

Fruit Carton Forming Costs Cut

improvement developed in study of existing methods of carton forming for volume-fill fruit packing eliminates rehandling

Gordon A. Rowe

A 50% reduction in the labor costs of forming telescopic fiberboard cartons is possible by an improved method designed for volume-fill—jumble-pack—methods of packing fruit.

Originally developed for citrus packing houses, the improved method may be used with volume-fill—filling the carton through the bottom, with the top side down—packing of deciduous fruits. Also, it may be adapted to other methods of packing in cartons.

The reduction in labor costs was accomplished by redesigning a simple and inexpensive jig and placing one at the end of each major size-filling line, which eliminates the rehandling of cartons between the carton-forming and the carton-feeding operations.

The placement of the jig at the end of the line was developed during a comparative study of four existing systems of carton forming.

In each of the operations studied, the method of bringing up supplies from storage to the forming stations is the same. Differences in procedures occur

only in the carton-forming and carton-feeding jobs.

In one method, the worker who forms the cartons takes a folded carton top from the supply stack, opens it and places it on a forming table with the flaps up. The end and side flaps are folded in and the shaped carton top is inverted. Similarly, a folded carton bottom is opened, inserted in the top section, and the formed carton set aside. Another worker—the carton feeder—lifts the formed cartons to a table in front of the carton-feed conveyor; they are size stamped, a treated liner inserted, and the completed carton placed on the conveyor.

The second method is similar except that the carton former also inserts the treated liner, size stamps and transfers the carton from the forming table to the carton-feed conveyor.

A carton-forming jig generally used in the citrus industry is also used in the third and fourth methods. However, in the third, one carton former opens a carton top, flaps down, and puts it into a fixed position in the jig as guides fold

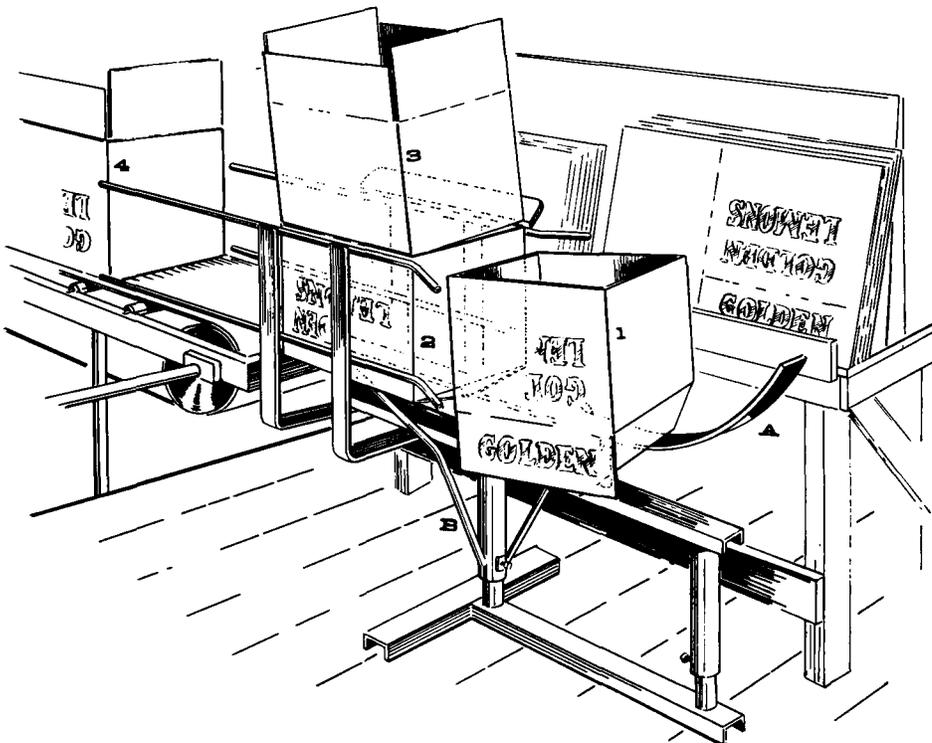
in the end and side flaps. Another former opens a carton bottom section, inserts it into the top, and sets the carton aside for feeding to the filling machine. In the fourth method, the carton-feeding job is done by the carton formers.

In the improved method—resulting from the study—the carton-feeding job is eliminated because the formed cartons can be moved directly onto the carton feed conveyors. The carton former takes a top section and puts it in the jig, as shown in position 1 in the drawing. End flaps are folded in by the guide rail A. Side flaps are folded in by the guide rods B as the top is moved to position 2, a fixed position. The carton bottom is opened and put into the carton top, as shown in position 3. Treated liners are inserted by the carton former. Carton feeding is eliminated because the formed carton is pushed onto the conveyor—position 4—as the top for the next carton is formed and moved from position 1 to 2. Only two motions are made to form and feed cartons. The cartons are size stamped—a full bundle at a time—by the man who stacks the folded cartons.

The studies indicate a performance standard—the hourly production rate that can be achieved by a worker of average skill and incentive—of 759 cartons per man-hour for the carton supply job as in the first four months. The perform-

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Carton-forming operation with redesigned and relocated jig.



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FIG MOSAIC

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determine what other potential virus vectors were to be found on the fig. The phytoseiid mites *Typhlodromus longipilus* Nesbitt and *Typhlodromus* sp. (Det. Baker) were the most abundant. Tetranychid mites were found only occasionally in southern California. Flower thrips, *Frankliniella* sp., and the aphids *Aphis gossypii* Glover and *Myzus persicae* (Sulz.) were present in moderate numbers. The fig psyllid *Homotoma ficus* L., which research workers in Italy reported as the probable vector or cause of fig mosaic in Italy, has not been found in California.

A series of transmission tests to five plants each was made with these species. No evidence was obtained that any of these insects are vectors of fig mosaic.

Symptoms of fig mosaic are very erratic in occurrence. Some of the inoculated plants have shown only one small chlorotic spot for months before developing conspicuous markings. Symptoms

developed more consistently at 90°F than at 80°F. Symptoms on the test plants were highly variable. Some markings consisted of faint, diffuse areas without clear-cut margins, while others were well delineated and contrasted sharply with the leaf in color. The markings varied greatly in size and shape. Many of the leaves showed severe distortion.

Demonstration of transmission of fig mosaic by the fig mite makes it important to determine whether or not the fig mite and fig mosaic can be controlled economically in the field. It will be necessary to study mite control on isolated fig plantings started with mosaic-free plants in order to determine the possibility and benefits of field control of fig mosaic. This will necessitate the finding of virus-free fig varieties from which propagations can be made. No such material is available locally.

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RED MITE

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Mite counts were made during the foliage season by selecting 100 leaves at random, running them through a mite-brushing machine, and counting them under a dissecting microscope. When the mite count reached an average of four or more mites per leaf, the plots were resprayed and the counts discontinued.

The materials used, rates of application, spray dates, and mite counts are shown in the lower table on page 6. Little effect was seen on the mite populations in the plot sprayed with dormant oil followed by lime sulfur, wettable sulfur; the counts paralleled those from the plot sprayed with dormant oil followed by Dithane. Phostex and Trithion in combination with oil did not give satisfactory control, as the former required retreatment in late May and the latter in early June. Dormant oil held the mites in check until June, which is consistent with results obtained in previous seasons.

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CARTON FORMING

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ance standard for this job, when the carton supply worker size stamps, is 488 cartons per man-hour. For the first two methods studied, carton-forming performance standards are 217 cartons per man-hour, and 316 for the third and fourth methods. The performance standard for carton forming by the improved method is 317, which includes inserting treated liners. With this method, no carton-feed worker is required. Size stamping is performed by the carton supply man. The performance standard for carton feeding in the first and third methods

is 261 cartons per man-hour, and 373 in the second and fourth methods.

Adaptation of the improved method in an orange packing house is shown in the accompanying photograph. Right and left hand jigs are used to allow a carton former to form on two lines without walking around a work station. Tables are used for holding bundles of cartons. An elevated skate roll conveyor is used for carton bottles where a short distance between conveyor lines prevails. With more space and separate tables for each line, both carton tops and bottoms are placed on the table. Boxes holding treated liners are on center uprights.

Hourly labor costs for crew organizations based on performance standards in relation to filling rate are shown in the

graph. For example, with labor costs at \$1.00 per hour, forming costs per hour—at a filling rate of 400 cartons per hour—would be \$5.11 for the first method and \$2.71 with the improved method.

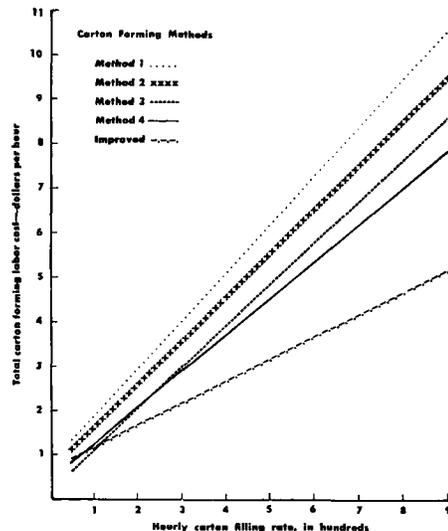
Estimated costs of the jigs as shown in the drawing are \$25-\$30 each, which is of minor importance when compared with the reduction in labor cost achieved.

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A more detailed report on the construction and installation of the improved jig described in the above article is available, without cost, at the local office of the County Farm Advisor.

The Tom Sims Packing House Equipment Company, the California Citrus Industry Research Association, the Fillmore Orange Association, and the Oxnard Citrus Association assisted in the studies reported here.

Hourly labor costs for forming cartons by different methods at various filling rates. Wage rate of \$1.00 per hour.



Commercial installation of improved carton-forming jigs in orange packing house.

