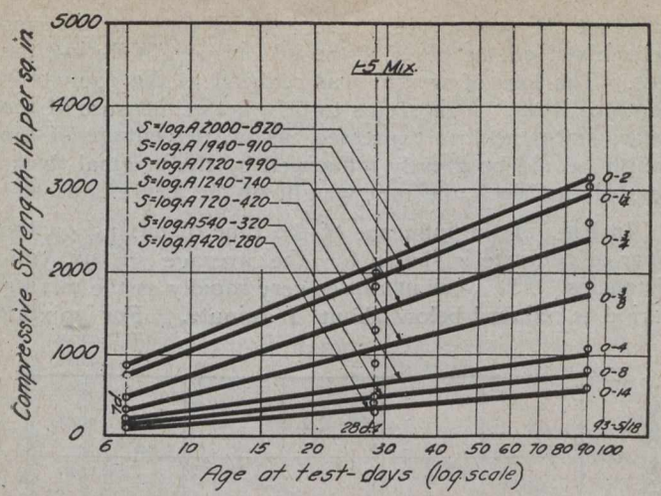

Fig. 37—Effect of Age on the Strength of Concrete

Series 93—1-5 mix, size of aggregate variable. Each point is the average of 24 tests based on 6 times of mixing for each grading. Age platted to logarithmic scale. Compare Figs. 20, 36, 39 and 46.

Concrete With Different Quantities of Cement

See Series 93, (Figs. 21 to 24) and Table 12. The lean mixes show a much greater relative increase in strength with continued mixing than do the rich mixes. The mixes tested varied from 1:15 to 1:2. For mixing periods from ¾ to 1½ minutes or from 1 to 2 minutes the increase in strength at 28 days was about 19 per cent. for the leanest mixes and 7 per cent. for the richest. These percentages are based on the strength at 1-minute mixing. These percentages are not sensibly different for ages of 7 days or 3 months.

Concrete With Aggregates of Different Sizes

See Series 93 (Fig. 25 to 28) and Table 12. Concrete with aggregates of small sizes is more affected by continued mixing than similar concrete with aggregates graded up to coarser sizes. The sizes tested ranged from 0-14-mesh to 0-2 ins. For instance, from ½ to 2 minutes we find an increase from 64 to 136 per cent. for 0-14 aggregates, and from 91 to 109 per cent. for 0-2-in. aggregates. While the concrete made of fine aggregates increases in strength more rapidly with time of mixing than the coarse, it is not feasible to compensate very great changes in the size and grading of the aggregate by additional mixing. For instance, in order to obtain the same strength as given for a 1-minute mix of 0-1¼-in.

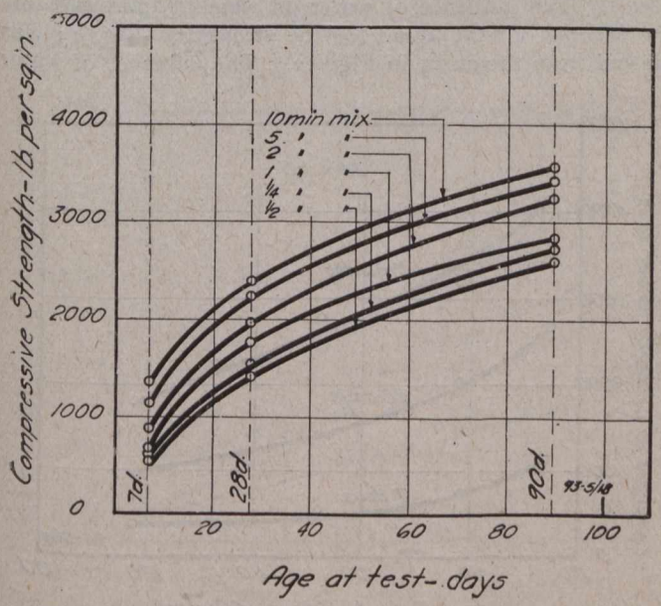

Fig. 38—Effect of Age on the Strength of Concrete

Series 93—All aggregates graded 0-1¼ in. Each point is the average of 32 tests; 8 different mixes. Compare Figs. 19 and 35.

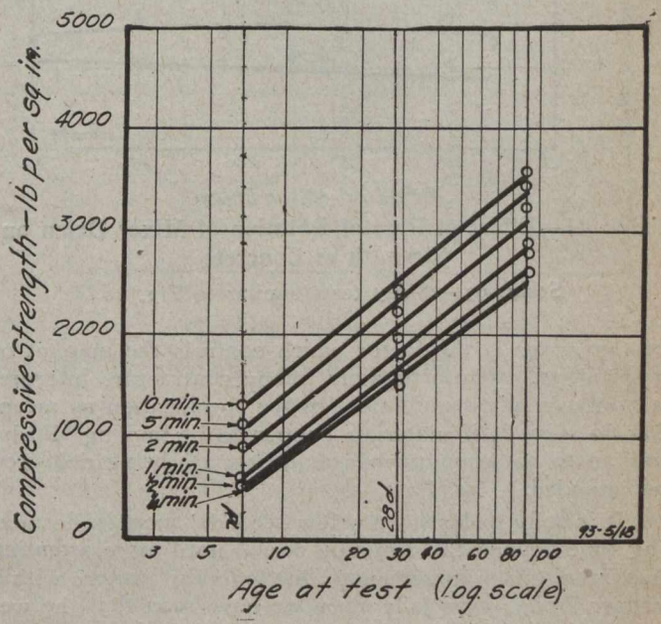

Fig. 39—Effect of Age on the Strength of Concrete

Series 93—Same data as in Fig. 38; age is platted to logarithmic scale. Compare Figs. 26, 36, 37 and 46.

concrete, we would have to mix 0-¾-in. concrete of the same mix for 10 minutes. This, of course, is only an indirect influence of the water ratio occasioned by differences in size and grading of the aggregate.

Further Remarks on Time of Mixing

If the evidence of these tests is a satisfactory guide, it appears that there has been a tendency to over-estimate the beneficial effects of increased mixing. It is shown that with this mixer the increase in strength which accompanied increases in mixing time from ¾ to 1½ minutes or

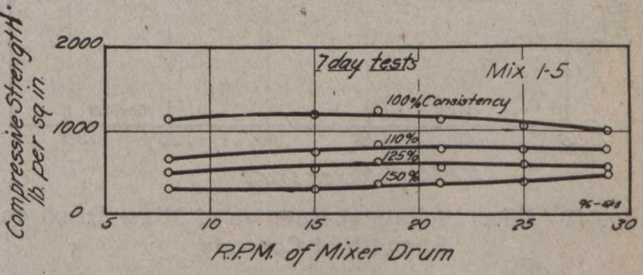

Fig. 40—Effect of Rate of Rotation of Mixer Drum on Strength of Concrete

Series 96—1-5 mix; 7-day tests. In general the values are the average of 4 tests. The 110% consistency was mixed in triplicate on different days; each value on this curve is the average of 12 tests.

from 1 to 2 minutes for usual concrete is only about 10 per cent. of the 1-minute strength. It seems doubtful if the increased cost of mixing each batch ¾ to 1 minute longer is justified by an increase of 10 per cent. in strength. It is the writer's belief that if concrete is mixed one full minute after all materials are in the drum, we are getting about the maximum efficiency if the output