

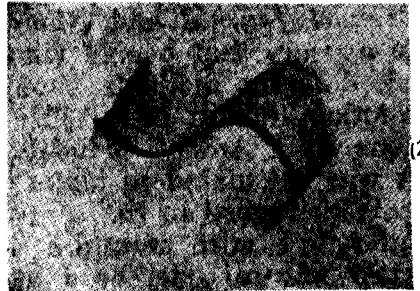
## The maintenance of forced oscillations

Please permit me to add a few words to my note on "The maintenance of forced oscillations of a new type," which appeared in *Nature (London)* of December 9, 1909. I stated that when a vibrating fork maintains the vibration of a string by periodically varying its tension, the stationary oscillation maintained may have a frequency of half of, equal to,  $3/2$  times, twice, &c., of that of the fork, each term in the harmonic series appearing separately by itself, or with one or more of the others conjointly, according to circumstances.

When two or more of the harmonics thus appear conjointly, they generally are not all in one plane of vibration; in other words, one or more appear in a plane which is normal to that of the others, and this can always be secured by a manipulative device. The paths described by any point on the string would in such circumstances be curved figures identical with, or analogous to, the well-known figures of Lissajous.



(1)



(2)

Figures 1 and 2

I send two photographs (figures 1 and 2), each only 3 cm by 2 cm, showing a short length of the string with a brilliant point in the middle of it, when executing such oscillations. The curves shown in them are only two out of a large number that I have observed and photographed, and can be recognised to be both compounds of the first three harmonics in the series mentioned above. It is difficult at first mentally to picture the process by which a tuning-fork executing normal oscillations maintains a string permanently in an oscillation of the type shown in the photographs.

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