cost of waste, and this will give you approximately an accurate cost of material.

ASSEMBLY CARDS.

It is next necessary to ascertain the cost of the completed article. To do this an assembly card (Figure V) is suggested. The cost of the different operations by department, as will be seen, is entered in the proper column, the operator's name or number and the department, the number of hours employed and the total. Material can also be figured with the value and the cost per piece for material, cost per piece for labor, the shop burden or loss, or according to the name of the article. The cards may be filed in one of three ways, either alphabetically according to the name of the party for whom the order was constructed, numerically according to the order number, or according to the name of the article. The forms can easily be enlarged or contracted to meet the particular requirements of factories of any capacity, and it will apply to any line in the manufacturing world.

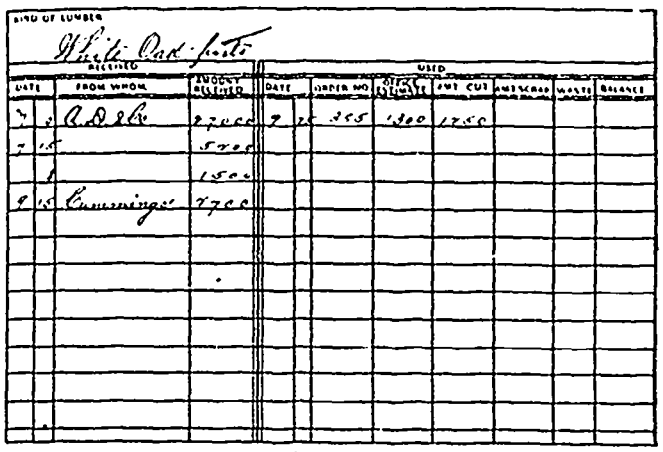

FIGURE IV.

HANDLING STOCK IN THE PLANING MILL.

As soon as a piece of lumber is dressed it must go somewhere at once, for the tale man at a machine that is doing anything like a day's work has no time to dally with it very long. If the system is a chain that carries all stock past a grading platform where one grader does all the work, that part of the matter is easily disposed of, and the final disposition is a matter of so much or so little trucking.

In some mills that have a number of machines conveniently in line, it is found to be most profitable to have a chain transfer at the feeding-out end of the machines and traveling at right angles to the delivery of the lumber. This chain, says a writer in The Wood-Worker, takes the finished product past a given point, where it is graded and marked for the stock shed, to which point it is conveyed by trucks, commonly called "dollies," or by a roller or chain transfer to a certain point in the stock shed, where the stock is loaded on trucks of varying form, for final distribution to the cars or to the stock bins to which it may have been assigned.

For the transfer system and the single grader there is this advantage, that there is not at all times the difficulty of finding a number of graders at higher wages than are paid to the laborers, and it also has a tendency to make the grades more uniform. There is also this advantage, all the trimming is done at the one saw at the grader's stand, and it is done right under his eye, so that the tendency to waste can be checked.

The final disposition of the dressed stock has to be made on the trucks, as no system yet devised has been able to handle so great a variety of sizes and grades and do it without the help of trucks of some sort. The shape and construction of these trucks vary in almost every locality, many mills yet using the old two-wheel "dollie," with all its unhandy features. There are many of them in the pine mills of the south, for no other reason, in some cases, than that they are considered "nigger" proof.

From an extensive experience I prefer the factory truck with removable standards to any other, for ease of handling and low first cost. A number of them can be placed convenient to the grader and all the bundled stock put on a truck, with each grade separate, while a fair-size boy can roll 500 feet on a level floor. Then there is this other advantage that the stock is never allowed to touch the floor, an advantage that contributes no small share toward lessening the cost of handling. These trucks can be handled in as small a space and around as sharp a corner as the "dollie," and have the added advantage that they will not upset nor tip up on the end when loaded, as the higher "dollies" are so prone to do. Where the lumber is bundled for shipment, these trucks are even more of a convenience, as the bundles can be loaded higher on a given platform space on the frame without sticking and are in no danger of being shaken off in the rolling of the truck Once used they are seldom discarded.

In the case where there is a grader at the several machines (and that system is by no means discarded) these little adjuncts to the success of a mill are especially valuable, as they furnish a ready means of transporting assorted quantities of lumber in a more compact and cleaner shape than by any other means. In case of necessity these trucks offer a sort of portable warehouse, holding their contents securely, yet ready for a quick movement, and taking very little room.

I have watched a number of systems of the transfer sort, and except for the saving effected at the grading end, there is not much to commend them over the trucks, and the trucks have to form no inconsiderable part of most transfer systems. In a number of instances I have seen lumber graded in the rough and loaded on the cars from the machine, without further grading, except in the case of a board getting accidently spoiled and laid aside. That does not seem to me to be a good system for anything else than plain surfacing or resawing where the lumber is shipped pile run and there are no culls to be laid out. For machines that work on stock from which orders are to be selected as they come in, this will not answer. It is in a case of this sort that the little trucks show their value.

FORESTRY METHODS.

The last report of the New York State College of Forestry contains some pertinent remarks by Dr. B. E. Fernow, the Director, in respect to the planting of hardwoods in the Adirondacks. He says :

There is one fact on the silvicultural side which the experiment has demonstrated to the satisfaction of the writer, namely, that in the hardwood forest of the Adirondacks, where the pine and spruce have been severely culled, the only practicable method, both from financial and silvicultural points o view, of securing a desirable new crop, is a clear cutting system, followed by artificial regeneration of the conifers, leaving only enough of the hardwoods to produce an admixture by natural regeneration, and saving only so much of the promising volunteer growth of young hardwoods and conifers as is not liable to be thrown by the winds. Indeed, it may often be best to make a clean sweep—denude, though the word has been used to denote vandalism—and replace artificially without reference to existing volunteer growth. This planting, of course, costs ; it is an investment for the future, but one that can be easily shown to be profitable in the long run. This method cannot be practised without taking care of the rubbish resulting from the logging operation, and this, of course, again entails expense. But when the simple and efficient system of clearing, followed by planting, is practised, the debris can be buried more cheaply, using the early spring season, before the snow is quite gone, and thus the fire danger, always attending logging operations, can be most readily reduced. The forest management has, indeed, by close watching, so far been fortunate in avoiding this constantly threatening danger. Here, too, the management needs financial assistance to increase means of prevention of forest fires, at least of the young plantations which are to replace the old crop. The annual logging area comprises between 500 and 800 acres, of which probably at least one-half will require replanting, and on these areas special precautions to ward off fire are necessary.

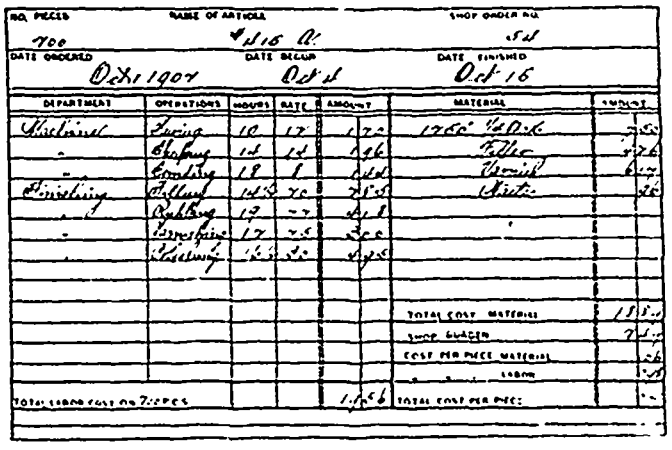

FIGURE V.