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## THE TREE-RING BULLETIN

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## A LARGE INCREMENT BORER

H. L. TRANSTROM\*

Core samples from softwood trees were needed in connection with run-off studies in the Owens River watershed, the major water supply source for the City of Los Angeles. The largest commercially available Swedish increment borer extracts a core which is only 15 3/4 inches long and 5/32 of an inch in diameter; in order to obtain longer and larger cores, enlarged copies of the Swedish increment borer were made in the Department of Water and Power machine shop.

Two core bits of chrome-molybdenum steel were made in the exact form of the core bit of the Swedish borer except that these were 19 and 30 inches long and designed to cut a core 19/32 of an inch in diameter. The shorter bit operated successfully, but when the longer bit was advanced into the tree about twenty-four inches, the elastic wood held its shank in such a vise-like grip that two men could no longer turn it. This difficulty was overcome by increasing the diameter of the screw head and introducing very sharp cutters just back of the head to further cut the wood and assure greater clearance. With these changes satisfactory cores have been secured from pines and firs, but to date the bits have not been tried in hardwoods. Since the original development, several core bits have been made ranging from 19 to 64 inches in length.

This improved core bit is shown in Figures 1 and 2. A cutting lip extends out beyond the first thread for a distance ranging from 1/32 to 1/8 of an inch, depending upon the length of the bit, and cuts out the core as the bit progresses into the tree. It has an inside diameter of 19/32 of an inch, which determines the diameter of the core sample. For the first 3/16 of an inch of its length, the inside diameter of the tube is the same as that of the cutting edge. In approximately the next 3/4 inch the bore flares to a diameter of 11/16 of an inch, which is maintained throughout the shank of the bit. The bit head is hardened and the rear end of the shank is squared to fit a standard two-foot tap-wrench, which is used to screw the core bit into the tree.

In starting the bit, it is better to have only one man turn the tap-wrench and carefully aim the cutting head at the center of the tree until it has penetrated about four inches, when two men may work together on the tap-wrench. Two men are required on the tap-wrench when the cutting head has penetrated deep into the tree to obtain a long core sample. Boring a hard-surfaced tree with a short bit for three or four inches and then withdrawing the bit without breaking the core provides a starting path which is helpful when using longer borers.

\*Statistical Section, Power Operating and Maintenance Division, Department of Water and Power, Los Angeles, California. Posthumous publication.

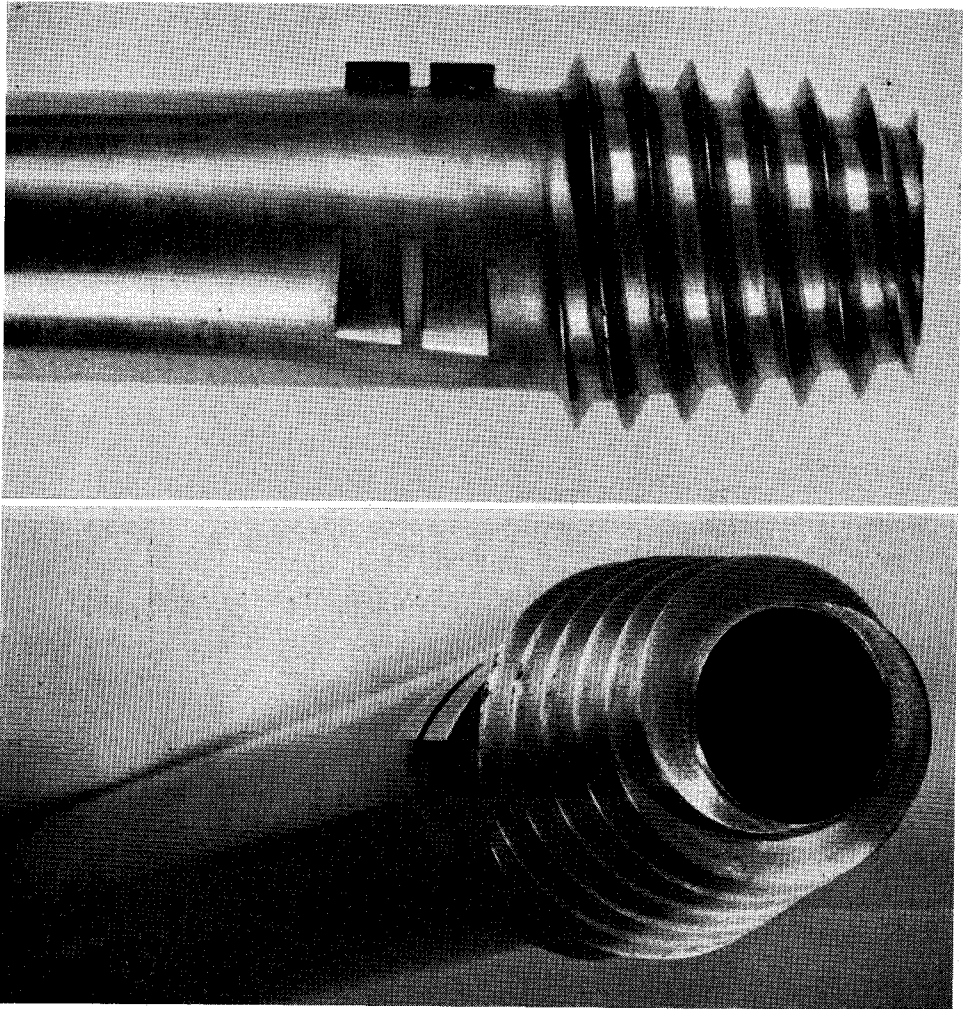


Fig. 1. The rear-of-thread cutters in this tree borer help to relieve binding.

When the cutting edge at the tip of the bit is rotated the screw thread forces it to move forward into the tree  $\frac{1}{3}$  inch per revolution. The pressure brought to bear by the screw, combined with the rotary motion of the cutting edge, causes a core to be cut out radially inside the trunk of the tree. During the cutting operation the core remains stationary while the bit rotates freely around it. This free rotation results from the increased inside diameter of the bit throughout almost its entire length.

After the boring has reached the desired depth, a thin semi-circular section of tubing, called a core breaker, is inserted between the bit and the core until it jams against the core in the conical tip of the bit. Rotating the bit in either direction causes the core to break off at its tip inside the tree. The core usually comes along when the core breaker is removed from the bit, but if it should not do so, it can easily be pushed out of the bit with a pencil or stick after the bit has been withdrawn from the tree.

