1 per cent. lipin than corresponding rubber-sulphur mixes with and without zinc oxide, and in normal plantation crepe the degree of acceleration is enhanced to such an extent that the optimum cure is almost as rapid as that obtained for a similar mix containing slab rubber. (Figs. IV, V, & VI).

It will be seen from a comparison of Figs. II & VI that the rate of cure for the crepe is increased so much that the cure at 20 minutes (Fig. VI) is more complete than that for 70 minutes in Fig. II.

EFFECT OF LECITHIN.

In view of the probable relationship between Hevea lipin and egg lecithin their effects on vulcanisation were compared. When crude technical lecithin was added to ordinary thin crepe rubber it was found that the degree of acceleration was materially greater than for Hevea lipin.

EFFECT OF HEVEA LIPIN AND EGG LECITHIN ON RUBBER-SULPHUR MIXES.

It is interesting to note, however, that the effect of adding lecithin to rubber while mixing on the hot rolls is strikingly similar to that produced by Hevea lipin. Immediately the lecithin or lipin is added, the plastic mass becomes opaque and crumbles and resembles breadcrumbs. When the crumbling mass is subjected to further mastication, although the temperature is not allowed to rise above 55°C., a further change takes place and the mass again assumes the appearance characteristic of masticated rubber on the hot rolls.

The addition of small quantities of Hevea lipin or egg lecithin to raw rubber in the form of plantation crepe, smoked sheet or slab crepe is always accompanied by the same peculiar behaviour during mastication on warm rolls. If however the rubber is first mixed with sulphur and/or zinc oxide, the degree of crumbling is considerably lessened but the partially masticated mix shows a strong tendency to adhere to the rolls in spite of the fact that the mass feels distinctly greasy.

From the similarity in the behaviour of the mixes containing egg lecithin or Hevea lipin it is evident that we are dealing with a phenomenon related in some manner to the chemical characteristics of this class of bodies.

From the preliminary work which we have carried out with the Hevea lipin, three important facts emerge:—

- (a) The peculiar physical effect of the lipin on the maceration properties of raw rubber on warm rolls.
- (b) The acceleration of cure caused by the lipin in fast curing rubbers,—slab and alcohol coagulated,—contrasted with the comparatively small effect on a slow curing rubber such as fine pale crepe or smoked sheet.
- (c) The increased accelerating effect of the lipin in the presence of zinc oxide.

REFERENCES.

- Bishop, R. O. (1923) Some factors affecting the rate of vulcanization of plantation rubber, *Malayan Agri. Jour.* XI, **11**, p. 310
-

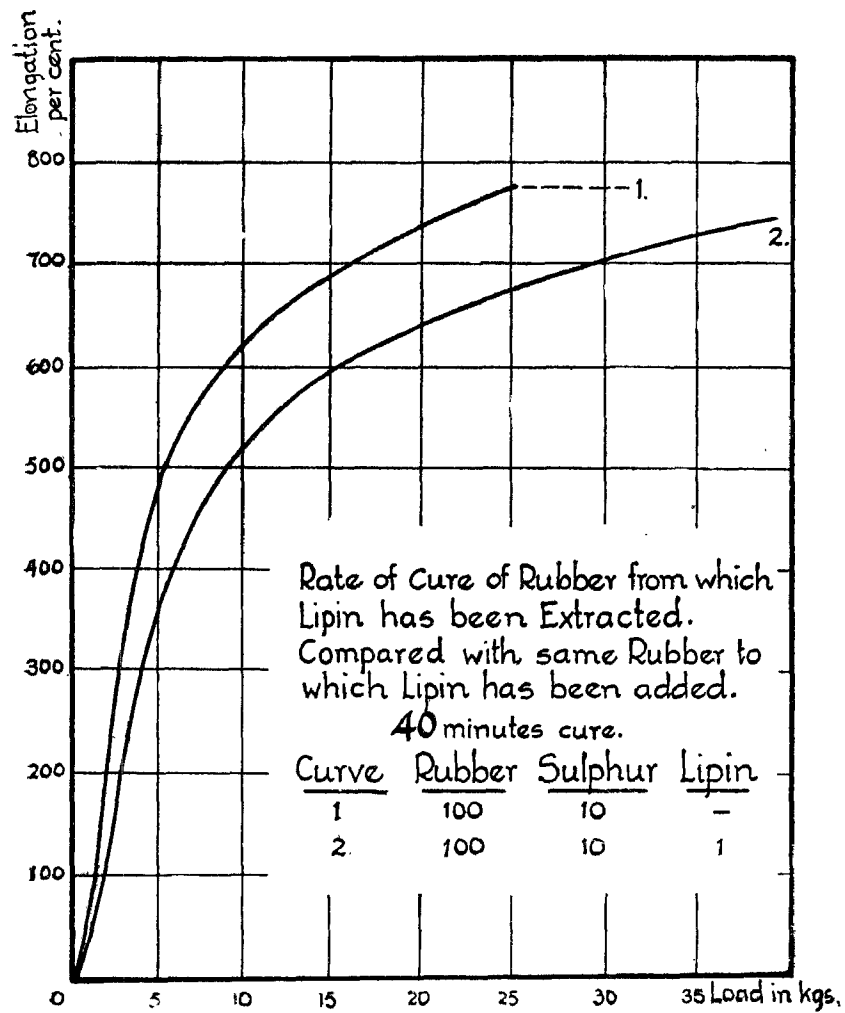


Fig: 1.

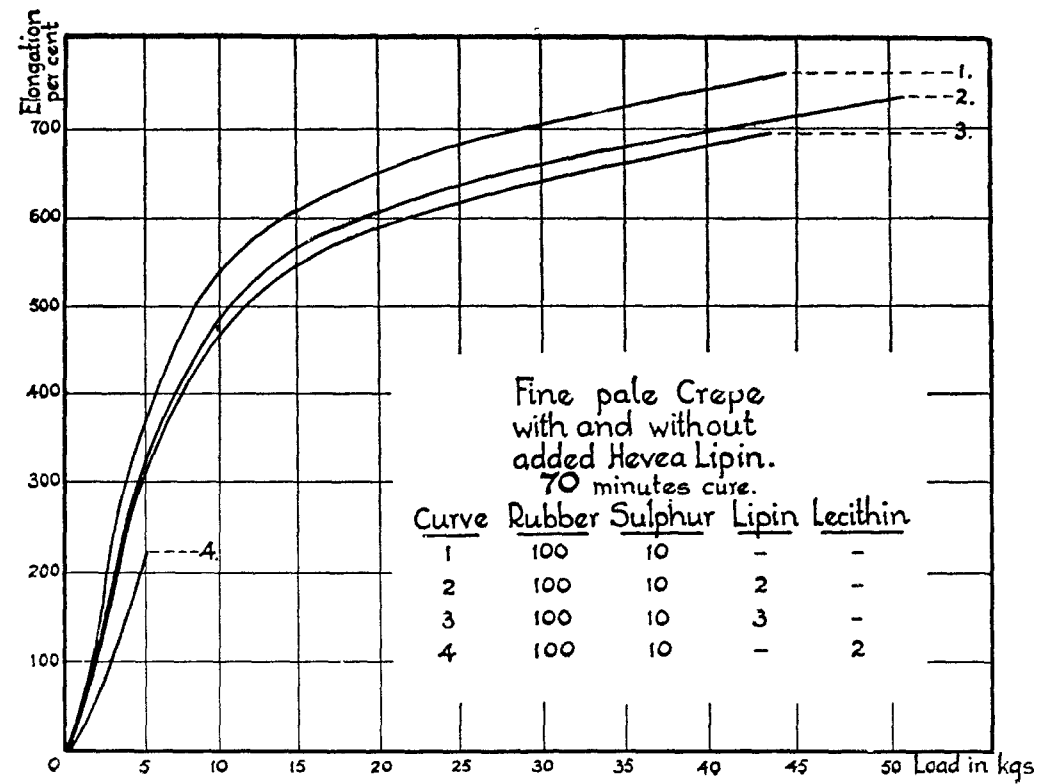
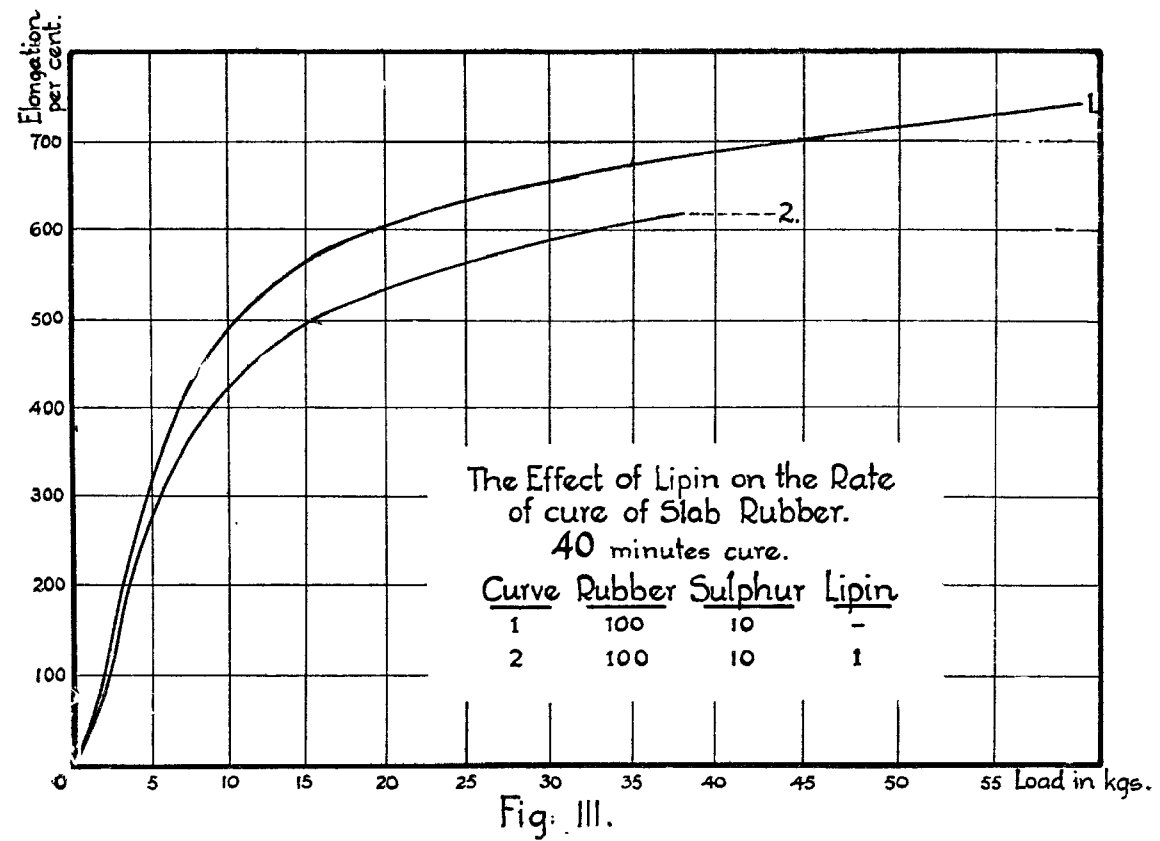


Fig II.



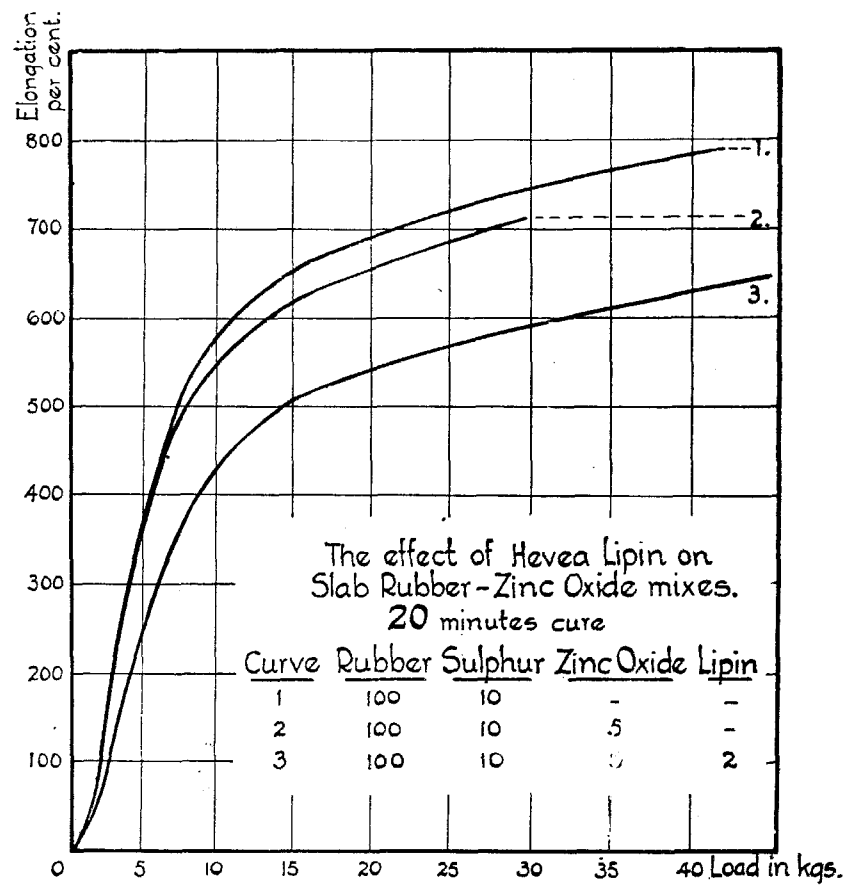


Fig IV.

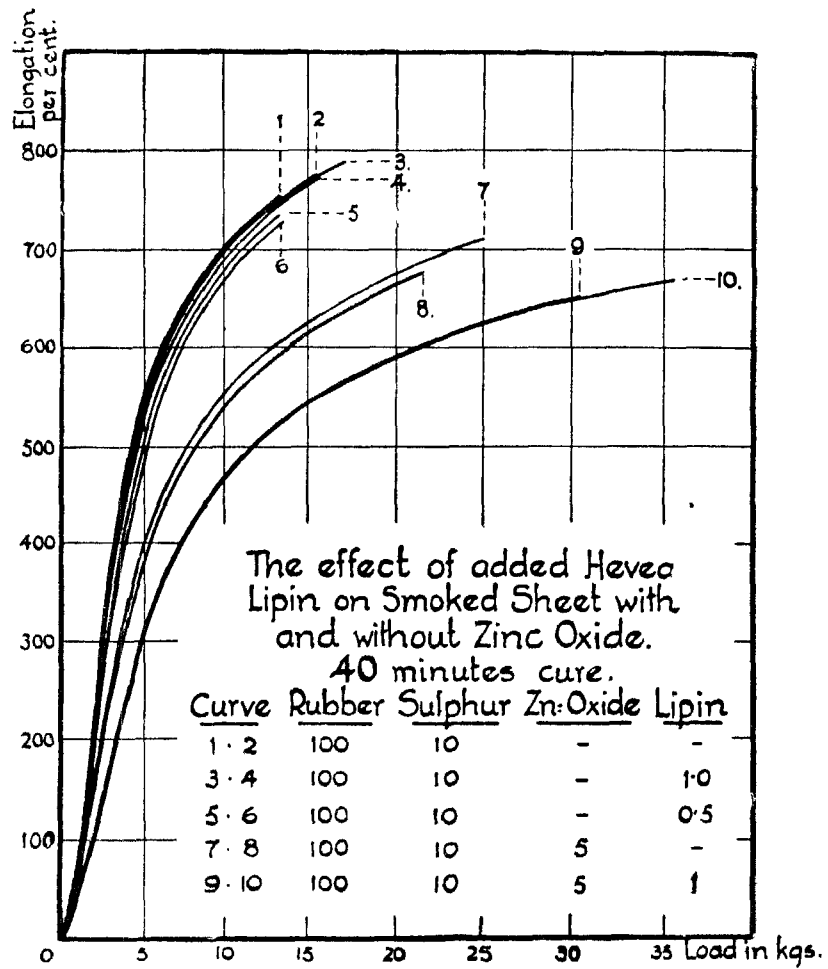


Fig V.

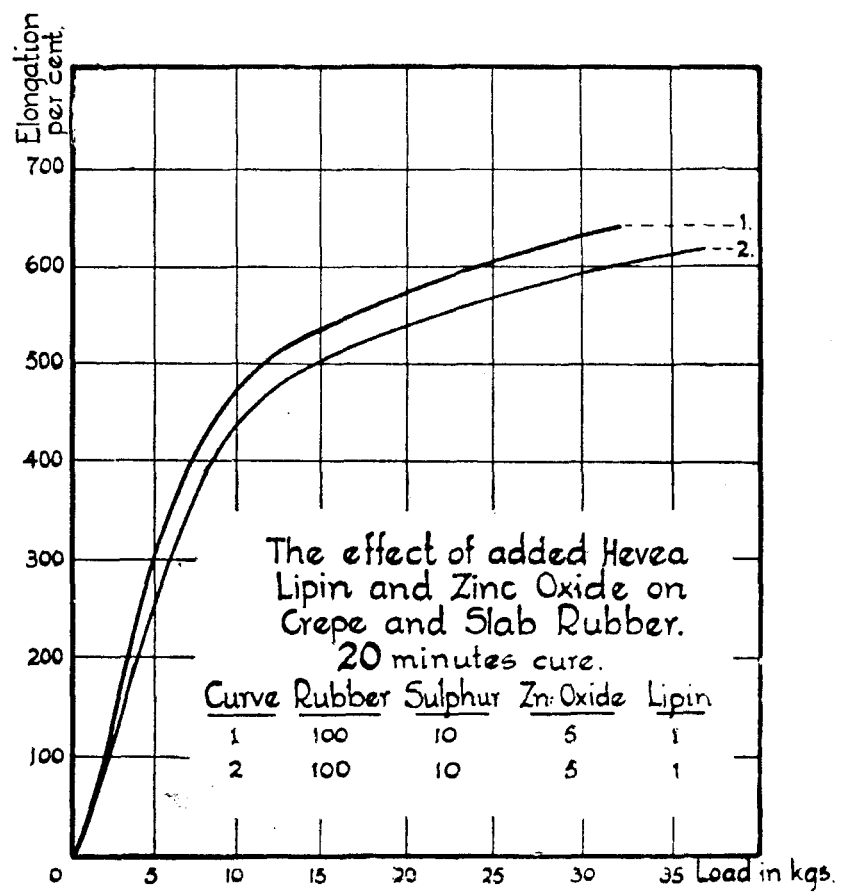


Fig: VI.