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Further developments in the bulk-harvesting of apples

J. C. Rowbotham

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Fig. 1.—Mr. J. L. Parke emptying a picking-box into a bulk bin on a trailer. The trailer carries two bulk bins end to end.

FURTHER DEVELOPMENTS

IN THE

BULK-HARVESTING OF APPLES

By J. C. ROWBOTHAM, Horticultural Instructor.



FOLLOWING the successful introduction during last season of bulk-harvesting of apples by two West Australian fruitgrowers—one at Donnybrook, the other at Kendenup—this year has seen more ambitious ventures in this field both by growers and the major packing houses of the Donnybrook district. Six growers and two large central sheds have installed equipment to handle bulk bins and not unnaturally a variety of types and sizes of bins have been built, and several methods of handling them evolved.

Four growers who do not pack their own fruit have equipped themselves to use the 30-35 bushel containers supplied free of cost by the central sheds, the other two have followed the example of Mr. Ralph Grist—the first Donnybrook grower to make a success of bulk picking—and fitted their packing sheds to handle their own large bins.

One of the large sheds uses a fork-lift truck to move the boxes from motor truck to floor, and floor to grading machine; the other is equipped with an overhead travelling hoist. The former company is using angle and tubular steel framed karri boxes; these hold approximately 30

bushels and the lower half of one end is hinged and swings upwards in two unequal sections, the idea being that the smaller door is opened first and after the flow of fruit eases the larger door is brought into operation to keep the fruit moving.

The other firm has built steel and wooden framed bins of local pine—these are of about 35-bushel capacity and are fitted with upsliding doors made in three sections. The floors of these bins are covered with linoleum to facilitate the flow of fruit towards the outlet.

In both sheds, mobile tilted tables are used to hold the filled bins in position for feeding the fruit on to the slow-moving



Fig. 2.—Mr. J. Gemmell lowering the bulk bin before commencing picking. He has fitted his tractor with a hydraulically - operated fork lift.

belts which deliver it to the foot of the elevator. In the case of the shed using the fork-lift truck, the tilted table is fitted with rollers for mobility on the cement floor and a foot-operated lever is used to increase the tilt angle. A novel feed belt made of 20 parallel "V" belts picks up the fruit as it emerges from the hinged doors and carries it forward to the elevator rollers.

This shed uses the hardwood boxes mentioned earlier with the large and small sectioned hinged outlets. Further modifications will be carried out to enable this outfit to keep the fruit rolling without attention. The 30-bushel bins are lifted from the floor, emptied and replaced on the floor in just over ten minutes.

The other company has installed a set of light rails, and the tilting table moves laterally across the shed on flanged wheels. The angle of tilt can be varied to suit the type of fruit being handled by means of a large wheel operating a quick-thread screw. Pears have been put through successfully by this outfit, the optimum angle having been found to be 35° from the horizontal. Apples flow readily at a lesser slope, about 25° . By using a rubber-covered baffle stretched about a foot in from the outlet these bins will feed apples on to the slow-moving belt without attention. The total time taken to lift, empty, and re-stack these 35-bushel boxes is just 15 minutes.

This shed uses the electric hoist to move the containers from truck to floor, to sizing

machine and out again. The great advantage that the fork-lift truck has over the hoist is that bins can be stacked anywhere the truck can go, and anywhere there is convenient floor space in the shed, whereas the electric hoist which can only travel lengthways can only pick up and stack immediately under the overhead beam. Of course if it was re-designed for transverse movement as well it would be almost as mobile as the fork-lift truck.

A travelling electric hoist has been installed by Mr. J. L. (Pat) Parke, a grower who harvested some 9,500 bushels in bulk bins this past season. His hoist, under

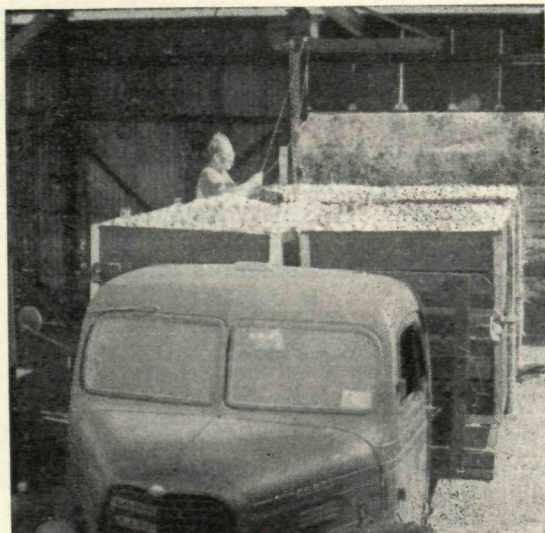
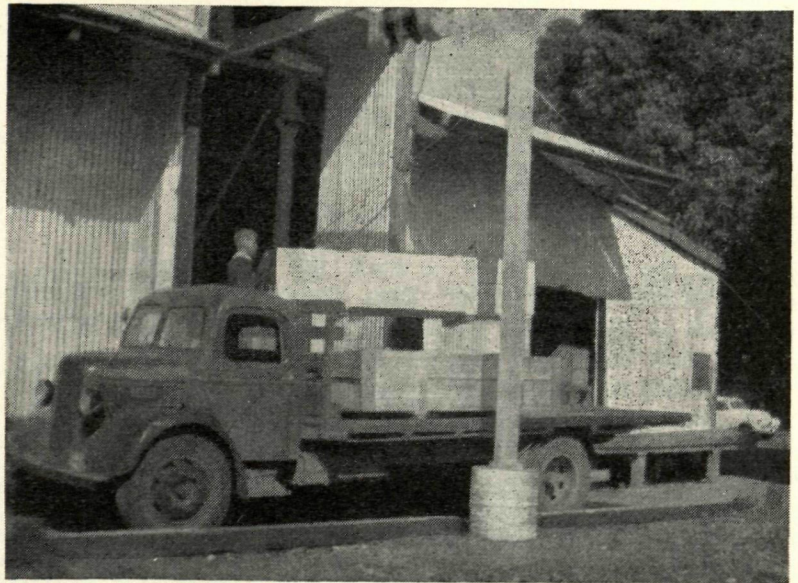


Fig. 3.—Mr. J. L. Parke loading filled bins on to a truck at the orchard.

Fig. 4.—Full bin being lifted off the truck at the packing shed. An electric hoist is used.



cover, can travel in four directions and as it is capable of 10-foot lift he states the overhead gear should be at least 13 feet 6 inches from the ground level to make it possible to stack four bins high. He does not pack his own fruit but delivers to central sheds and is only interested in providing an easy method of making his picked fruit readily available to the carrier who moves his filled boxes to the packing houses. He also has fabricated some excellent trailers, one steel-framed type mounted on airplane wheels which is long enough to hold two bins end to end. Another type is carried on truck wheels and carries one bin.

Both types of trailers have extended and cranked axles to give a ground clearance of 8 in. This was found to be the absolute minimum to prevent the longer type hitting the ground when traversing rough country or crossing small drains. For convenience in emptying picking-bags the trailers were kept as low as possible and a small, strong box about 9 in. high is carried for use as a step to assist in comfortable and bruise-free emptying of fruit from the bags. Mr. Parke has the most elaborate outfit operated by a grower, and has spent almost £1,000 on equipment and shed. Mr. Parke Sen. is certain that the money was well-spent as is his son who does a lot of the picking. He states that, single-handed, he can pick and cart to the

loading point 105 bushels of apples in 1½ hours—less time than it formerly took to pick them into dump cases. This does not mean that Mr. Parke Jun. does all the picking; for most of the season two teams of two men each with tractors hauling one and sometimes two trailers in tandem comprise the harvesting complement.

A nearby grower, Mr. Jack Gemmell, who also delivers all his crop to central sheds has attacked the problem of moving the bins around his orchard from an entirely different angle. He has had fitted on the rear of his tractor a hydraulically operated fork-lift—this is operated by the standard gear already on his machine, the cost of the extra fittings being £170. He carts four empty containers on his truck from the shed to a convenient spot in his orchard, lifts one off with the fork-lift and transports it around the trees he is picking. When it is full, he lifts it back into its position on the truck and repeats the operation, until the four bins are filled and a full load of 120 to 140 bushels is picked in a little over half the time formally taken with the dump case method.

M. C. Fry & Sons have fitted a similar hydraulic fork-lift to their tractor and move the bins in the same manner as Mr. Gemmell.

Messrs. Keall Bros.—who have successfully bulk-harvested pears as well as apples in the commercial bins—worked out

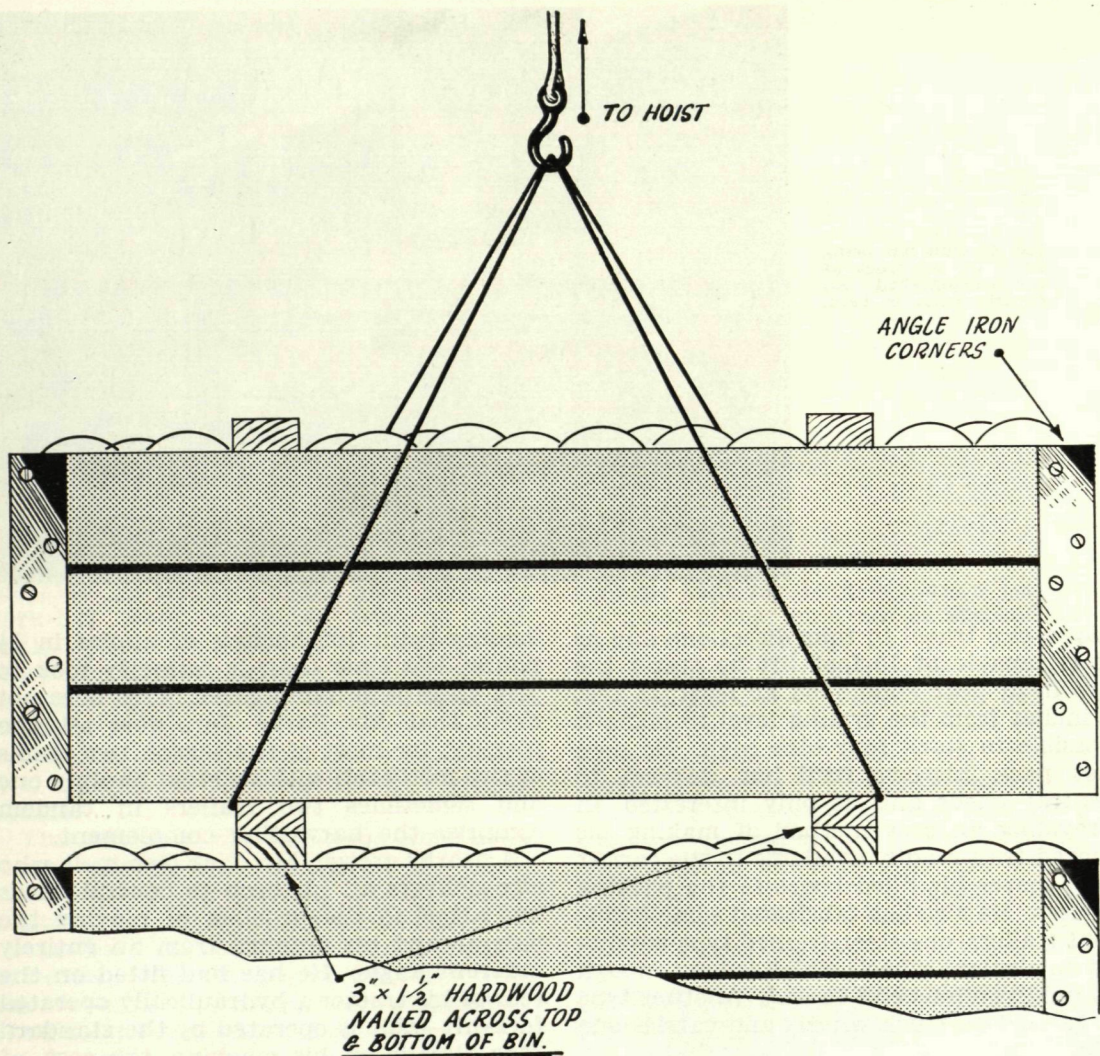


Fig. 5.—Diagram showing how, when bins are stacked, hardwood spacers protect fruit from damage. The detachable metal slings are shown in position.

a very cheap and simple method of lifting the boxes from truck to trailer and vice versa.

By means of a pulley block rigged to a convenient gum-tree and a length of wire rope hooked to their tractor draw-bar they were able to cut their handling costs for their first season without a large initial expense. It is their intention to invest in a tractor-operated fork-lift for future seasons, as nothing will, in their opinion, do more to reduce harvesting costs than the bulk method.

Messrs. W. & B. Dilley of Upper Capel, favour the loose bin and low frame trailer

type of equipment. Their boxes hold 20 to 25 bushels and are lifted from trailer to shed floor and shed floor to sorting elevator by means of a castor-wheeled straddle-truck type of vehicle. The lifting of the full bins is accomplished by means of a hand-operated winch built into the framework of the straddle-truck. Dilley's bins have the advantage of being very light in weight, being constructed of angle iron and hard-board—painted to render them weatherproof. They cost about £6 each for labour and materials.

Mr. H. G. Tichbon of Argyle, who is assisted by his two sons Neville and Michael

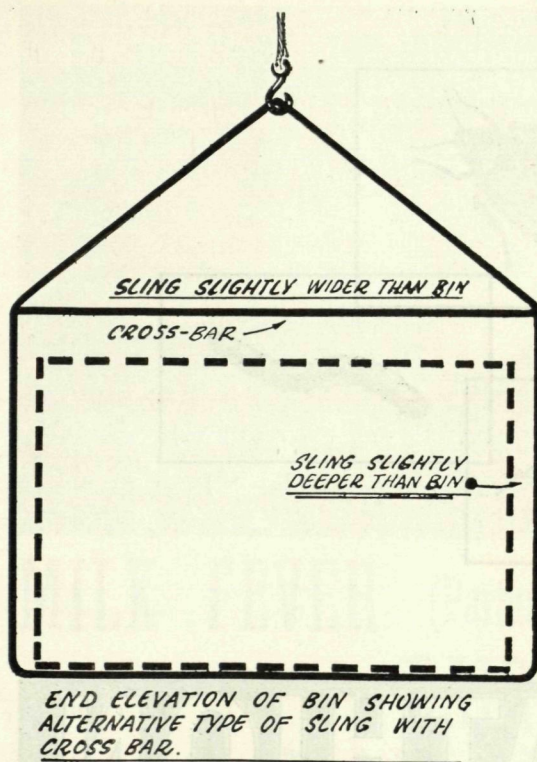


Fig. 6.—Diagram of sling made from $\frac{3}{8}$ in. or $\frac{1}{2}$ in. mild steel rod. Width and depth are greater than the width and depth of the bins. The cross-brace is optional.

uses a long trailer and loose bins also, but has installed a half-ton endless chain hoist which travels across the intake end of the packing shed on a long "H" beam. Their boxes, made of angle-iron and local pine, cost only £5 plus labour and weigh 200 lb. empty. Six bins have been built for the first season's trial and so successful has it provide that for next year another nine will be constructed. The cost of the 26 feet of "H" beam, the hoist, and the extra timbering in the shed to carry the added load was in the region of £100. With this outfit the owner is able to lift a bin off the trailer—which is pulled straight into the shed as the floor is at ground level—and set it in position on the tilted table in less than one minute. This has been achieved by lowering the intake, thus obviating the necessity for a high lift. In practice, a few tugs on the chain of the hoist lifts the box of fruit high enough to clear the framework of the trailer, and a gentle push on the bin moves it directly over the table. A pull on the chain in the

reverse direction lowers the 25 bushels of fruit into position ready for sorting and grading. The size of the sliding door and the design of the endless belt-feed hopper and the angle of table are such that the apples feed onto the elevator in a steady stream that does not need manual attention.

For reserves for wet weather there is enough space under the overhead beam (which has 11 ft. clearance) to stack up to 12 full bins in stacks of four which means just on 300 bushels of loose fruit—quite a sizable wet weather reserve.

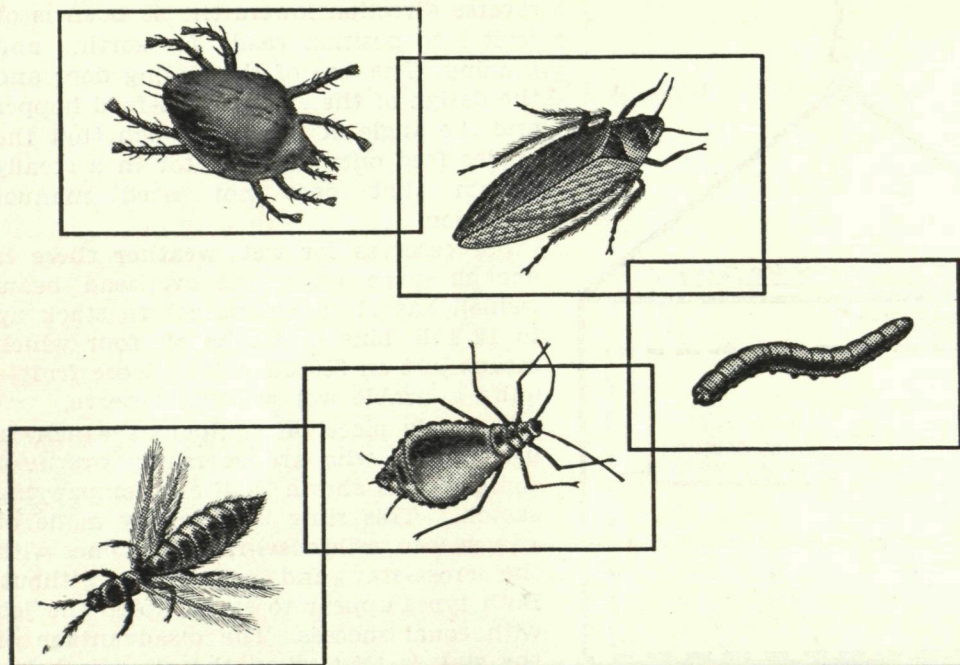
A handy piece of equipment which is used by all who are operating overhead equipment is shown in the accompanying sketch. This sling is generally made of $\frac{3}{8}$ in. to $\frac{1}{2}$ in. mild steel rod sometimes with the cross-stay and sometimes without. Both types appear to stand up to the job with equal success. The disadvantage of the stay is that when the sling is being manoeuvred on and off the bins a few apples on the top layer could be bruised by a careless operator.

On the question of bruising, many inspections made of both apples and pears of all commercial varieties, and in all stages of maturity has confirmed last year's conclusion that bruises caused up to the time of packing can be materially reduced by suitable bulk-harvesting equipment.

It was possible at times in the major sheds to see boxed fruit being tipped on to one hopper of a double-sided grader and bulk fruit being discharged on to the one adjacent and the differences were often outstanding, in every case the verdict was in favour of the big box.

This was particularly noticeable after the first good autumn rains. Several growers delivering in dumps had to be warned against sending in badly bruised and crushed Granny Smiths, but not one complaint went back to any one using bulk bins.

Interest in bulk handling is spreading to other fruit districts, notably Mt. Barker and also citrus growers at Harvey and it seems likely that before many years pass a considerable proportion of the State's fruit crop will be handled in this way.



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