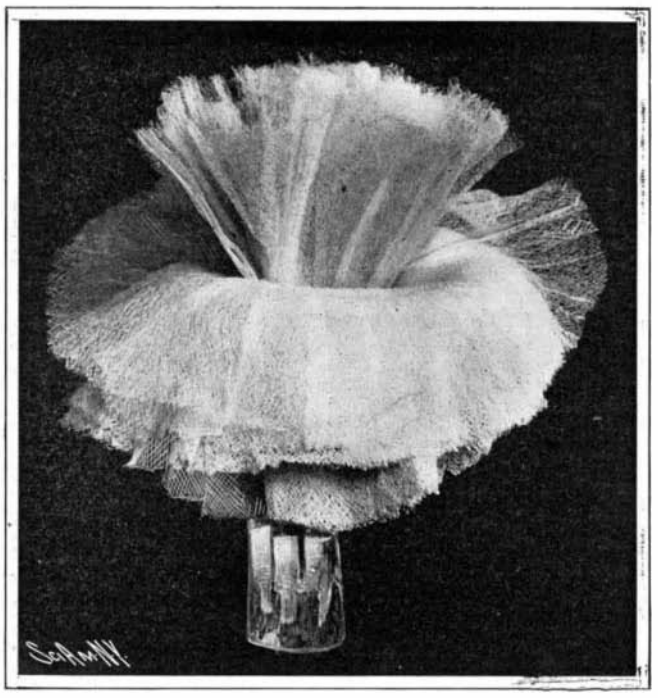
THE-VIRGIN LACE (LACE-BARK) OF THE TROPICS.

BY L. LODIAN.

There are in all about half a dozen lace-bark trees in the world, so called because the inner bark yields a natural lace in ready-made sheet form which can be made up in serviceable articles of apparel. Only four of these curious species of trees are of much practical value. Tourists who have stopped at Hawaii or Samoa may recall the lace-bark clothing of the natives—clothing of a neat brown color when new, of remarkable strength and of a fragrant odor, like freshly-cured tobacco leaf. The native "tapa" cloth, as it is called, is made from the bark of the *Brusonetia papirifera*, but is not usually included among the real lace-bark trees.

Lace-Bark Veil, Showing the Natural Fiber of the Tree.



How the Lace-Bark is Unfolded.

VIRGIN-LACE (LACE-BARK) OF THE TROPICS.

Of the lace-bark trees yielding a pure, snowy lace of utility, we have on the Pacific side of the hemisphere the *Sterkulia acerifolia* of Australia (also called "flame tree," in allusion to its showy red flower), and in Maori Land the *Plagianthus betulinus*. On the Atlantic side there is only one lace-yielding tree so far known—the *Lageta linteria* of the Caribbean Islands. Of the *Dafne tenuifolia* of South America I have never been able to discover a single specimen, despite careful search, nor have I ever met anyone who has seen the tree growing in South America.

In its natural state the lace-bark is of a most delicate cream-white tint. It is probably a kind of fibrous pith. When the outer bark is removed, it can be unfolded and unwound in one seamless piece, having a surface of a little more than a square yard. Washing and sun bleaching give it a dazzling white appearance. It has a faint, agreeable odor not unlike that of freshly split bamboo. The fabric is airily light. It is used in the West Indies for mantillas, cravats, collars, cuffs, window curtains—in a word, for every purpose that ordinary lace is used.

The specimen here shown thrown over a bust of Washington, which is almost natural size, shows how large is the piece of veiling and how free from flaws. In making up shawls, veils, and the like, it is customary to piece two sheets of lace-bark together. Delicate and apparently weak as it is in single mesh, a bit of lace-bark, if rolled into a thin string, will all but resist human strength to break it. In string, braided, and rope form, it is used for making up the light lace-bark harness of the tropics.

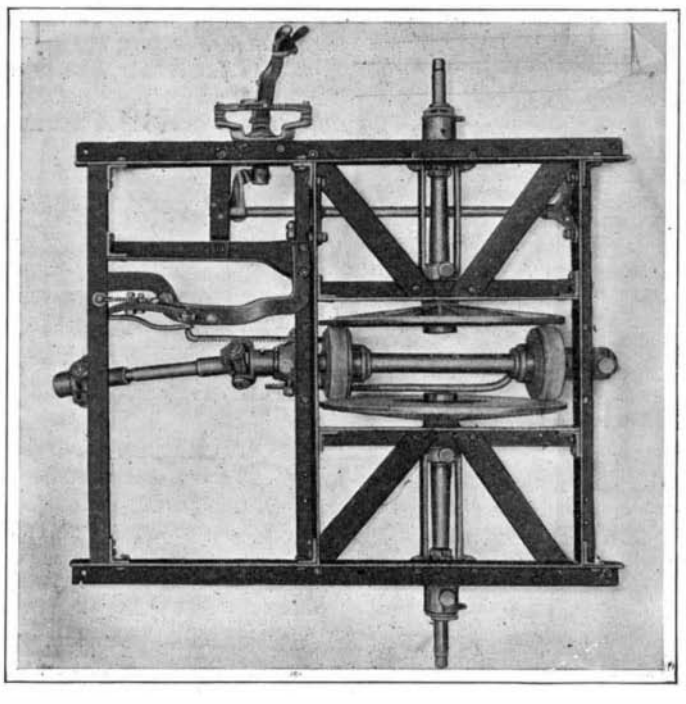
Despite its practical use there is no essential demand for lace-bark any more than for the edelweiss of the Alps. It has been used by the natives for hundreds of years, and yet is comparatively little known to this day. A few specimens of lace-bark articles are believed to exist in different countries of Europe. These were made some hundreds of years ago, yet, although their age is considerable, they are said to be in a good state of preservation.

AN EFFICIENT DISK TRANSMISSION FOR AUTOMOBILES.

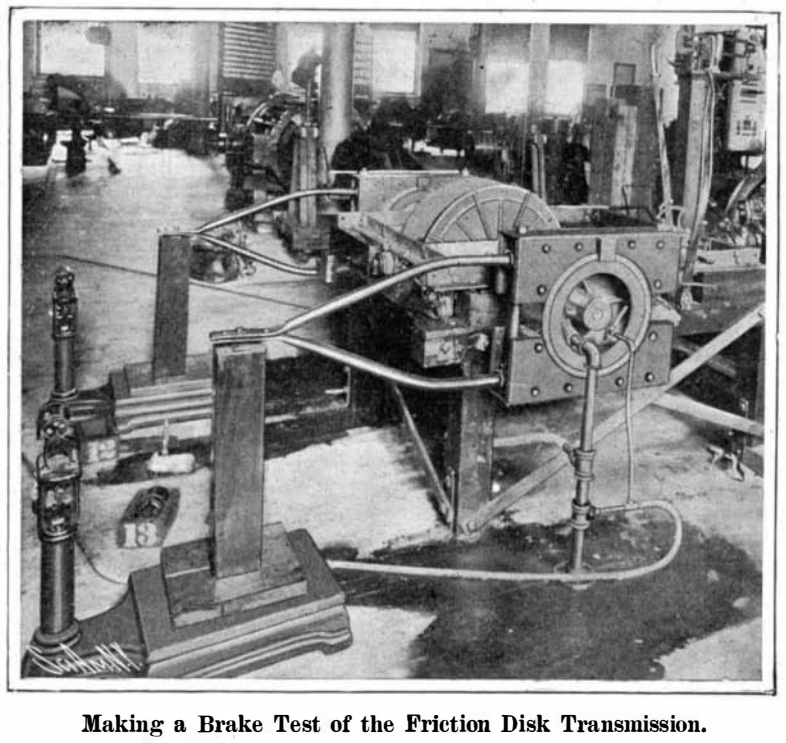
One of the earliest types of variable-speed automobile transmission gears to be experimented with was the friction-disk arrangement, which consisted, generally, of a small friction pulley set at right angles to a large disk (often the motor flywheel) and adapted to be driven by it. By sliding the pulley across the face of the disk from its center outward, any desired speed from zero up to the maximum could be obtained. A transmission of this type, though exceedingly simple and cheap to maintain, had the disadvantage of being decidedly inefficient. It will therefore interest our readers to know that a brake test of a friction-disk transmission of a radically different design has resulted in showing the new type of gear to be even superior in efficiency to the usual three-speed sliding-gear transmission.

The accompanying illustrations give a good idea of the transmission and of the manner in which the brake test was made.

The Marble-Swift transmission is exactly opposite in principle from the usual friction disk transmission just described. Instead of a large disk driving a small friction pulley, the drive is here from a small pulley to a large disk. The pulley is near the periphery of the disk when the driven member is traveling at the lowest speed, and it gradually nears the center of the disk as the speed of the driven member is increased. The result is that the transmission is most efficient at a low speed of the driven member; but there is not as much friction loss or chance of slippage at any speed as there is with the old type. As constructed for an automobile, the transmission has two disks and two driving pulleys mounted on a shaft placed between the disks, and so arranged that one pulley contacts with one disk and the other pulley with the other disk. The pulleys can be approached to each other or moved apart by means of a rack device, and thus various speeds can be obtained. The transmission can be thrown out of gear by setting the shaft so that neither pulley contacts with its disk. The reverse is obtained by making each pulley contact with the disk opposite to the one against which it usually rubs. A universally-jointed driving shaft runs forward from the pulley shaft to the motor, while the driving sprockets for the two rear wheels are placed on the ends of the two disk shafts. No differential is found necessary, as the differential motion is allowed for by a slippage of the friction pulleys. The disks are made of steel, and the pulleys of compressed paper. The wear is inappreciable over long periods of time; but the most interesting feature of the transmission is that it is quite efficient. Our other photograph shows the apparatus used in making the brake test of this gear. Water-cooled brake blocks were placed on the end of each disk shaft, and the driving pulleys were connected to an electric motor. The pull on the brake blocks was accurately measured by means of horizontal arms bearing on posts placed on platform scales. The motor was run at a constant speed of about 800 R. P. M., and the power supplied was accurately measured and corrected for motor efficiency, as determined by a subsequent brake test. The friction gear used in this instance had 6-inch driving pulleys having 1⅛-inch face, and the disks were 19 inches in diameter, which permitted of a wide variation in speed. The sliding-gear transmission, which was tested at the same time, gave a speed reduction of 8 to 1, 3½ to 1, and 2 to 1, respectively. The average efficiency of all the tests was 84.6 per cent for the friction-disk transmission and 82.05 per cent for the sliding-gear transmission. Two sets of tests were made of each at loads of 7 and 10 horse-power, and for the different ratios of speed reduction. The highest efficiency shown by the sliding gear was 84.4 per cent, under a load of 7.06 delivered horse-power, while the highest efficiency shown by the friction-disk transmission was 87 per cent when delivering 10.05 horse-power. The efficiency of the sliding gear varied from 80.5 per cent on the first speed, when driving the brake pulleys 101.5 R. P. M. and delivering 10 horse-power, to 83.9 per cent at 404.5 R. P. M. and the same delivery of power; while the friction-disk transmission varied from 87 per cent at 256 R. P. M. and 10.05 horse-power to 81.9 per cent at 425.5 R. P. M. and 10 horse-power. It will thus be seen that the friction-disk gear is, as stated above, more efficient at low speeds, where all the power that it is possible to develop is needed, while the sliding-gear transmission is the more efficient on the high speed, which is obtained with a direct drive through bevel gears. The advantage of the disk transmission in doing away with all gears, even to those of the differential, is quite pronounced. The disadvantage of great friction losses seems to have been done away with. The tests were made at the Armour Institute of Technology, Chicago, and were thorough.



Plan View of Transmission, Showing Large Disks Driven by Small Pulleys.



Making a Brake Test of the Friction Disk Transmission.

AN EFFICIENT DISK TRANSMISSION FOR AUTOMOBILES.