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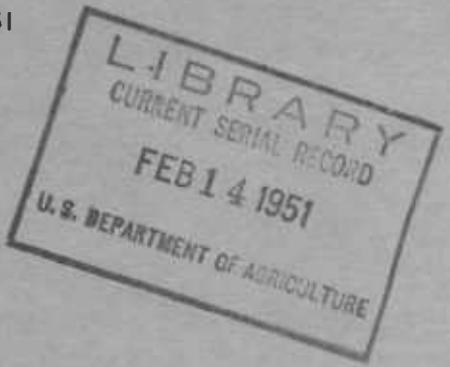
The Check-out Operation

IN SELF-SERVICE RETAIL FOOD STORES



UNITED STATES DEPARTMENT OF AGRICULTURE
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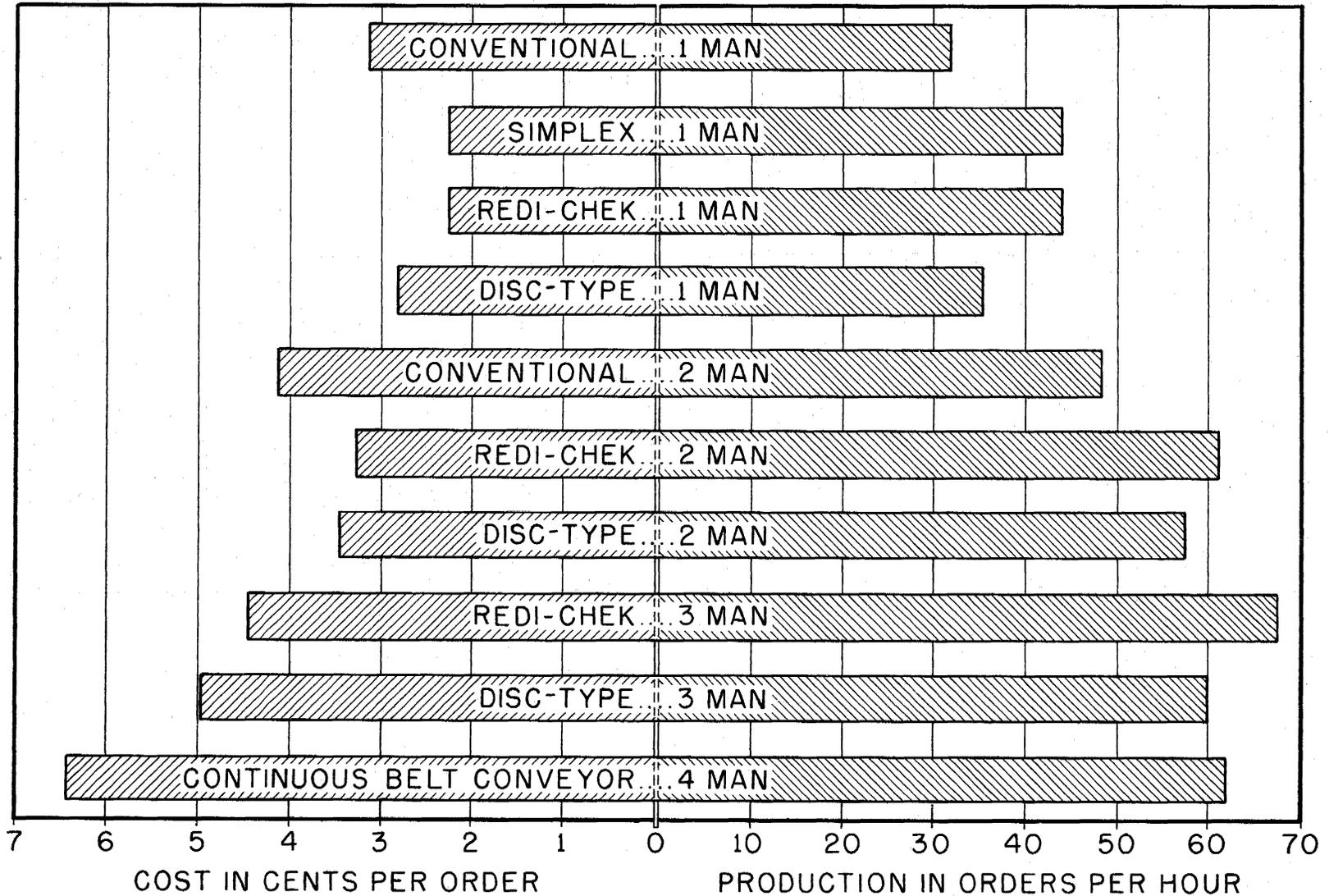


Figure 1.--Comparative productivity of check-out counters in self-service food stores, by the number of persons in the crew and type of equipment.

SUMMARY

A new type grocery check-out counter has been developed which increases by 38 percent the number of orders checked out per hour, as compared with the usual methods. Cost per order decreased by 26 percent. The new counter, called the Redi-chek, gave the highest production of the 5 types of equipment that were analyzed and time-studied during the project. Forty-four orders per hour were handled at a labor cost of 2.3 cents per order with 1 person operating the equipment; 61 with 2 persons, and 67 with 3 persons. More than 20 percent of total labor in all stores studied was used in the check-out operation, indicating a potential for considerable saving.

The Redi-chek was designed to reduce the number of times the cashier handled each item. The following features were incorporated in the equipment: (1) The sorting of merchandise was eliminated; (2) the order was rung up and bagged simultaneously (the bag was placed in a specially constructed well which held the mouth of the bag open); (3) a 7-foot conveyor belt was used to move the merchandise to the cashier's position; (4) an automatic coin changer was incorporated in the equipment to simplify change-making; (5) two additional bagging wells were added, so that when a bagger was added to the equipment, he could bag items with both hands simultaneously; and (6) a bag rack was installed behind the counter to hold completed orders. The Redi-chek was operated by one, two, and three persons.

Another system, called the Simplex, was developed and tested. It likewise processed 44 orders per hour. It was particularly adaptable for stores which do not have definite week-end sales peaks. The cashier removed the items from the basket and placed them in a bag--recessed in a well--simultaneously with the ring-up. An automatic coin changer was used. This counter was limited in operation to 1 person.

A single operator, using conventional equipment with merchandise presorter, produced 32 orders per hour at a labor cost of 3.1 cents per order. This was the lowest rate of production and highest cost of any type of equipment studied. This performance can be explained by the physical handlings involved in the operation: (1) As the order was sorted; (2) when the items were rung up on the register; and (3) when the merchandise was bagged. Other handlings were necessary when the cashier unloaded the basket or when she used the presorter.

When an additional person was used on the conventional equipment, production was increased by 52 percent. This contradicts the belief, frequently encountered during the study, that a cashier and bagger working together would produce more than two cashiers working alone. Labor cost for the two-man operation was 4.1 cents per order.

A continuous belt conveyor check-out was also studied. It contained an 18-inch-wide rubber belt, running the entire length of the equipment (14 feet). The unit was operated in much the same way as the conventional equipment, with the belt conveyor replacing the merchandise presorter for the one-man operation. The unit provided for operation by as many as four persons. A crew of this size produced 62 orders per hour, but at a high cost per order (6.4 cents). These rates compare with the three-man operation of the Redi-chek which handled 67 orders per hour at a cost of 4.5 cents per order.

For the one-man operation, a disc-type counter, which uses a revolving disc to move merchandise to the cashier, was 11 percent more productive than the conventional equipment. With a three-man crew, the disc-type check-out counter almost equaled the production of the four-man operation on the continuous belt conveyor unit.

The automatic coin changer contributed to increased check-out production and improved accuracy in making change.

Motorized departmental keys on the cash register improved performance of the ring-up part of the operation by 4 percent and facilitated elimination of the sorting of merchandise.

Of considerable importance is the fact that a change in equipment to the Simplex or the Redi-chek unit is not necessary in order to obtain improved performance in the check-out operation. Most other types of check-out counters now in use can be altered, at small cost, to eliminate the sorting of merchandise and to improve the bagging operation. Several types of equipment now in use, such as the disc-type unit, can easily incorporate the cashier's bagging-well to make possible the simultaneous ringing up and bagging of merchandise.

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THE CHECK-OUT OPERATION IN SELF-SERVICE RETAIL FOOD STORES

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INTRODUCTION

The check-out operation plays an important part in retail self-service food stores. In all stores studied in this project, the check-out function accounted for more than 20 percent of the total man-hour requirements. Its importance is further emphasized by its accepted position as the common bottleneck in the store during peak periods of the week. It is not uncommon for self-service food stores to handle from 60 to 70 percent of their weekly volume on Friday and Saturday. Peak periods within these high volume days place an immense load on check-out operating personnel and equipment. It is an accepted fact in the industry that store sales volume is directly affected by the rapidity with which customers are accurately processed through the check-out operation. In stores where automobile parking facilities are limited, increased service at the check-out operation during peak periods may lead to increased volume through a larger turn-over in the parking areas. With the advent of self-service meat and produce merchandising, the cashiers at the checkstand often become the only personal contact with the customer. This further increases the need for a pleasant reaction by the customer to check-out personnel and equipment.

The purpose of the study was to evaluate the check-out operation to determine the advantages and disadvantages of the more common methods and types of equipment now in use, as well as to develop and evaluate improved methods and equipment which might enable the industry to give improved customer service at the same cost or at a lower cost.

Detailed studies were made on several types of equipment and were carried on in nine stores in two retail food store chains. Observations were made of the check-out operation in stores located in various sections of the country. The scope of the study consisted of an analysis of all work associated with the movement of the merchandise from the time it was brought to the check-out location until the complete order was checked and bagged (or boxed), ready to leave the store.

METHODOLOGY

The same approach was used for each study. The first step was to orient store personnel with respect to the purpose and plan of the project. The use of the stopwatch was explained. The necessity for the operator to perform at his usual pace while being time-studied was stressed. The objective of making the job easier for the employee was emphasized. Employee suggestions and criticisms were welcomed and when improved equipment was designed, the employee was made a part of the developmental work.

The operation was broken down into its detailed component parts, called elements. Each element was timed for a large number of successive orders and the average time was used as a basis for developing performance figures for the operation. A rating factor was applied to the average elemental times for each operator studied, this factor being based on the effective speed at which the operator worked. Skill was not considered to be a factor in individual performance, as it was defined for the purposes of this study as the ability of the individual to follow a given motion pattern.^{1/} Thus, with the method standardized, speed alone controlled variations in elemental times between trained operators. The rating factor was applied to the average time for each element in order to convert actual performance of the operator studied to expected performance by the average operator working with a standardized method. A fatigue and personal allowance factor of 15 percent^{2/} was applied to the sum of the various elements for each study. Avoidable delays on the part of the operator were excluded from the standards. Operator delay time caused by the lack of customers at the checkstand was excluded. Set-up and clean-up times (consisting of the preparation of equipment for operation in the morning and cleaning up the equipment and check-out area in the evening) were excluded from all standards. No operator studied who operated any type of equipment used the touch system; each watched the cash register keyboard and indicator when operating the cash register in order to eliminate ring-up errors.

Time studies were taken on each type of equipment and on the various sized crews to determine the basic time required to perform each of the various elements in the operation and the frequency with which each of these elements occurred. Production standards were developed from these data to show production per hour and production per man-hour.^{3/}

The size of the average store order (number of ring-up items per average order) was dependent on several factors and varied from store to store. The average order for one store contained 14.29 ring-up items. For comparative purposes, all standards have been developed to conform with this size of average order.

Although variations in company operating procedures were encountered in the study in the several stores of the two organizations in which the project was

^{1/} Ralph Presgrave, *The Dynamics of Time Study* (New York, London: McGraw-Hill Publishing Company, 1945).

^{2/} The selection of the 15 percent figure was based on the *Personal and Fatigue Allowance Table* as developed by Dr. Ralph M. Barnes, p. 370, in his book *Motion and Time Study*, New York: John Wiley and Sons, Inc. 1949.

^{3/} For detailed standards of all equipment studied see Appendix.

conducted, all phases of the study were standardized to conform with the following conditions: (1) No weighing of merchandise was performed at the check-out operation; (2) checks were cashed and bottle refunds were made at the checkstand; (3) customers' coupons were handled at the checkstand; (4) cash registers were cleared daily in midafternoon by the head cashier or store manager; (5) all merchandise was price-marked except canned milk, baby foods, bread, jellos and puddings, soft drinks, candy and tobacco, and some produce items; (6) coffee was not ground at the check-out counter; (7) the nesting type basket was used in all stores in which studies were made; (8) boxes were used instead of bags as containers for orders when requested by the customer; and (9) female employees were used as cash register operators; male employees were used for all other check-out operations, such as bagging and carry-out.

Orders per hour were used as the unit of measurement rather than sales per hour because the latter does not give a true basis for comparison. Man-hour production in sales per unit of equipment varies with: (1) Variation in the size of the average order; (2) a variation in the percentage of units sold in each of the three merchandise departments--grocery, meat, and produce; and (3) variation in the price per item.

THE CONVENTIONAL CHECK-OUT OPERATION

One-Man Operation Produced Approximately 32 Orders per Hour

The conventional check-out counter (fig. 2) was designed for customer unloading of the order from the basket to the presorting area on the counter. The operator, usually called the cashier, performed the following elements in processing the average order:

<u>Element</u> ^{1/}	<u>Time consumed per average order</u> ^{2/} <u>Minutes</u>
1. Unload basket ^{3/}	0.0717
2. Pull presorter forward; push presorter back	.0275
3. Sort after using presorter (usually larger orders)	.0809
4. Sort items as/or after placed on counter (usually smaller orders)	.0299
5. Ring up order	.4173
6. Subtotal, add tax, and total order	.0740
7. Take money from customer	.0786
8. Make change; give to customer	.1592
9. Obtain and position bag	.0925
10. Bag items	.4630
11. Sum of irregular elements ^{4/}	.1400
Total man-minutes per order	1.6346
Fatigue and personal allowance (15%)	1.15
Standard in man-minutes per order	1.8798

^{1/} For detailed description of elements, see Appendix, page 31.

^{2/} For details of standard, see table 4 in Appendix.

^{3/} When customers would not unload their baskets as requested, it was necessary for the cashier to perform this part of the operation.

^{4/} For detailed description, see Appendix, page 35.

The handling of each item three separate times (as sorted, rung-up, and bagged) was time-consuming and fatiguing. The production per man-hour, based on 14.29 ring-up items per average order, was found to be 31.9 orders, and the labor cost in cents per order 3.1.

Some Correlations were Found to Exist

Some elements occurred more frequently and others occurred less frequently as the size of the average order increased. For example, as the size of the average order increased, it was necessary for the cashier to: (1) Sort more orders that had been unloaded by the customer to the presorting area of the counter (element No. 3; ^{4/} and (2) sort fewer orders that were unloaded by the customer onto the

^{4/} The relationship between size of average order and *sort after using presorter* was positive and appeared to be linear. (See Appendix, fig. 23 $r = 0.87$; $r^2 = 0.76$.)

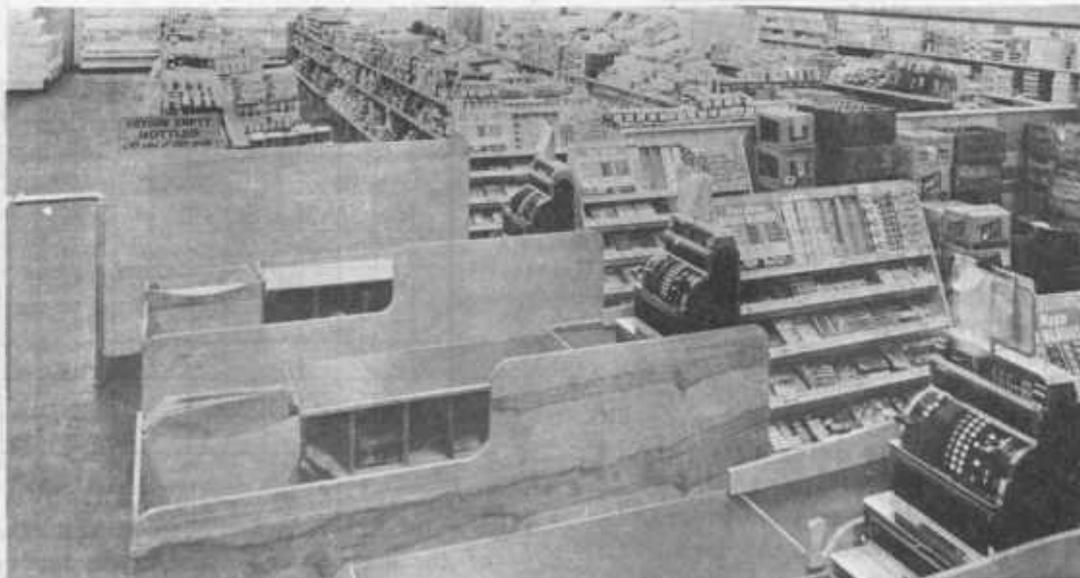


Figure 2.--The conventional check-out counter.

counter opposite the cashier's position (element No. 4). ^{5/} The curve showing the relationship between size of the average order and the number of ring-up items per bag ^{6/} increased at a decreasing rate, reaching a maximum at about 18 ring-up items per average order. This relationship was found to hold true for all types of equipment studied. The *time* required to perform the various elements in the operation was not affected significantly by the size of the average order.

Increase in Size of Average Order Increased Productivity

It was found that small increases in the size of the average order would result in material increases in productivity since there were several elements whose time and frequency of occurrence did not vary with the size of the average order. For example, stores that sold 10 items in the average order could increase production per check-out man-hour by 5.2 percent by selling an additional item to each customer. ^{7/} This productivity increased with each additional item, but at a decreasing rate (fig. 3).

^{5/} The relationship between size of average order and *sort item as/after placed on counter* was negative and appeared to be curvilinear. (See Appendix, fig. 24 $r = 0.64$; $r^2 = 0.41$.)

^{6/} This relationship was positive and appeared to be curvilinear. (See Appendix fig. 25 $r = 0.93$; $r^2 = 0.86$.)

^{7/} See Appendix, table 14.

Adding a Bagger to Conventional
Equipment Increased
Productivity by
52 Percent

Frequently during peak periods an additional person was added to the check-out operation in order to increase equipment productivity and reduce waiting time for customers who were ready to be checked out. This employee took over the bagging operation from the cashier. As a result of the unbalanced work load between the two operators, the bagger had an unavoidable delay (reported as *delay for merchandise from cashier*) which occurred between most orders. This delay was caused by the lack of merchandise coming from the cashier during the period in which she was waiting for the customer to pay for the order, making change and counting it out to the customer, and performing the sorting elements for the succeeding order.

The addition of a bagger to the operation increased production to 48.4 orders per hour.^{8/} The labor cost per order increased from 3.1 to 4.1 cents because of the increase in total man-minutes required per order (fig. 4). This 52 percent increase in production from 31.9 to 48.4 orders per hour contradicted the belief, frequently encountered during the project, that a checker and bagger would produce more than two checkers working alone. The standards for one- and two-man operation on the conventional equipment showed that two average checkers working alone produced 32 percent more than an average checker and bagger working together.^{9/} This is readily understood when it is pointed out that the bagger takes over less than 40 percent of the total operation.^{10/} Therefore, if maximum output and customer service are desired, it is advantageous to add checkers until all units are operated by one person, before adding a bagger to any one unit.

Although the same total percentage of orders was sorted in the two-man operation as in the one-man operation (79.8) the total elemental times for sorting were found to differ slightly. The ring-up time per item was found to be approximately the same and the time to take money from the customer somewhat higher. This *take money from customer* element increased because the cashier could not utilize the

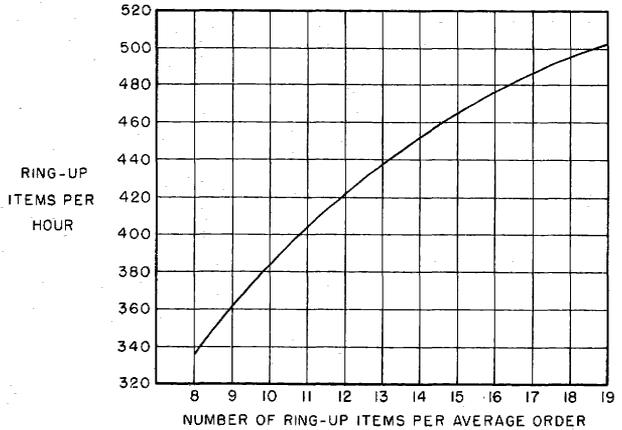


Figure 3.--Relationship between the size of the average order and productivity on the conventional check-out counter (1-man) in the self-service food store.

^{8/} See Appendix, table 5.

^{9/} Based on 14.29 ring-up items per order, production per hour for 2 checkers was 63.8 orders; for checker and bagger, 48.4 orders.

^{10/} Based on the 1-man operation, the bagger takes over the bagging elements 9 and 10 (.5555 minutes) of all regular elements 1-10 (1.4946 minutes). Furthermore, he takes over only a few of the irregular elements. (For breakdown, see page 44.)

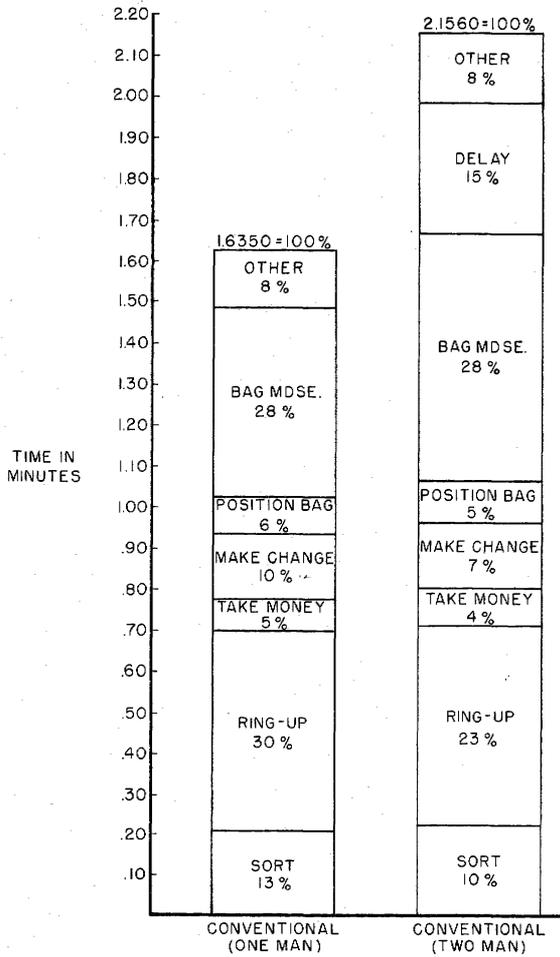


Figure 4.--Comparison of the time required to perform the various functions involved in checking out an order on the conventional check-out counter, in self-service food stores, using one operator and using two operators.

delay in waiting for money from the customer to perform succeeding elements, such as obtain bag and bag merchandise, as she could when working alone. The obtain bag element, when performed by the bagger, required more time than when performed by the cashier because of the differences in position of the two with regard to the location of the empty bags. The bagging time in minutes per item increased by 30 percent only because it included extremely short delays between items as they were rung up by the cashier. The average unavoidable delay of almost one-third of a minute on the part of the bagger occurred for 96 percent of the orders.

As shown in detail on page 45 the sum of the irregular elements increased to .1690 minute per order when the bagger was added to the operation.

No studies were made of the conventional equipment operated by more than two men.

DEVELOPMENT OF THE SIMPLEX UNIT

Analysis of figure 4, along with motion studies of the operation on the conventional equipment, indicated that possibilities for improving the operation lay primarily in revision of the sorting, making change, and bagging elements. The Simplex check-out unit (fig. 5) was designed and constructed. It incorporated the following changes in method and procedure: (1) Sorting of merchandise was eliminated; (2) the ringing and bagging elements were combined into a simultaneous operation; and (3) the making of change was facilitated through the installation of an automatic coin changer. (The name Simplex is used descriptively--it does not constitute a trade mark.)

A Change in the Cash Register Operation Made Possible the Elimination of the Sorting Elements

In order to eliminate the sorting elements it was necessary to alter the departmental keys on the cash register so that each key would revert to the upright position after the ring-up of each item. This was found to be a minor, inexpensive change and was incorporated on registers for each Simplex unit installed. Motion-study analysis of the cash register operation indicated several possibilities for improvement through redesign of the register. One of these, that of motorizing departmental keys to eliminate the necessity of depressing the motor bar for each item rung up, has been accomplished, and registers with this change have been in operation for many months. The motorized departmental keys have resulted in a 4-percent increase in production in the ring-up part of the operation.

One of the objections which arose to the proposal of eliminating the sorting of merchandise at the checkstand was based on the assumption that accuracy would be decreased with respect to the proper allocation of each item to its respective department (grocery, meat, and produce). In actual tests, however, because the cashier had to select the proper departmental key for each item, ring-up accuracy was improved.

Thus it is possible for the sorting of merchandise to be eliminated from the check-out operation in any retail self-service store, regardless of the present type of equipment, by either (1) having the manufacturer's local agency alter the present cash register to allow the departmental keys to revert to the upright position after each item is rung up, or (2) purchasing a cash register whose departmental keys are motorized. It is felt that one of these alternatives is necessary in order to maintain satisfactory accuracy in crediting each item sale to its proper department.

An additional revision in cash register design that is believed advantageous to improved performance is the replacement of the totalizing lever with subtotal and total keys. On present registers it is necessary to move the totalizing lever and depress the motor bar in order to obtain either a subtotal or a total.

The Cash Register Till was Improved

With the use of the automatic coin changer described in a section following, it was found advantageous to divide the cash drawer till into two sections so that



Figure 5. --The Simplex check-out counter.

bills could be located more conveniently in the forward part of the drawer. Where the coin changer was not used, motion studies indicated that coin and bill change should be arranged so as to make for smooth continuous operation. (Fig. 6.)



Figure 6.--The cash register drawer--
Suggested coin and bill arrangement.

Ring-up and Bagging Operations were Combined

The proposal to combine the ringing-up and bagging of items into a simultaneous operation resulted from motion study of the one-man operation on the conventional equipment. It was apparent that the left hand contributed little to productive work during the ringing-up of items, and frequently did no more than hold the bag upright during the bagging operation. It was felt that if the order could be rung up and bagged simultaneously, man-hour production would be increased. The first problem that arose from this proposal was that of keeping the mouth of the bag open and holding the bag in a convenient place while the order was being processed. This was readily accomplished by applying a vacuum through two rubber cups built into the walls of a holding well. A vacuum cleaner pump was connected with the cups by means of rubber tubing, and was turned on and off with a foot switch. A pump installed with each check-out unit was positioned out of sight beneath the counter.

Automatic Coin Changer Improved Accuracy and Increased Production

The automatic coin changer was incorporated into the equipment to simplify the conventional method of making change for the customer and to improve the accuracy of the operation. The method of the conventional equipment consisted of: (1) Counting the change as it was removed from the register till; (2) moving the change to a position for the customer to receive it; and (3) counting the individual coins and bills as they were given to the customer. On the Simplex unit the coin changer was connected by means of a chute to a coin cup located convenient to the customer's normal standing position. This equipment eliminated the need for handling or counting change. Furthermore, it eliminated the mental calculation necessary with the use of the conventional method. The result was an improvement in accuracy in the operation by approximately 10 percent; that is, when the register was cleared in mid-afternoon, the cashier when using the coin changer balanced out 10 percent nearer to the zero optimum.

THE SIMPLEX CHECK-OUT OPERATION

Simplex Unit Produced 44 Orders per Hour

In contrast to the conventional check-out operation where the equipment was designed for customer unloading of the basket, the Simplex unit provided for the delivery of the loaded basket to the cashier. The cashier, upon receipt of the order in the basket, performed the following elements in processing the average order:

<u>Element</u> ^{1/}	<u>Time per average order</u> ^{2/}
	<u>Minutes</u>
1. Position basket ^{3/}	0.0115
2. Obtain and position bag; turn on vacuum	.1048
3. Ring up and bag items	.6059
4. Subtotal, add tax, and total order	.0740
5. Take money from customer	.0786
6. Make change for customer	.1123
7. Remove bag from well; position for customer	.0247
8. Sum of irregular elements	<u>.1655</u>
Total man-minutes per order	1.1773
Fatigue and personal allowance (15%)	<u>1.15</u>
Standard in man-minutes per order	1.3539

^{1/} For detailed description of elements, see Appendix, page 32.

^{2/} For details of standard, see Appendix, table 6.

^{3/} The cashier disposed of the basket after processing the order by moving it through her side of the checkstand to the reserve basket area.

After tests were made, six Simplex units were constructed and installed in one store, replacing six conventional checkstands. After personnel were trained in the use of equipment, extensive time studies were taken to determine man-hour production in order to relate performance to that on the conventional equipment. The same operators were studied on both types of equipment in the same store under similar conditions. The time studies showed that production amounted to 44.3 orders per hour on the Simplex unit as compared with 31.9 orders per hour on the conventional equipment--labor costs per order were 2.3 cents and 3.1 cents respectively. An analysis of the individual elements shows where this gain in production was made. The first four elements on the conventional equipment, giving a weighted total time of .2100 minute to be charged to each order, were replaced by a new element, that of *position basket*, requiring .0115 minute per order. The time for the positioning part of the element *obtain and position bag* was increased because it was necessary for the operator to press each side of the bag to the vacuum cups within the well after the vacuum was applied. The foot switch operation of the vacuum pump allowed this part of the element to be performed simultaneously with the remainder of the element and did not involve an additional time factor.

The ring-up and bagging time for the Simplex equipment totaled .6059 minute per order, while the same elements on the conventional equipment required .8803 minute per order (fig. 7). The use of the coin changer reduced the time required for making change from .1592 to .1123 minute, or 29.5 percent. Positioning the completed order for the customer was a new element in the Simplex unit operation. The time required for this was .0247 minute per order. The increase in the sum of irregular elements for the Simplex unit was caused primarily by the requirement to dispose of a larger percentage of baskets. (See page 40.)

Actual increases in sales per man-hour confirmed the validity of the increase in production as indicated by the time-study standards.

The same type of relationship was found to exist between size of order and productivity as for the conventional equipment (fig. 8 and Appendix, table 15).

Lack of Flexibility was a Definite Disadvantage

Some of the disadvantages of the Simplex unit were as follows:

1. Lack of flexibility of the equipment during peak volume periods. On the conventional equipment an additional employee could be added to the operation to increase production and reduce waiting time on the part of the customer. This was not possible on the Simplex unit as the latter was strictly a one-man operation. Considering the fact that the use of conventional equipment operated by two persons is only 9 percent more productive than the one-man Simplex operation, and at the same time 83 percent more costly in man-hours per order, the difference in total potential capacity may seem to be a minor factor. This is true in stores where extreme volume peaks are not normal. Several such stores were encountered during the course of the study. But in stores where peaks reach substantial proportions, the Simplex unit was found to be not entirely satisfactory owing to this lack of flexibility.

2. Customer reactions. Customer reactions to the Simplex unit, while favorable as a whole, were in some instances unfavorable. No statistical measurement was made of this reaction. The most frequent unfavorable comment was that the operation

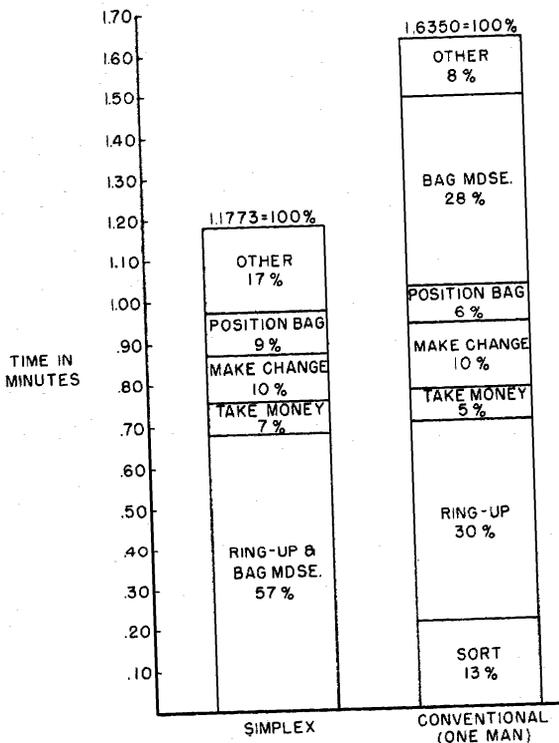


Figure 7.--The Simplex and the conventional (1-man) check-out counters, in the self-service food stores, compared as to the time required to perform each part of the check-out operation and the percentage of each part to the total.

seemed to be slower. This remark was no doubt evoked by the customer when comparing the ring-up operation only on the conventional equipment with that of ringing-up and bagging the items simultaneously. The reaction to the use of the coin changer was almost 100 percent favorable.

3. Limited space for customer exit. Even though customer-exit aisles were made as wide as those in stores having conventional equipment (24 inches), the exit of customers with large orders was sometimes difficult owing to interference by the cash register and coin changer which were located adjacent to the aisle. Store personnel carrying orders to the outside of the building also encountered this interference.

Simplex Equipment Improved Customer Service at a Lower Unit Cost

Some of the advantages ^{11/} of the Simplex unit were as follows:

1. Increased man-hour production at a lower unit cost per order. Man-hour production increased from 31.9 orders to 44.3 orders; the cost of processing the order was reduced from 3.1 cents to 2.3 cents (table 3, Appendix).

2. Improved customer service. As the operators acquired experience, customer service in the store improved. This was true during peak periods despite the fact that the conventional unit operated by two men was 10 percent more productive than the Simplex equipment operated by one man. (A two-man crew for every conventional unit during peak periods was frequently impossible because personnel were not available.)

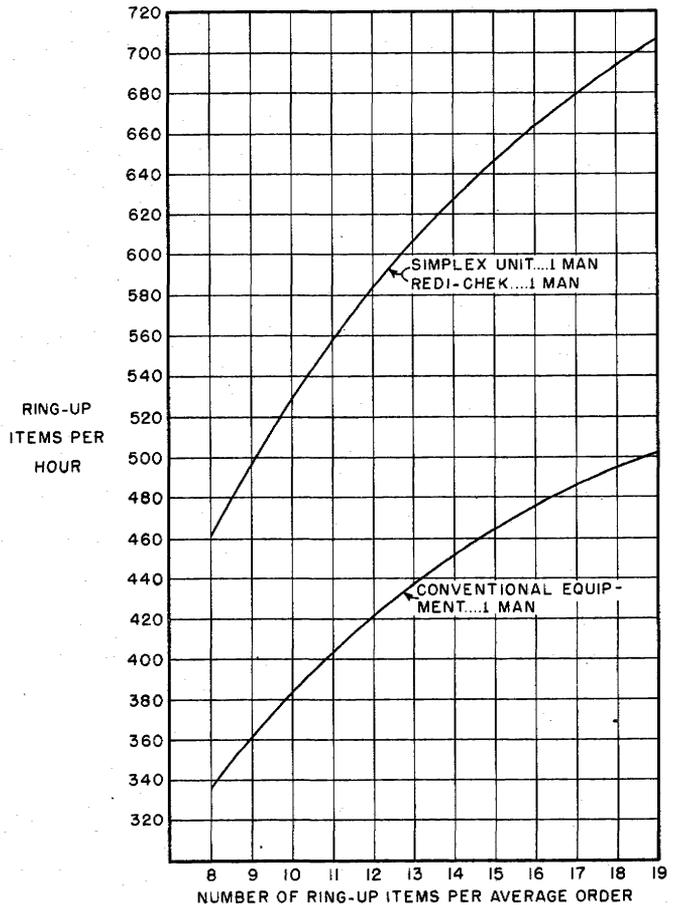


Figure 8.--Relationship between the size of the average order and productivity on the conventional (1-man), the Redi-chek, and the Simplex check-out counters in the self-service food stores.

^{11/} Cost of equipment is considered on page 23.

3. Reduced space requirements. Over-all space requirements were reduced to 64 percent of requirements for the conventional equipment. A comparison of space requirements for all types of equipment is shown in Appendix, table 16.

4. Less operator fatigue. All operators (originally trained on the conventional equipment) indicated increased fatigue for the first few days on which they were being trained on the Simplex unit. This was believed to be caused by two factors: (1) Change of work patterns requiring use of certain body muscles; and (2) an increased number of units handled in a given period. As the operators gained experience they reported the operation on the Simplex unit to be less fatiguing than on the conventional equipment.

DEVELOPMENT OF THE REDI-CHEK UNIT

In order to overcome the disadvantages which arose with the use of the Simplex unit, steps were taken to redesign the equipment. Foremost consideration was given to maintaining the principles involved in the operation of the Simplex unit.

The Redi-chek check-out unit, figure 9, was the result of this redesign. (The name "Redi-chek" is used descriptively--it does not constitute a trade mark.) More like the conventional unit in appearance, the Redi-chek equipment was designed to obtain maximum man-hour production by use of one, two, or three persons. In developing the equipment design a means was found to maintain an open-mouth position of the bag without the use of a vacuum. Since the counter level of the Redi-chek unit was raised to 33 inches from 24 inches on the Simplex unit, it was possible to raise the wall height on the bagging well by 7 inches. It was found that the 60-pound bag, used for more than 90 percent of the orders that were simultaneously rung up and bagged, could be maintained in an open-mouth position if the well were properly constructed as to depth and width. Other sizes of bags used in the operation, all smaller than 60-pound capacity, were not so adaptable to the Redi-chek equipment as to the Simplex unit. The vacuum was used on the latter to maintain an open mouth on the bag, but no such means was made available in the Redi-chek unit. For this reason it was found advisable frequently to perform the ringing up and bagging of small orders (usually 1 to 5 items) as separate operations.

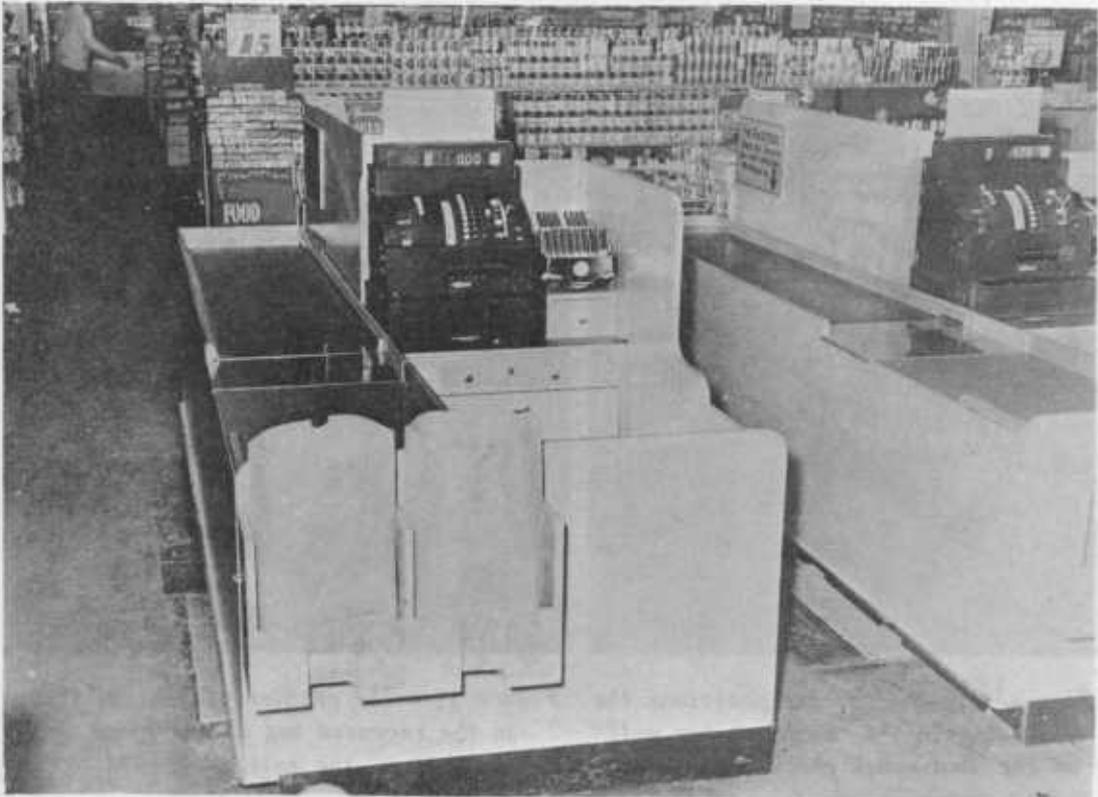


Figure 9.--The Redi-chek check-out counter.



Figure 10.--The cashier can ring-up and bag items while the customer unloads the order on the conveyer belt.



Figure 11.--The cashier positions the 60-lb. bag in the "cashier's bag well" on the Redi-check check-out counter.



Figure 12.--The cashier places the items in the recessed bag as she rings up the sale.



Figure 13.--The cashier makes change, using the automatic coin changer.



Figure 14.--Removing the filled bag from well on the Redi-chek check-out counter.

The construction of the well herein described made necessary the manual lifting of the filled bag from the well to the counter by the cashier. It was felt that this might lead to excessive fatigue over long periods of continuous operation. Therefore two units were constructed which contained a hydraulic lift beneath the floor of the well. The operator raised and lowered the well floor by means of a switch provided for the purpose. Studies of these units showed two significant factors: (1) The time required to remove the bag from the well manually was .0498 minute, while the time required to remove it by use of the lift was .1049 minute; and (2) cashiers preferred for most orders to remove the filled bag manually in spite of the fatigue factor, which they regarded as minor in relation to the over-all operation. Furthermore, the cost of incorporating the lift into the equipment (amounting to approximately \$300 per unit when produced in large quantities) was felt to make it prohibitive.

The type of coin changer used on the Redi-chek unit differed from the one used on the Simplex unit in that coin change was transported manually by the cashier from the changer to the customer. The coin changer was positioned to the right of the cash register, and it was found impractical to extend a coin chute and cup several feet to the customer's normal standing position.

Further change from the Simplex unit involved the addition of a belt conveyor to transport merchandise from the point of deposit by the customer to the cashier's

position. (With the Redi-check unit the customer unloaded his order from the basket to the presorting area, as with the conventional unit.) This belt, running at a speed of 60 feet per minute and operated by a 1/4 h.p. motor, was activated by the cashier by means of a foot pedal.

The conveyor belt brought about a considerable advantage over the conventional equipment. Since sorting of the order was eliminated, there was no longer any necessity for assisting the customer in unloading. On the conventional equipment, the complete order had to be on the counter available to the cashier before she could sort the items and begin the ring-up operation. With the Redi-check unit, items could be brought to the cashier's position and rung up immediately, so that the ring-up and unloading operations frequently were performed simultaneously. (See fig. 10, p. 16.) It was noticeable that customers no longer demanded assistance in unloading the order to the presorting area. Customers were still requested to place individual items so that the prices were up to facilitate the checking operation.

The Redi-check equipment differed from other types of equipment studied in the facilities provided for the bagger. For the types of check-out equipment observed in use, other than the Simplex and Redi-check units herein described, no provision was made for the *efficient* bagging of merchandise; the bagger had to use one hand to hold the mouth of the bag open during the bagging operation. The bagging wells provided for the bagger on the Redi-check unit made possible movement of merchandise from the counter to the container(s) with both hands. The width and depth dimensions for the bagger wells were the same as for the well used by the cashier when working alone. The bag was maintained in an open-mouth position by the pressure of the sides of the bag on the walls of the well. Two wells were installed instead of one so that the bagger could: (1) Use idle time (available when change was being made for a customer) to position bags for a succeeding order that required more than one bag; and (2) bag a large order into two bags simultaneously. A removable aluminum cover for the cashier's well was provided for use when a bagger was added to the operation. The well cover when used provided a continuous surface from the discharge end of the conveyor to the bagger's position. When the equipment was operated by two or three persons the cashier moved the items with her left hand across the well cover to the bagger's position as the items were rung up with the right hand.

A bag rack was installed about 5 feet to the rear of each check-out stand, for use by the bagger in the two-man or three-man operation, as a disposal point for completed orders. The customer picked up the order on the way out of the store. This rack held five full 60-pound bags at any one time. The objective of the bag rack was to eliminate delay on the part of the bagger as he waited for the customer to pick up the completed order.

THE REDI-CHEK CHECK-OUT OPERATION

Single-Operator Performance on the Redi-Chek was the same as
on Simplex Unit

Four Redi-chek checkstands were installed in one store, replacing six Simplex units. The operators time studied were the same as those studied on the conventional and Simplex units. The cashier performed the following elements in processing an average order:

<u>Element</u> ^{1/}	<u>Time per average order</u> ^{2/}
	<u>Minutes</u>
1. Obtain and position bag (fig. 11)	0.1156
2. Ring up and bag items (14.29 ring-up items at .0415 minutes per item) (fig. 12)	.5930
3. Subtotal, add tax, and total order	.0740
4. Take money from customer	.0786
5. Make change and give to customer (fig. 13)	.1365
6. Remove bag from well; position for customer (fig. 14)	.0366
7. Sum of irregular elements	<u>.1457</u>
Total man-minutes per order	1.1800
Fatigue and personal allowance (15%)	<u>1.15</u>
Standard in man-minutes per order	1.3570

^{1/} For detailed description of elements, see Appendix, page 33.

^{2/} For details of standards, see Appendix, table 7.

Production per man-hour for the one-man operation on the Redi-chek unit amounted to 44.2 orders, and labor cost per order 2.3 cents, the same as on the Simplex unit. There were differences in some of the elements, and in the elemental times. The time necessary to *obtain and position bag* was slightly increased because of a difference in the location of empty bags. In using the Redi-chek unit the item of ring-up and bagging time was reduced from .0424 minute to .0415 minute because the individual items frequently were well spread out, thus facilitating the selection of items in the desired sequence. The manual handling of coin change increased the time required to *make change and give to customer* from .1123 minute to .1365 minute; the latter still compared favorably with the .1592 minute required for performance of the element without the use of the coin changer. This difference in time requirement was particularly significant in the two-, or three-man operation, as any savings in the cashier's time resulted in a saving of a like amount of time for each of the other operators. ^{12/}

^{12/} Because of the comparatively small savings in minutes per order realized through the use of the automatic coin changer on the Redi-chek check-out unit, it is believed advisable to use the changer only on those units in the store which are most frequently operated.

Adding a Bagger to the Redi-Chek
Increased Production to 61 Orders per Hour

During peak periods of volume the Redi-chek unit could be operated by two or three persons. When this occurred, the cashier's well was covered by a flat aluminum well cover, making a continuous surface from the discharge end of the conveyor to the foot of the checkstand counter. When the equipment was operated by two persons the second person (bagger) obtained and positioned the bag(s) in the well(s) provided for him. He bagged the items with both hands as the items were received from the cashier (fig. 15) and disposed of the completed order to the bag rack (fig. 16). He used a part of the idle time occurring when the cashier was taking money and making change to obtain and position the bag(s) for the succeeding



Figure 15.--A bagger is added to the Redi-chek check-out counter to increase production during rush hours.



Figure 16.--The bagger places the filled bag on an order rack. The customer or carry-out clerk will take it from the rack.

customer and to dispose of baskarts. Since the cashier's share of the total operation was greater than that of the bagger, the latter frequently had an unavoidable delay while waiting for merchandise. The cashier rang up the items, computed the order total, and took the money from and made change for the customer. The cashier selected items from the order in the same manner as when working alone, those items most suitable for the lower part of the bag being processed first. Individual items were moved by the cashier with her left hand from the discharge end of the conveyor across the well cover to foot of the counter in much the same manner as when operating with the conventional equipment. The two-man operation on the Redi-chek unit increased production of the unit to 61.2 orders per hour. Labor cost per order increased from 2.3 to 3.3 cents.

In comparing the time study standard ^{13/} with that developed for the two-man operation on the conventional equipment it was noticed that the ring-up time per item had decreased from .0291 to .0287. This reduction reflects the use of the motorized departmental keys. The standard for two-man operation of the Redi-chek unit showed a considerable increase in the time required to take money from the customer over that for any of the standards developed heretofore. This was caused by two factors: (1) The customer had less time to get her money ready for payment, as she had to unload her basket and place the items on the conveyor--at the same time her order was being processed more rapidly (frequently simultaneously with the unloading) than with the other types of equipment; and (2) the cashier had little opportunity to utilize delay time while waiting for the customer to pay for the order.

The total time for *obtain and position bag* was slightly higher for the bagger than for the cashier operating alone on the Redi-chek unit, as the bag supply was more conveniently located for the latter than for the former. ^{14/} The bagging time per item was reduced from .0422 minute on the conventional two-man operation to .0311 minute because both hands were used. The bagging wells eliminated the necessity for holding the bag with one hand while the other put the items into the bag.

As mentioned previously, because of the lack of a balance of work loads between the cashier and the bagger, there remained an element of unavoidable delay for the latter in waiting for merchandise from the cashier.

It was significant that the production per hour for the two-man operation on the Redi-chek unit was 38.5 percent higher than the one-man operation on the same equipment, and 26.4 percent higher than the two-man operation on the conventional unit.

Adding an Expediter Increased Production to 67 Orders per Hour

The addition of a third man to the Redi-chek equipment was sometimes necessary during peak periods to further increase equipment productivity and thus improve customer service. The third man (called the expeditor) took over the job of unloading the basket from the customer (fig. 17). He selected items from the basket on the basis of the type of merchandise that would be bagged first. He placed the items from 4 to 8 inches apart, price up, on the cashier side of the conveyor for convenient processing by the cashier. An aluminum dead plate was attached over the feed end of the conveyor; this dead plate was used as a holding area by the expeditor for fragile and combination priced items until all other items in the order were placed on the conveyor for processing. Owing to the lack of balanced work loads the expeditor had unavoidable delay time (*delay for cashier to ring items*) between each order.

^{13/} See Appendix, table 8.

^{14/} A further improvement in the Redi-chek unit is being developed which provides a separate bag supply for use by the bagger which should reduce the total elemental time for this part of the operation to about .0900 minute.



Figure 17.--An expediter is added to the Redi-chek check-out counter to speed up customer service.

By adding the expediter to the two-man operation on the Redi-chek, production was increased from 61.2 orders per hour to 67.5 orders per hour, ^{15/} an increase of 10 percent; at the same time labor cost per order increased from 3.3 cents to 4.5 cents, an increase of 36.4 percent.

The ring-up time per item was .0274 minute, as compared with .0287 minute for the two-man operation of the Redi-chek. This improvement was brought about by eliminating the necessity for the cashier to (1) select the items in the desired order and (2) turn prices up whenever necessary--these operations being performed by the expediter.

The time for take money from customer was .0712 minute as compared with .1307 minute when the equipment was operated by two men and .0786 when operated by one

^{15/} See Appendix, table 9.

man. With the addition of the expediter, the customer no longer had a part to perform in the processing of the order (she had to unload the basket when no expediter was used) and therefore more frequently had her money ready when the total of the order had been announced by the cashier.

The bagging time per item was reduced to .0292 minute through the reduction of the number of slight delays--delays which occurred during the bagging operation whenever a two- or three-man crew was used.

Unavoidable delays occurred for both the bagger (*delay for merchandise from cashier*) and the expediter (*delay for cashier to ring-up items*). Both were caused by unbalanced loads in the operation.

The Redi-Chek had Some Disadvantages

The two disadvantages encountered in using the Redi-chek were:

1. Cost of equipment. The cost of the Redi-chek unit amounted to \$634 excluding the automatic coin changer (\$278). These figures can be compared with \$350 for the conventional equipment, or with \$200 (approximately) for the Simplex equipment, excluding the automatic coin changer (\$278).

2. Training of personnel. Several days were needed to train personnel *properly* in (a) the simultaneous ring up and bagging of items so that the principles of good bagging of merchandise could be maintained and (b) the operation of the automatic coin changer in order to obtain accuracy in the change-making operation.

Advantages of the Redi-Chek were Significant

The main advantages of the Redi-chek were:

1. Production. Man-hour and over-all production was the highest of any type of equipment studied. (See Appendix, table 3.)

2. Space utilization. Fewer checkstands were needed to process a given volume, which permitted maximum utilization of floor space.

3. Customer service. Customers were processed faster for all periods during the week, whether it was a one-man operation during slack periods, or a two- or three-man operation during peak periods.

4. Customer and store personnel reaction. Reaction from customers, management, and store personnel was very favorable.

The Redi-Chek was Adapted to Produce Weighing at The Check-Out Operation

A scale was incorporated into the Redi-chek for use in those stores where some or all of the produce was weighed at the check-out operation. This unit was so constructed that the scale could be used by the cashier when working alone (fig. 18),

or by the expediter when a three-man crew was employed (fig. 19). In the store where this equipment was installed 7.4 percent of all purchased items required weighing at the checkstand. The number of unit produce sales per 14.29 ring-up items per order requiring weighing amounted to 1.057. The elemental time per unit weighed, amounted to .0412 minute, giving a time per order for *weigh produce* of .0435. These basic elemental times could be used to convert any of the standards herein discussed, to a store where produce weighing is necessary at the check-out operation. For example, to obtain performance for the one-man operation on the Redi-chek, .0435 minute would be added to 1.1800 to obtain the total man-minutes per order. The sum of these, 1.2235, plus the 15 percent for fatigue and personal allowance would give a standard performance in man-minutes of 1.4070. This figure divided by 60 would give the standard in man-hours per order, and divided into 60 would give orders per hour.



Figure 18.--A modification of the Redi-chek which permits produce weighing at the check-out counter.



Figure 19.--Produce weighing by the expediter on the Redi-chek check-out counter.

The production and cost figures on the Redi-chek represents average performance for a trained operator. To achieve this level of performance management must first train check-out personnel in the proper use of the equipment. To maintain this performance management should provide for periodic check-ups.

THE CONTINUOUS BELT CONVEYOR UNIT

Its Objective was to Improve Customer Service

Studies were made on a comparatively new type of check-out equipment, called the Continuous Belt Conveyor unit (fig. 20). The equipment was designed to give maximum production and customer service during peak volume periods. Under these conditions it was most effectively operated by a four-man team. Studies on the equipment were limited to the four-man operation.

The check-out counter was much the same as the conventional unit, except that the entire counter surface was covered by a continuous 18-inch belt conveyor. The operation was performed in a manner similar to that of the three-man operation on the Redi-chek. ^{16/}

The four-man team consisted of the cashier, two baggers, and an expeditor. The cashier rang up the items, computed the tax and total of the order, and took money from and made change for the customer. The two baggers bagged the order and placed the filled bags on the order rack. The

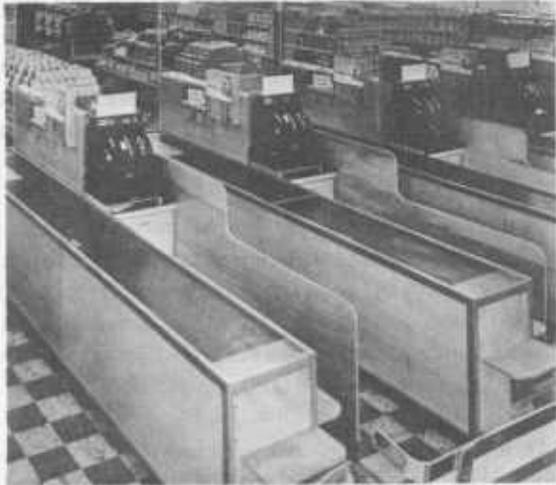


Figure 20.--The continuous belt conveyor check-out counter.

expediter unloaded the basket and sorted and placed the items, price up, on the cashier side of the conveyor by departmental group. A sorting dead plate was provided for the expediter as in the three-man operation of the Redi-chek. Small cardboard order separators, conveniently located, were provided for use by the expediter. The expediter placed one of the order separators on the conveyor after the last item of each order. It signified to the cashier and to the baggers the end of one order and the beginning of the next order. The separator was removed from the conveyor by one of the baggers and stored temporarily in a slot provided in the equipment. When 15 to 20 of the separators were accumulated by the baggers, they were handed to the cashier, who in turn handed them to the expediter for re-use.

The cashier rang up the items by department group. Departmental keys on the cash register were not motorized. The conveyor, operated with a foot switch by the cashier, carried the merchandise from the expediter to the baggers, the merchandise seldom being handled physically by the cashier.

The baggers usually worked together on the same order. The equipment included a small platform on which the bags rested during the bagging operation. The mouth of

^{16/} The Continuous Belt Conveyor unit was studied at the time the Redi-chek was being designed. Several features of the former were incorporated into the latter.

the bag was held open by the bagger with one hand as the other hand bagged the merchandise. One bagger could not handle the load alone when successively large orders were being processed because (1) items were received on the conveyor by departmental group and the accumulation of fragile items tended to congest the bagging area, and (2) bagging with both hands simultaneously was not possible. This is not to say that the equipment could not be operated by a three-man crew; but the use of only one bagger would cause considerable delay on the part of the cashier and the expediter and thereby decrease over-all production in orders per hour.

Four-man Operation was Productive but Costly

Time studies were made on the four-man operation of the continuous belt conveyor unit. Production amounted to 62 orders per hour ^{17/} as compared with 67.5 for the three-man operation of the Redi-chek. Labor costs per order on the 2 were 6.4 cents and 4.5 cents respectively.

Analysis of some of the elemental times ^{18/} explained differences in over-all and man-hour production. The increase in ring-up time on the continuous belt conveyor unit was caused by the inability of the expediter to sort items by department, turn prices up, and feed items onto the conveyor as fast as the cashier could check them. On the Redi-chek the expediter did not sort the items by departmental groups as the register keys were motorized.

Order separators, accounting for a total of .0991 minute per order, were not incorporated in the Redi-chek unit; the expediter used a 2- to 3-foot space on the conveyor to indicate the completion of one order and the beginning of the next order.

The bagging time per item was high for the continuous belt conveyor unit because, as stated before, the merchandise was received by departmental breakdown, and the equipment did not permit simultaneous bagging with both hands.

Delays on the part of each operator were caused by unbalanced work loads for four men on the equipment.

^{17/} See Appendix, table 10.

^{18/} No explanation has been found for the increase in the element *take money from customer*. It may have been caused by a difference in customer habits, as the continuous belt conveyor unit was studied in a different geographical area than the other types of equipment.

THE DISC-TYPE CHECK-OUT OPERATION

The Disc-type checkstand (fig. 21) represents another approach to improved equipment performance, better customer service, and lower unit cost. Its design substituted a revolving disc for the presorter on the conventional equipment as a means of moving the merchandise to the cashier. The equipment was operated by one, two, or three men. In the one- and two-man operations the customer unloaded the basket, placing the items on the disc. The cashier operated the disc by either a foot or hip switch and moved the items to the rear of the stand simultaneously with the ring-up operation. When the third man (the expeditor) was added, he assumed the unloading function and placed the items price up on the disc. He used a 12-inch rubber stick to separate successive orders on the disc.



Figure 21.--One-man operation on the disc-type check-out counter.

Departmental sorting was usually eliminated on the disc-type unit. The cash register of conventional design or one with motorized departmental keys may be used on the equipment.^{19/} The equipment did not provide for simultaneous ringing and bagging, nor did it provide bagging wells to maintain bags in an open-mouth position (for bagging with both hands simultaneously by the bagger in the two- or three-man operation).

Operation of the equipment was very similar to that on the conventional unit, differing only in that the unloading (that part performed by the cashier) and sorting elements were eliminated. The unloading function as performed by the cashier was eliminated because, as on the Reqi-chek unit, the operator began ringing-up the

^{19/} Studies were made on units where motorized departmental keys were used.

order as soon as the initial items were unloaded by the customer. ^{20/} After the order was rung up, money was taken from the customer, change was made (no coin changer was used), and the order was bagged.

The production on the Disc-type equipment operated by one man was 35.5 orders per hour. ^{21/} This was 11 percent more productive than the conventional equipment (one-man) and 25 percent less productive than the Simplex unit or the Redi-chek unit (one-man).

The delay for disc element occurred when the operator waited for merchandise to move from the point at which unloaded by the customer to the position of the cashier. The other elemental times approximated those for similar elements on the conventional equipment. An insufficient number of studies was made on the Disc-type unit to obtain a reliable sample for all irregular elements involved. The sum of the irregular elements used for the conventional equipment was applied to the one-man standard on the Disc-type unit; ^{22/} an analysis of these elements (Appendix, tables 1 and 2), show that they apply to the operation of the Disc-type equipment as well as to the conventional equipment.

Several studies were made of the two-man team (fig. 22) and the three-man team operating the Disc-type check-out unit. ^{23/} With the exception of disc delay and the bagging and change-making operations, the procedures and elemental times were similar to those for the two- and three-man operation of the Redi-chek. Production on the two-man operation was 57.8 orders per hour (at 3.5 cents per order); production on the three-man operation amounted to 60.3 orders per hour (at 5.0 cents per order).



Figure 22.--Two-man operation on the Disc-type check-out counter.

^{20/} The number of customers who refused to unload their baskets onto the revolving disc (or on the Redi-chek) has been found to be negligible.

^{21/} See Appendix, table 11.

^{22/} Irregular elements for the two-man conventional equipment were used for the two-man Disc-type unit standard; irregular elements for the three-man Disc-type unit were taken, for the most part, from the three-man Redi-chek operation.

^{23/} See Appendix, tables 12 and 13.

PRESENT TYPES OF EQUIPMENT CAN BE IMPROVED AT SMALL EXPENSE

A change in equipment to the Simplex or Redi-chek is not necessary in order to obtain improved performance in most retail food stores. Most other types of equipment now in use can be altered to: (1) Eliminate the sorting elements (with a minor change in present cash registers or the use of registers with motorized departmental keys); and (2) improve the bagging operation (by adding to present equipment bagging wells which maintain an open-mouth position of the bag). Several types of equipment now in use, such as the Disc-type unit, can easily incorporate the cashier's bagging well to make possible simultaneous ringing and bagging of merchandise during periods when the equipment is operated by a single person.

Patents have been applied for on the Simplex and Redi-chek units. These have been dedicated to the public and will be made available on a free-use basis. For details of the design of these units, write to:

Marketing and Facilities Research Branch
Production and Marketing Administration
U. S. Department of Agriculture
Washington 25, D. C.

APPENDIX

Description of Regular Elements

Conventional Check-out Operation

1. Unload basket. Signs requested the customer to sort his merchandise on the presorting area by department (grocery, meat, or produce), and to turn the price of the items up to facilitate the checking of the order by the operator. Some customers refused to move merchandise from their basket to the presorting area on the counter. This made it necessary occasionally for the cashier to walk to the basket location and perform this part of the operation. The cashier sorted the items into departmental groups as she placed them on the counter. The percentage of the customers who would not unload their baskets varied with different areas within the United States.

2. Pull presorter forward; push back. The cashier moved the merchandise to a location on the counter opposite her position by pulling the presorter (a three-sided wooden frame) forward. This element occurred only for those orders which were placed in the presorting area by the customer.

3. Sort after using presorter. The cashier had to sort the merchandise at this point because customers usually failed to sort items into departmental groups and seldom turned item prices up as requested.

4. Sort items as/after placed on counter. The customer often placed the merchandise on the counter adjacent to the cashier's position. This made it unnecessary to use the presorter and the cashier sorted the items as they were placed on the counter unless she had not completed the transaction with the previous customer. Of all orders, 79.8 percent required some sorting--the small (1 to 5 item orders) often permitted selection of items by the cashier in the desired order.

5. Ring up order. The cashier rang up each item with her right hand and simultaneously moved the item toward the foot of the checkstand with her left hand, thus segregating the merchandise that had been checked from that which had not. She called out the price of each item as it was handled. The number of ring-up items was generally less than the number of actual items in the order, because of the combination prices of various commodities. Company-pricing policy determined this relationship, but for comparative purposes the figure of 1.126 actual items to each ring-up item was used.

6. Subtotal, add tax, and total order. In States where there was a general sales tax on all store commodities, it was necessary to compute the tax mentally, or determine it from a chart, and add it to the subtotal in order to obtain the total price of the merchandise. As soon as the order was totaled, the cashier announced to the customer the amount due.

7. Take money from customer. Customers seldom had their money ready for payment when the total was announced by the cashier. Whenever possible the cashier utilized this unavoidable delay time to perform some of the elements that were to follow in the bagging operation. The *take money* element began when the total of the order

appeared on the register (if no succeeding elements were performed) and ended when the bill was placed on the ledge above the cash register till; if succeeding elements were performed, the element began when the cashier held out her hand to receive the money from the customer.

8. Make change and give to customer. After the money was received by the cashier, the cash till was opened, the tape record of the sale torn off and placed with the order, and the coin and bill change counted as it was removed from the drawer. The coin and bill change was again counted as it was given to the customer. The customer's bill was then removed from the register ledge, placed in the proper till slot, and the drawer closed. This signified the end of the element. Occasionally, the customer gave the cashier the correct change. When this occurred, the element was limited to opening the drawer, placing the money in the register, and closing the drawer.

9. Obtain and position bag. The bag was removed from its storage area located beneath the counter, opened, and positioned on the counter for the bagging operation. When a box was used it was usually obtained from a position outside the equipment, frequently from a storage point located some distance from the check-out stand. Some customers preferred boxes, and the extent to which this element occurred was included in each standard under *sum of irregular elements*.

10. Bag items. The first one or two items were placed in the container with the container in a horizontal position. Thereafter the bag stood upright on the counter and the mouth of the bag was held open with the left hand while the right hand placed the individual items in the bag.

11. Delay for merchandise from cashier. When a bagger was added to the operation a delay occurred between most orders. This unavoidable delay was caused by the lack of merchandise coming from the cashier during the period in which she was waiting for the customer to pay for the order, making change and counting it out to the customer, and performing the sorting elements for the succeeding order.

Simplex Check-Out Operation

1. Position baskart. Frequently it was necessary to position the baskart before proceeding to the remainder of the operation; this involved moving the baskart from the point at which it was left by the customer to a position adjacent to the cashier's standing position. ^{24/}

^{24/} As is indicated by the standard (Appendix, table 6) the positioning of the baskart is shown as occurring for only 24.5 percent of the orders. Actually, this element occurred more frequently, but was sometimes performed simultaneously with that of obtaining the bag from the empty bag holder. When this combination of elements occurred, only the limiting element, that of obtaining the bag, was timed. The same situation existed with respect to the frequency of occurrence of the seventh element, that of removing the filled bag from the well and positioning it for the customer. The limiting element here (listed under regular elements) was subtotaling the order.

2. Obtain and position bag; turn on vacuum. The cashier either simultaneously with or after having performed the foregoing element obtained a bag from the reserve bag recess. The bag was positioned in the bag well and the vacuum turned on by means of the foot switch.

3. Ring up and bag items. The cashier selected an item from those visible in the baskart, picked it up with her left hand, read the price, and rang up the item sale on the register with her right hand as the item was lowered into the bag with her left hand. Thus, when the order was completely rung up, it was also bagged. Successive items were selected for processing, not by departmental type, but by the type of merchandise to be placed in the bottom, middle, or top parts of the bag. It was found that for the average order of 20 items or less the merchandise could be selected as desired--fragile merchandise and combination-priced items were left in the baskart for processing last. For extremely large orders, however, where fragile merchandise covered the remainder of the order in the baskart, it was sometimes necessary to ring up and set aside such merchandise for rehandling at the conclusion of the ring-up operation.

4. Subtotal, add tax, and total order. This element was identical to that described in the operation of the conventional check-out equipment.

5. Take money from customer. The time necessary to perform this element was also the same as in the conventional check-out operation. The cashier used unavoidable delay time caused by waiting for money from the customer to pre-position a container for the next customer and/or to dispose of the baskart.

6. Make change for customer. Coin change was made by depressing the appropriate one of the 99 keys on the changer keyboard that corresponded to the last two digits in the total sale price of the order. The design of the changer made any mental calculation unnecessary. For example, change for a 71-cent sale out of a dollar was made by depressing the 71-cent key. The coin changer also had provisions for automatic change-making from 25, 50, or 75 cents.

7. Remove bag from well; position for customer. It was frequently necessary to move the filled bag from the well and position it for the customer, particularly when more than one bag was necessary for one order.

8. Sum of irregular elements. (For details, see page 47.)

The Redi- chek Check-out Operation

1. Obtain and position bag (fig. 11). The operator obtained the bag with her left hand and transferred the lip of the bag to her right hand. Holding one lip of the bag between the thumb and forefinger of her right hand, she inserted the left hand and arm into the bag, opening the bag as it was lowered into the well. The number of bags per order (that is, the frequency of occurrence of the element) was the same as with other types of equipment studied in the project.

2. Ring up and bag items (fig. 10). The operator rang up and bagged items simultaneously, as on the Simplex unit. This operation frequently began before the customer had completely unloaded the order from the baskart (fig. 10).

3. Subtotal, add tax, and total order. (See page 31, item 6.)

4. Take money from customer. The time necessary for the performance of this element was frequently dependent, as with the conventional and Simplex equipment, on the ability of the cashier to utilize waiting time for the performance of succeeding elements. This waiting time for the customer to pay the bill was used to remove the filled bag from the well and position an empty bag for the order of the succeeding customer.

5. Make change and give to customer. As shown in figure 13, the cashier obtained the coin change from the coin changer, removed the necessary bill change from the register till, and handed both to the customer. Bill change was counted out to the customer but coin change was not.

6. Remove bag from well; position for customer (fig. 14). This part of the operation was performed by grasping both sides of the bag with the two hands and lifting it manually to the counter for convenient pick-up by the customer. ^{25/} When a bagger was added, the bag was disposed to the order rack. ^{26/}

7. Dispose filled bag to order rack (2-man and 3-man operation of Redi-check). When a bagger is added to the equipment, he placed the items in bag(s) which are positioned in one or both bagging wells at the end of the counter. When the bag is full he places it on the order rack. Either the customer or the carry-out clerk will take the order from the rack.

8. Delay for merchandise from cashier (2-man and 3-man operation of the Redi-check). Since the cashier's share of the total operation was greater than that of the bagger, the latter frequently had an unavoidable delay while waiting for merchandise. He used part of the idle time to obtain and position bags for the succeeding customer and to dispose of baskarts.

^{25/} The element *remove bag from well; position for customer*, while not materially different from the Simplex in total elemental time, was considerably different in the frequency with which the element occurred. In the Redi-check unit, comparatively small orders were frequently removed from the well with the left hand as the total was being computed on the register. When this occurred, the limiting element (to compute the total) was measured; the other element was not measured. Furthermore, small orders were rung up and bagged separately on the Redi-check more frequently than on the Simplex unit, where vacuum cups permitted use of the well on smaller bags.

^{26/} The production standard indicated that more bags were disposed to the order rack (1.294 per order) than the number of bags needed per order (1.145). This was caused by several commodities which frequently were not bagged at the checkstand. Examples were 10-pound or larger units of prepackaged potatoes, oranges, and apples, 25-pounds or larger units of flour and sugar, cartons of soft drinks, and gallon containers of various commodities, each of which was disposed individually by the bagger to the order rack.

9. Place items on the conveyor (3-man operation of the Redi-check). When an expditer was added to the operation this was his chief function. He removed the items from the basket and placed them on the conveyor belt, prices showing and between 4 to 6 inches apart. Items were removed in the same sequence as they were to be placed in the bag--heavy items on the bottom and fragile items on top.

10. Delay for cashier to ring items (3-man operation of the Redi-check). Because the work loads are not balanced the expditer has an unavoidable delay between each order. While the cashier is making change for the customer he is idle.

11. Sum of irregular elements. (See page 49.)

Description of Irregular Elements

An irregular element was one of the necessary parts of each operation not normally associated with the performance of each cycle. The weighted time for all irregular elements that applied to a given standard was included in the standard in the form of *sum of irregular elements*.

Irregular elements were classified into two types, "A" and "B". A type "A" irregular element had the same total elemental time and variable percent regardless of the type of equipment used or the number of personnel operating on the equipment. A type "B" irregular element was one whose total elemental time and/or variable percent varied with the type of equipment used and/or the number of personnel operating the equipment.

The total elemental time was that time required to perform the element whenever it occurred. The variable percent represented the frequency of occurrence of the element. The weighted elemental time was computed by multiplying the total elemental time by the variable percent, and represented the time allotted to each order for the element. The standard in orders per man-hour was the expected performance of the average operator working under normal conditions.

Type "A" Irregular Elements

1. Check price of item. This element consisted of asking another store employee (or manager) the price of an unmarked item.

2. Check register tape roll. The tape roll inside of the cash register was inspected infrequently to determine whether it needed replacement.

3. Correct customer's tape. When ring-up errors were detected it was sometimes necessary to make pencil corrections on the customer's tape and the cashier's error sheet.

4. Delay for clearing register. In the stores in which the check-out operations were studied, the cash registers were cleared during operating hours each day by the head cashier or store manager. This caused unavoidable delay for the cashier.

5. Discuss shortage (and note credit). Infrequently there was discussion between the customer and the cashier as to the price charged for merchandise, and when an error had occurred the amount was written on the refund slip.

6. Dispose of empty bottles (and make refund). When a customer brought empty bottles to the check-out counter the cashier placed the bottles beneath the counter (and made a refund to the customer unless the customer was purchasing merchandise in a like number of bottles).

7. Dispose of empty bottles to back room. ^{27/} Usually during slack periods the cashier removed the empty bottles from beneath the counter and carried them by hand or in a basket to the back room of the store for storage.

8. Handle customer coupons. Coupons were redeemed at the checkstand and disposed of by the cashier to a tray provided for their storage.

9. Install new register tape. Spare register tape rolls were kept in the checkstand beneath the counter. When the tape in the register ran out, it was replaced by the cashier.

10. Make separate change for customer. Customers sometimes requested separate change for a bill or coin. This was made by the cashier as a separate operation.

11. Make change for other cashier. When bills or coins of a given denomination ran out, the operator would request change from another cashier or from the head cashier. This transaction was included in this element and in element 13 below.

12. Obtain box. ^{27/} When the customer requested that a box be used as a container for the order, the cashier frequently would walk to the back room to obtain one; usually several boxes were brought back and the unneeded ones placed at a nearby reserve position.

13. Obtain change from other cashier or head cashier. (See 11 above.)

14. Process produce. ^{27/} This consisted of cutting the tops off of carrots or other produce and disposing of the unwanted parts to the waste container provided in the checkstand.

15. Rearrange baskarts in reserve area. ^{27/} Occasionally it was necessary for a cashier to rearrange baskarts in the reserve area. This operation constituted a regular part of the set-up and clean-up; it was included under *irregular elements* only to the extent that it had to be performed occasionally by the check-out operator during periods when customers were waiting to be processed.

^{27/} As is indicated by the description of the elements, they were performed by the cashier when working alone; when additional persons were added to the operations, they performed certain elements. (For details of breakdown see tables 4, 7, 8, and 9.)

16. Ring for carry-out clerk. When the customer requested assistance from store personnel for carrying the completed order to the parking area, the cashier pushed a button connected with a buzzer in the back room which signified that a carry-out (sometimes called a page) employee was needed at the check-out counter.

17. Talk to customer. ^{28/} A necessary part of processing each order was a greeting to the customer. This greeting usually caused no delay in the operation; however, when the conversation interfered with the processing of the order by the operator, these unavoidable delays were included under *talk to customer*.

The total elemental time and variable percent for each of the above elements as they were applied to each standard are shown in table 1.

Table 1.--Type "A" irregular elements in the check-out operation

Element	: Total : elemental : time	: Variable : percent ^{1/}	: Weighted : elemental : time
	Minutes	Percent	Minutes
1. Check price of item	0.2128	1.7	0.0036
2. Check register tape roll	.1000	.1	.0001
3. Correct customer's tape	.1829	.3	.0005
4. Delay for clearing register	1.0860	.4	.0043
5. Discuss shortage (and note credit)	1.4900	.1	.0015
6. Dispose of empty bottles and make refund	.2412	3.1	.0075
7. Dispose of empty bottles to back room	.4374	.2	.0009
8. Handle customer coupons	.3340	.6	.0020
9. Install new register tape	1.2391	.5	.0062
10. Make separate change for customer	.1905	1.2	.0023
11. Make change for other cashier	.3435	.7	.0024
12. Obtain box	.2914	1.8	.0052
13. Obtain change from other cashier or head cashier	.2941	2.6	.0076
14. Process produce	.1083	3.4	.0037
15. Rearrange baskarts in reserve area	.8925	.1	.0009
16. Ring for carry-out clerk	.0891	5.6	.0050
17. Talk to customer	.1544	5.1	.0079

^{1/} Variable percent represents the frequency of occurrence of the element.

Type "B" Irregular Elements

1. Break coin change in drawer. Extra coin change was kept in the cash register drawer in rolls. When the supply of loose coins of any one denomination became low, the cashier opened the roll by breaking it on the edge of the drawer.

^{28/} See footnote 27.

2. Cash check. This element varied with type of equipment; it was considerably lower where the automatic coin changer was used. The element consisted of accepting the check from the customer, stamping the check, and giving the proper amount of change to the customer.

3. Clean checkstand counter. ^{29/} The cashier occasionally obtained a cloth from beneath the counter, wiped the dirt and refuse off the counter, and disposed of the cloth. The elemental time varied with the surface area and the bagging wells cleaned.

4. Delay for carry-out clerk. Upon completion of the order, the cashier, if the customer so requested, rang for a clerk (or page) to carry the order to the customer's car. Often, in the case of large orders, there was little or no room to accommodate the order following, so the cashier had an unavoidable delay while waiting for the clerk to remove the order.

5. Delay for customer unloading. Occasionally a customer was not aware of the proper check-out procedure and did not unload the basket until the cashier so specified. The cashier had an unavoidable delay until the customer unloaded the first few items. For the Simplex unit this represents the time required to obtain the cart when the customer did not know where it was supposed to be delivered.

6. Dispose bag to order rack. ^{29/} This element occurred (as an irregular element) only on the one-man operation of the Redi-chek. If the customer was not ready to leave the store when the cashier had completed the order, the latter would place the bag or bags on the bag rack.

7. Dispose of baskarts. ^{29/} This element varied with the type of equipment and size of the crew. Whenever the customer neglected to push the basket to the storage area, the cashier or bagger would perform the task. For the conventional and Redi-chek units, the cart was pushed from either the customer aisle or from the rear of the check-out stand to the storage area.

8. Fill coin changer (automatic change maker). This element was associated with the Simplex and Redi-chek equipment. Whenever the coin magazine became low in one denomination, a roll of change was removed from the drawer, unwrapped, and slid into the slot.

9. Move completed part of the order down checkstand. This element occurred only with the two- or three-man operation. When the bagger lagged behind the checker some of the merchandise sometimes was positioned out of the reach of the bagger, which required that the cashier move that part of the completed order down the counter.

10. Move completed order to side. Upon completion of the order the customer occasionally was not ready to leave the store. Therefore the cashier moved her order to one side so she could begin to process the next order.

^{29/} See footnote 27.

11. Move merchandise down conveyor. This element was unique to the Redi- chek. It represented the time required for the item or items to move on the conveyor to a point where the cashier could perform the ring-up function. This element usually occurred while the cashier was positioning the bag in the well. When these two elements occurred simultaneously the latter was the limiting element and the *movement of merchandise* element was not recorded. When the *move merchandise down conveyor* occurred alone, it was recorded under this category.

12. Remove well cover. When customer traffic slackened so that the cashier could process the orders alone, she removed the well cover and placed it in a conveniently located rack. She then performed the ring-up and bagging elements simultaneously.

13. Replace well cover. When one or two persons were added to the operation, the cashier removed the well cover from the rack and placed it in position over the well. This element also occurred sometimes when the customer requested the order be placed in a box.

14. Replenish bag supply. ^{30/} This element represented the time required to (1) replenish the reserve supply of empty bags in the space provided in the equipment and (2) move bags from the reserve supply area to the immediate supply area. The smaller immediate supply area in the Simplex unit explained the reason for higher variable percent and lower elemental time for this equipment.

15. Ring up extra item. Occasionally the customer presented an item for processing after the order had been rung up. The checker rang up the item and usually made the addition on the customer's tape.

16. Talk to other store clerk. ^{30/} This element represented necessary discussion that pertained to the operation of the check-out function or other functions in the store. As is indicated in table 2, the elemental times and variable percent varied with the type of equipment and size of crew.

^{30/} See footnote 27.

Table 2.--Type "B" irregular elements in check-out operation

Element	Code of equipment and size crew to which element applies ^{1/}	Total elemental time	Variable percent	Weighted elemental time
	Code	Minutes	Percent	Minutes
1. Break coin change in drawer	K, L	0.2181	.4	0.0009
2. Cash check	K, L	.7658	6.3	.0482
3. Clean checkstand counter	M, N, O, P K, L M	.4631 .1472 .1785	6.3 3.9 3.9	.0292 .0057 .0070
4. Delay for carry-out clerk	N, O, P K, M, N L	.2307 .2520 .5040	3.9 .4 .4	.0090 .0010 .0020
5. Delay for customer unloading	K, N M	.2023 .1363	6.4 2.6	.0129 .0035
6. Dispose bag to order rack	N	.2836	.7	.0020
7. Dispose of baskarts	K L M N	.1858 .1136 .0542 .1054	1.7 9.5 6.2 2.1	.0032 .0222 .0413 .0022
8. Fill coin changer	O, P M, N, O, P	.1745 .3737	7.9 3.6	.0138 .0135
9. Move completed part of order down checkstand	L O, P	.1311	2.0	.0026
10. Move completed order to side	M N	.1465 .1561	2.0 1.0	.0029 .0016
11. Move merchandise down conveyor	N, O, P	.1071	0.5	.0005
12. Remove well cover	N, O, P	.0661	3.4	.0022
13. Replace well cover	N, O, P	.0813	3.4	.0028
14. Replenish bag supply	M K, L, N, O, P	.1597 .5469	2.6 .4	.0042 .0022
15. Ring up extra item	K L M, N, O, P	.2143 .2143 .1614	.6 1.0 .6	.0013 .0021 .0010
16. Talk to other store clerk	K L M N O P	.3133 .2500 .1000 .1643 .1100 .1150	.7 5.2 .3 2.4 5.9 3.0	.0026 .0130 .0003 .0039 .0065 .0035

^{1/} Codes used: K - Conventional--1-man N - Redi-Chek--1-man
L - Conventional--2-man O - Redi-Chek--2-man
M - Simplex--1-man P - Redi-Chek--3-man

Table 3.--Comparative equipment productivity and cost of check-out operation

Type of equipment	: Orders : per : hour	: Orders : per : man-hour	: Labor cost : per : per order ^{1/}
	<u>Number</u>	<u>Number</u>	<u>Cents</u>
1. Conventional-----1-man	31.9	31.9	3.13
2. Conventional-----2-man	48.4	24.2	4.13
3. Simplex-----1-man	44.3	44.3	2.26
4. Redi- chek-----1-man	44.2	44.2	2.26
5. Redi- chek-----2-man	61.2	30.6	3.27
6. Redi- chek-----3-man	67.5	22.5	4.45
7. Continuous Belt Conveyor----4-man	62.0	15.5	6.44
8. Disc-type-----1-man	35.5	35.5	2.82
9. Disc-type-----2-man	57.8	28.9	3.46
10. Disc-type-----3-man	60.3	20.1	4.98

^{1/} The cost in cents per order was computed on the basis of \$1 per man-hour for all operators required in the various crew arrangements.

Table 4a.--Development of production standard for conventional check-out--1-man operation

Description of element	No. elements per standard unit	Basic elemental time	Total elemental time	Variable	Weighted
				percent ^{1/}	elemental time
			Minutes	Percent	Minutes
1. Unload basket and sort merchandise			0.5517	13.0	0.0717
2. Pull presorter forward; push back			.0600	45.9	.0275
3. Sort after using presorter			.1763	45.9	.0809
4. Sort items as/after placed on counter			.1432	20.9	.0299
5. Ring up order	14.29 r-u items	.0292 min.			
	per order ^{2/}	per item	.4173	100.0	.4173
6. Subtotal, add tax, and total order			.0740	100.0	.0740
7. Take money from customer			.0786	100.0	.0786
8. Make change and give to customer			.1592	100.0	.1592
9. Obtain and position bag			.0808	114.5	.0925
10. Bag items	12.48 r-u items	.0324 min.			
	per bag	per item	.4044	114.5	.4630
11. Sum of irregular elements			.1400	100.0	.1400
Total minutes per order					1.6348
Fatigue and personal allowance					1.15
Standard in minutes per order					1.8798
Standard in hours per order					.0313
Standard in orders per man-hour					31.9
Standard in orders per hour					31.9

^{1/} Variable percent represents the frequency with which the element occurred. For example, the first element *unload basket and sort merchandise* occurred 13 times for each 100 orders processed. Elements numbers 9 and 10 are shown as occurring more than once for each order because the average order of 14.29 ring-up items required more than one bag.

^{2/} Items per order in all the production standards are *ring-up* items per order.

Table 4b.--Development of production standard for conventional check-out--1-man operation--continued

Irregular elements

Description of element	Total	Variable	Weighted
	: elemental time : <u>Minutes</u>	: percent : <u>Percent</u>	: elemental time <u>Minutes</u>
1. Break coin change in drawer	0.2181	.4	0.0009
2. Cash check	.7658	6.3	.0482
3. Check price of item	.2128	1.7	.0036
4. Check register tape roll	.1000	.1	.0001
5. Clean checkstand counter	.1472	3.9	.0057
6. Correct customers tape	.1829	.3	.0005
7. Delay for carry-out clerk	.2520	.4	.0010
8. Delay for clearing register	1.0860	.4	.0043
9. Delay for customer unloading	.2023	6.4	.0129
10. Discuss shortage (and note credit)	1.4900	.1	.0015
11. Dispose of baskarts	.1858	1.7	.0032
12. Dispose of empty bottles (and make refund)	.2412	3.1	.0075
13. Dispose of empty bottles to back room	.4374	.2	.0009
14. Handle customer coupons	.3340	.6	.0020
15. Install new register tape	1.2391	.5	.0062
16. Make separate change for customer	.1905	1.2	.0023
17. Make change for other cashier	.3435	.7	.0024
18. Obtain box	.2914	1.8	.0052
19. Obtain change from other cashier or head cashier	.2941	2.6	.0076
20. Process produce	.1083	3.4	.0037
21. Rearrange baskarts in reserve area	.8925	.1	.0009
22. Replenish bag supply	.5465	.4	.0022
23. Ring for carry-out clerk	.0891	5.6	.0050
24. Ring up extra item	.2143	1.0	.0021
25. Talk to customer	.1544	5.1	.0079
26. Talk to other store clerk	.3733	.7	.0022
Total			.1400

Table 5a.--Development of production standard for conventional check-out--2-man operation

Description of element	No. elements per standard unit	Basic elemental time	Total elemental time	Variable percent	Weighted elemental time	
					Cashier Minutes	Bagger Minutes
1. Unload basket			0.5338	20.8	0.1110	--
2. Pull presorter forward; push back			.0600	44.7	.0268	--
3. Sort after using presorter			.1434	44.7	.0641	--
4. Sort items as/after placed on counter			.1542	14.3	.0221	--
5. Ring up order	14.29 r-u items per order	.0291 min. per item	.4158	100.0	.4158	--
6. Subtotal, add tax, and total order			.0740	100.0	.0740	--
7. Take money from customer			.0926	100.0	.0926	--
8. Make change and give to customer			.1592	100.0	.1592	--
9. Obtain and position bag			.0901	114.5	--	.1032
10. Bag items	12.48 r-u items per bag	.0422 min. per item	.5267	114.5	--	.6031
11. Delay for merchandise from cashier			.3279	96.1	--	.3151
12. Sum of irregular elements			.1690	100.0	.1124	.0566
					1.0780	1.0780
Total man-minutes per order					2.156	
Fatigue and personal allowance					1.15	
Standard in man-minutes per order					2.3793	
Standard in man-hours per order					.0413	
Standard in orders per man-hour					24.2	
Standard in orders per hour					48.4	

Table 5b.--Development of production standard for conventional check-out--2-man operation--continued

Irregular elements

Description of element	Total	Variable	Weighted	
	elemental	percent	elemental time	
	time		Cashier	Bagger
	<u>Minutes</u>	<u>Percent</u>	<u>Minutes</u>	<u>Minutes</u>
1. Bag separate item	--	--	--	--
2. Break coin change in drawer	0.2181	.4	0.0009	--
3. Cash check	.7658	6.3	.0482	--
4. Check price of item	.2128	1.7	.0036	--
5. Check register tape roll	.1000	.1	.0001	--
6. Clean checkstand counter	.1472	3.9	--	.0057
7. Correct customer's tape	.1829	.3	.0005	--
8. Delay for carry-out clerk	.2520	.8	.0010	.0010
9. Delay for clearing register	1.0860	.8	.0043	.0043
10. Discuss shortage and note credit	1.4900	.1	.0015	--
11. Dispose of baskarts	.1136	19.5	--	.0222
12. Dispose of empty bottles (and make refund)	.2412	3.1	.0075	--
13. Dispose of empty bottles to back room	.4374	.2	--	.0009
14. Handle customer coupons	.3340	.6	.0020	--
15. Install new register tape	1.2391	.5	.0062	--
16. Make separate change for customer	.1905	1.2	.0023	--
17. Make change for other cashier	.3435	.7	.0024	--
18. Move (completed) part of order down checkstand	.1150	6.5	.0075	--
19. Obtain box	.2914	1.8	--	.0052
20. Obtain change from other cashier or head cashier	.2941	2.6	.0076	--
21. Process produce	.1083	3.4	--	.0037
22. Rearrange baskarts in reserve area	.8925	.1	--	.0009
23. Replenish bag supply	.5465	.4	--	.0022
24. Ring for carry-out clerk	.0891	5.6	.0050	--
25. Ring up extra item	.2143	.6	.0013	--
26. Talk to customer	.0772	10.2	.0040	.0040
27. Talk to other store clerk	.1250	10.4	.0065	.0065
Total			.1124	.0566

Table 6a.--Development of production standard for Simplex check-out--1-man operation

Description of element	:	No. elements	:	Basic	Total	:	Variable	:	Weighted
				elemental	elemental				percent
	:	per standard unit	:	time	time	:	percent	:	time
					<u>Minutes</u>		<u>Percent</u>		<u>Minutes</u>
1. Position basket					0.0471		24.5		0.0115
2. Obtain and position bag					.0915		114.5		.1048
3. Ring-up and bag items		14.29 r-u		.0424 min.					
		items per order		per item	.6059		100.0		.6059
4. Subtotal, add tax, and total order					.0740		100.0		.0740
5. Take money from customer					.0786		100.0		.0786
6. Make change for customer					.1123		100.0		.1123
7. Remove bag from well; position for customer					.0450		54.9		.0247
8. Sum of irregular elements					.1655		100.0		<u>.1655</u>
Total minutes per order									1.1773
Fatigue and personal allowance									1.15
Standard in minutes per order									1.3539
Standard in hours per order									.0226
Standard in orders per man-hour									44.3
Standard in orders per hour									44.3

Table 6b.--Development of production standard for Simplex check-out--1-man operation--continued
Irregular elements

Description of element	Total	Variable	Weighted
	elemental time	percent	elemental time
	<u>Minutes</u>	<u>Percent</u>	<u>Minutes</u>
1. Cash check	0.4631	6.3	0.0292
2. Check price of item	.2128	1.7	.0036
3. Check register tape roll	.1000	.1	.0001
4. Clean checkstand counter	.1785	3.9	.0070
5. Correct customer's tape	.1829	.3	.0005
6. Delay for carry-out clerk	.2520	.4	.0010
7. Delay for clearing register	1.0860	.4	.0043
8. Delay for customer unloading	.1363	2.6	.0035
9. Discuss shortage and note credit	1.4900	.1	.0015
10. Dispose of baskarts	.0542	76.2	.0413
11. Dispose of empty bottles (and make refund)	.2412	3.1	.0075
12. Dispose of empty bottles to back room	.4374	.2	.0009
13. Fill coin changer	.3737	3.6	.0135
14. Handle customer coupons	.3340	.6	.0020
15. Install new register tape	1.2391	.5	.0062
16. Make separate change for customer	.1905	1.2	.0023
17. Make change for other cashier	.3435	.7	.0024
18. Move completed order to side	.1465	2.0	.0029
19. Obtain box	.2914	1.8	.0052
20. Obtain change from other cashier or head cashier	.2941	2.6	.0076
21. Process produce	.1083	3.4	.0037
22. Rearrange baskarts in reserve area	.8925	.1	.0009
23. Replenish bag supply	.1597	2.6	.0042
24. Ring for carry-out clerk	.0891	5.6	.0050
25. Ring up extra item	.1614	.6	.0010
26. Talk to customer	.1544	5.1	.0079
27. Talk to other store clerk	.1000	.3	.0003
Total			.1655

Table 7a.--Development of production standard for Redi-chek check-out--1-man operation

Description of element	:	No. elements	:	Basic	Total	:	Variable	:	Weighted
				elemental	elemental				Percent
	:	per standard unit	:	time	time	:	percent	:	time
					<u>Minutes</u>		<u>Percent</u>		<u>Minutes</u>
1. Obtain and position bag					0.1010		114.5		0.1156
2. Ring up and bag items		14.29 r-u		.0415 min.					
		items per order		per item	.5930		100.0		.5930
3. Subtotal, add tax, and total order					.0740		100.0		.0740
4. Take money from customer					.0786		100.0		.0786
5. Make change and give to customer					.1365		100.0		.1365
6. Remove bag from well; position for customer					.0498		73.4		.0366
7. Sum of irregular elements					.1457		100.0		<u>.1457</u>
Total minutes per order									1.1800
Fatigue and personal allowance									<u>1.15</u>
Standard in minutes per order									1.3570
Standard in hours per order									.0226
Standard in orders per man-hour									44.2
Standard in orders per hour									44.2

Table 7b.--Development of production standard for Redi-check check-out--1-man operation--continued
Irregular elements

Description of element	Total	Variable	Weighted
	elemental	percent	elemental
	time	percent	time
	Minutes	Percent	Minutes
1. Cash check	0.4631	6.3	0.0292
2. Check price of item	.2128	1.7	.0036
3. Check register tape roll	.1000	.1	.0001
4. Clean checkstand counter	.2307	3.9	.0090
5. Correct customer's tape	.1829	.3	.0005
6. Delay for carry-out clerk	.2520	.4	.0010
7. Delay for clearing register	1.0860	.4	.0043
8. Delay for customer unloading	.2701	4.8	.0130
9. Discuss shortage and note credit	1.4900	.1	.0015
10. Dispose bag to order rack	.2836	.7	.0020
11. Dispose of baskarts	.1054	2.1	.0022
12. Dispose of empty bottles (and make refund)	.2412	3.1	.0075
13. Dispose of empty bottles to back room	.4374	.2	.0009
14. Fill coin changer	.3737	3.6	.0135
15. Handle customer coupons	.3340	.6	.0020
16. Install new register tape	1.2391	.5	.0062
17. Make separate change for customer	.1905	1.2	.0023
18. Make change for other cashier	.3435	.7	.0024
19. Move completed order to side	.1561	1.0	.0016
20. Move merchandise down conveyer	.1071	.5	.0005
21. Obtain box	.2914	1.8	.0052
22. Obtain change from other cashier or head cashier	.2941	2.6	.0076
23. Process produce	.1083	3.4	.0037
24. Rearrange baskarts in reserve area	.8925	.1	.0009
25. Remove well cover	.0661	3.4	.0022
26. Replace well cover	.0813	3.4	.0028
27. Replenish bag supply	.5465	.4	.0022
28. Ring for carry-out clerk	.0891	5.6	.0050
29. Ring up extra item	.1614	.6	.0010
30. Talk to customer	.1544	5.1	.0079
31. Talk to other store clerk	.1643	2.4	.0039
Total			.1457

Table 8a.--Development of production standard for Redi-chek check-out--2-man operation

Description of element	No. elements per standard unit	Basic	Total	Variable percent	Weighted elemental time	
		elemental time <u>Minutes</u>	elemental time <u>Minutes</u>		Cashier <u>Minutes</u>	Bagger <u>Minutes</u>
1. Ring up items	14.29 r-u items per order	.0287 min. per item	0.4101	100.0	0.4101	--
2. Subtotal, add tax, and total order			.0740	100.0	.0740	--
3. Take money from customer			.1307	100.0	.1307	--
4. Make change and give to customer			.1365	100.0	.1365	--
5. Obtain and position bag			.1134	114.5	--	.1298
6. Bag items	12.48 r-u items per bag	.0311 min. per item	.3881	114.5	--	.4444
7. Dispose filled bag to order rack			.0690	129.4	--	.0893
8. Delay for merchandise from cashier			.2113	67.5	--	.1426
9. Sum of irregular elements			.1494	100.0	<u>.1021</u>	<u>.0473</u>
					.8534	.8534
Total man-minutes per order					1.7068	
Fatigue and personal allowance					1.15	
Standard in man-minutes per order					1.9628	
Standard in man-hours per order					.0327	
Standard in orders per man-hour					30.6	
Standard in orders per hour					61.2	

Table 8b.--Development of production standard for Redi-check check-out--2-man operation--continued

Irregular elements

Description of element	Total	Variable	Weighted	
	elemental	percent	Cashier	Bagger
	time	percent	Minutes	Minutes
	Minutes	Percent	Minutes	Minutes
1. Cash check	0.4631	6.3	0.0292	--
2. Check price of item	.2128	1.7	.0036	--
3. Check register tape roll	.1000	.1	.0001	--
4. Clean checkstand counter	.2307	3.9	--	.0090
5. Correct customer's tape	.1829	.3	.0005	--
6. Delay for clearing register	1.0860	.8	.0043	.0043
7. Discuss shortage and note credit	1.4900	.1	.0015	--
8. Dispose of baskarts	.1745	9.7	--	.0138
9. Dispose of empty bottles (and make refund)	.2412	3.1	.0075	--
10. Dispose of empty bottles to back room	.4374	.2	--	.0009
11. Fill coin changer	.3737	3.6	.0135	--
12. Handle customer coupons	.3340	.6	.0020	--
13. Install new register tape	1.2391	.5	.0062	--
14. Make separate change for customer	.1905	1.2	.0023	--
15. Make change for other cashier	.3435	.7	.0024	--
16. Move completed part of order down checkstand	.1311	2.0	.0026	--
17. Move merchandise down conveyor	.1071	.5	.0005	--
18. Obtain box	.2914	1.8	--	.0052
19. Obtain change from other cashier or head cashier	.2941	2.6	.0076	--
20. Process produce	.1083	3.4	--	.0037
21. Rearrange baskarts in reserve area	.8925	.1	--	.0009
22. Remove well cover	.0661	3.4	.0022	--
23. Replace well cover	.0813	3.4	.0028	--
24. Replenish bag supply	.5465	.4	--	.0022
25. Ring for carry-out clerk	.0891	5.6	.0050	--
26. Ring-up extra item	.1614	.6	.0010	--
27. Talk to customer	.0772	10.2	.0040	.0040
28. Talk to other store clerk	.0550	11.8	.0033	.0033
Total			.1021	.0473

Table 9a.--Development of production standard for Redi-check check-out--3-man operation

Description of element	No. elements per standard unit	Basic elemental time	Total elemental time	Variable percent	Weighted elemental time		
					Cashier Minutes	Bagger Minutes	Expediter Minutes
1. Ring up items	14.29 r-u items per order	.0274 min. per item	0.3915	100.0	0.3915	--	--
2. Subtotal, add tax, and total order			.0740	100.0	.0740	--	--
3. Take money from customer			.0712	100.0	.0712	--	--
4. Make change and give to customer			.1365	100.0	.1365	--	--
5. Obtain and position bag			.1134	114.5	--	.1298	--
6. Bag items	12.48 r-u items per bag	.0292 min. per item	.3644	114.5	--	.4172	--
7. Dispose filled container to order rack			.0690	129.4	--	.0893	--
8. Delay for merchandise from cashier			.1985	46.2	--	.0917	--
9. Place items on conveyor	14.29 r-u items per order	.0274 min. per item	.3915	100.0	--	--	.3915
10. Delay for cashier to ring items			.3722	100.0	--	--	.3722
11. Sum of irregular elements			.1574	100.0	<u>.1009</u>	<u>.0461</u>	<u>.0104</u>
					.7741	.7741	.7741
Total man-minutes per order					2.3223		
Fatigue and personal allowance					1.15		
Standard in minutes per order					2.6706		
Standard in man-hours per order					.0445		
Standard in orders per man-hour					22.5		
Standard in orders per hour					67.4		

Table 9b.--Development of production standard for Redi-check check-out--3-man operation--continued

Irregular elements

Description of element	Total	Variable	Weighted		
	elemental	percent	elemental time		
	time	percent	Cashier	Bagger	Expediter
	Minutes	Percent	Minutes	Minutes	Minutes
1. Cash check	0.4631	6.3	0.0292	--	--
2. Check price of item	.2128	1.7	.0036	--	--
3. Check register tape roll	.1000	.1	.0001	--	--
4. Clean checkstand counter	.2307	3.9	--	.0090	--
5. Correct customer's tape	.1829	.3	.0005	--	--
6. Delay for clearing register	1.0860	1.2	.0043	.0043	.0043
7. Discuss shortage and note credit	1.4900	.1	.0015	--	--
8. Dispose of baskarts	.1745	7.9	--	.0138	--
9. Dispose of empty bottles (and make refund)	.2412	3.1	.0075	--	--
10. Dispose of empty bottles to back room	.4374	.2	--	.0009	--
11. Fill coin changer	.3737	3.6	.0135	--	--
12. Handle customer coupons	.3340	.6	.0020	--	--
13. Install new register tape	1.2391	.5	.0062	--	--
14. Make separate change for customer	.1905	1.2	.0023	--	--
15. Make change for other cashier	.3435	.7	.0024	--	--
16. Move completed part of order down checkstand	.1311	2.0	.0026	--	--
17. Move merchandise down conveyor	.1071	.5	.0005	--	--
18. Obtain box	.2914	1.8	--	.0052	--
19. Obtain change for other cashier or head cashier	.2941	2.6	.0076	--	--
20. Process produce	.1083	3.4	--	.0037	--
21. Rearrange baskarts in reserve area	.8925	.1	--	.0009	--
22. Remove well cover	.0661	3.4	.0022	--	--
23. Replace well cover	.0813	3.4	.0028	--	--
24. Replenish bag supply	.5465	.4	--	.0022	--
25. Ring for carry-out clerk	.0891	5.6	.0050	--	--
26. Ring up extra item	.1614	.6	.0010	--	--
27. Talk to customer	.0515	15.3	.0026	.0026	.0026
28. Talk to other store clerk	.1150	19.0	.0035	.0035	.0035
Total			.1009	.0461	.0104

Table 10a.--Development of production standard for continuous belt conveyor check-out--4-man operation

Description of element	No. elements per standard unit	Basic elemental time	Total elemental time	Variable percent	Weighted elemental time		
					Cashier	Baggers (2)	Expediter
					Minutes	Minutes	Minutes
1. Ring up items	14.29 r-u items per order	.0290 min. per item	0.4144	100.0	0.4144	--	--
2. Subtotal, add tax, and total order			.0740	100.0	.0740	--	--
3. Take money from customer			.0712	100.0	.0712	--	--
4. Make change and give to customer			.1592	100.0	.1592	--	--
5. Delay for baggers or expediter			.1920	6.5	.0125	--	--
6. Return order separators to expediter	12.33 separators per return	.2108 min. per return	.0171	100.0	.0171	--	--
7. Obtain and position bag			.0891	114.5	--	.1020	--
8. Bag items	12.48 r-u items per bag	.0346 min. per item	.4543	114.5	--	.5202	--
9. Dispose filled container to order rack			.0884	129.4	--	.1144	--
10. Dispose order separators to counter slot			.0456	100.0	--	.0456	--
11. Dispose order separators to cashier	12.33 separators per return	.4724 min. per return	.0152	100.0	--	.0152	--
12. Delay for merchandise from cashier	2 men waiting	.5512 min. per man	.9448	85.7	--	.8097	--
13. Place items on conveyor	14.29 r-u items per order	.0290 min. per item	.4144	100.0	--	--	.4144
14. Place order separators on conveyor			.0212	100.0	--	--	.0212
15. Delay for cashier to ring items			.4981	79.2	--	--	.3945
16. Sum of irregular elements			.1732	100.0	.0913	.0723	.0096
					.8397	1.6794	.8397
Total man-minutes per order					3.3588		
Fatigue and personal allowance					1.15		
Standard in minutes per order					3.8626		
Standard in man-hours per order					.0644		
Standard in orders per man-hour					15.5		
Standard in orders per hour					62.0		

Table 10b.--Development of production standard for continuous belt conveyor check-out--4-man operation--continued
Irregular elements

Description of element	Total	Variable	Weighted		
	elemental	percent	Cashier	Baggers(2)	Expediter
	time	Percent	Minutes	Minutes	Minutes
	Minutes	Percent	Minutes	Minutes	Minutes
1. Break change in drawer	0.2181	.4	0.0009	--	--
2. Cash check	.7658	6.3	.0482	--	--
3. Check price of item	.2128	1.7	.0036	--	--
4. Check register tape roll	.1000	.1	.0001	--	--
5. Clean checkstand counter	--	--	--	--	--
6. Correct customer's tape	.1829	.3	.0005	--	--
7. Delay for clearing register	1.0860	1.6	.0043	.0086	.0043
8. Discuss shortage and note credit	1.4900	.1	.0015	--	--
9. Dispose baskarts	.0956	47.6	--	.0455	--
10. Dispose empty bottles and make refund	.2412	3.1	.0075	--	--
11. Dispose empty bottles to back room	.4374	.2	--	.0009	--
12. Handle customer coupons	.3340	.6	.0020	--	--
13. Install new register tape	1.2391	.5	.0062	--	--
14. Make change for other cashier	.3435	.7	.0024	--	--
15. Make separate change for customer	.1905	1.2	.0023	--	--
16. Obtain change from other cashier	.2914	1.8	.0052	--	--
17. Process produce	.1083	3.4	--	.0037	--
18. Rearrange baskarts in reserve area	.8925	.1	--	.0009	--
19. Replenish bag supply	.5465	.4	--	.0022	--
20. Ring up extra item	.2143	.6	.0013	--	--
21. Talk to customer	.0772	10.2	.0020	.0040	.0020
22. Talk to other clerk	.1250	10.4	.0033	.0065	.0033
Total			.0913	.0723	.0096

Table 12.--Development of production standard for disc-type check-out--2-man operation

Description of element	No. elements per standard unit	Basic	Total	Variable percent	Weighted elemental time	
		elemental time	elemental time		Cashier	Bagger
					Minutes	Minutes
1. Delay for order to turn on disc			0.0587	33.3	0.0195	--
2. Ring up items	14.29 r-u items per order	.0248 min. per item.	.4058	100.0	.4058	--
3. Subtotal, add tax, and total order			.0740	100.0	.0740	--
4. Take money from customer			.1307	100.0	.1307	--
5. Make change; give to customer			.1592	100.0	.1592	--
6. Obtain and position bag			.1194	114.5	--	.1367
7. Bag items	12.48 r-u items per bag	.0346 min. per item	.4318	114.5	--	.4944
8. Delay for merchandise from checker			.2140	100.0	--	.2140
9. Sum of irregular elements			.1690	100.0	<u>.1124</u>	<u>.0565</u>
					.9016	.9016
Total man-minutes per order					1.8032	
Fatigue and personal allowance					1.15	
Standard in minutes per order					2.0737	
Standard in man-hours per order					.0346	
Standard in orders per man-hour					28.9	
Standard in orders per hour					57.8	

Table 13.--Development of production standard for disc-type check-out--3-man operation

Description of element	No. elements per standard unit	Basic elemental time	Total elemental time	Variable percent	Weighted elemental time				
					Cashier	Bagger	Expediter		
					Minutes	Percent	Minutes	Minutes	Minutes
1. Delay for order			0.0575	48.0	0.0276	--	--		
2. Ring up items	14.29 r-u items per order	.0278 min. per item	.3975	100.0	.3975	--	--		
3. Subtotal, add tax, and total			.0740	100.0	.0740	--	--		
4. Take money from customer			.1058	100.0	.1058	--	--		
5. Make change; give to customer			.1592	100.0	.1592	--	--		
6. Obtain and position bag			.1194	114.5	--	.1367	--		
7. Place items in bag	12.48 r-u items per bag	.0350 min. per item	.4368	114.5	--	.5001	--		
8. Delay for merchandise from checker			.1863	100.0	--	.1863	--		
9. Place items on disc	14.29 r-u items per order	.0278 min. per item	.3975	100.0	--	--	--	.3975	
10. Place order separator on disc			.0212	100.0	--	--	--	.0212	
11. Delay for cashier to ring items			.4368	100.0	--	--	--	.4368	
12. Sum of irregular elements			.1550	100.0	<u>.1018</u>	<u>.0428</u>	<u>.0104</u>		
					.8659	.8659	.8659		
Total man-minutes per order					2.5977				
Fatigue and personal allowance					1.15				
Standard in minutes per order					2.9874				
Standard in man-hours per order					.0498				
Standard in orders per man-hour					20.1				
Standard in orders per hour					60.3				

Table 14.--Relationship between size of order and man-hour production with conventional equipment--1-man operation

Increase in size of average order		Increase in items per man-hour produced		Increase in sales per man-hour by the following Percentage
From:--	To:--	From:--	To:--	
<u>Items</u>	<u>Items</u>	<u>Items</u>	<u>Items</u>	<u>Percent</u>
8	9	336	362	7.7
9	10	362	384	6.1
10	11	384	404	5.2
11	12	404	422	4.5
12	13	422	438	3.8
13	14	438	452	3.2
14	15	452	465	2.9
15	16	465	476	2.4
16	17	476	486	2.1
17	18	486	496	2.1
18	19	496	503	1.4

Table 15.--Relationship between size of order and man-hour production with Simplex equipment--1-man operation

Increase in size of average order		Increase in items per man-hour produced		Increase in sales per man-hour by the following percentage
From:--	To:--	From:--	To:--	
<u>Items</u>	<u>Items</u>	<u>Items</u>	<u>Items</u>	<u>Percent</u>
8	9	461	497	7.8
9	10	497	529	6.4
10	11	529	557	5.3
11	12	557	583	4.7
12	13	583	606	3.9
13	14	606	627	3.5
14	15	627	647	3.2
15	16	647	664	2.6
16	17	664	680	2.4
17	18	680	694	2.1
18	19	694	706	1.7

Table 16.--Equipment space requirements

Type of equipment	: : Width : <u>1/</u>	: : Length : <u>1/</u>	: : Total : space : <u>1/</u>
	<u>Feet</u>	<u>Feet</u>	<u>Sq. Ft.</u>
1. Conventional	6.0	10.5	63.0
2. Simplex	6.2	6.5	40.3
3. Redi-chek	6.2	11.5	71.3
4. Continuous belt conveyor	6.0	14.0	84.0
5. Disc-type	6.0	10.0	60.0

^{1/} Customer aisles (2-ft. wide) included.

Figure 23

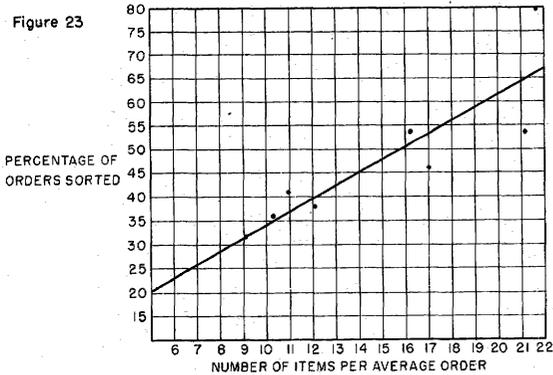


Figure 24

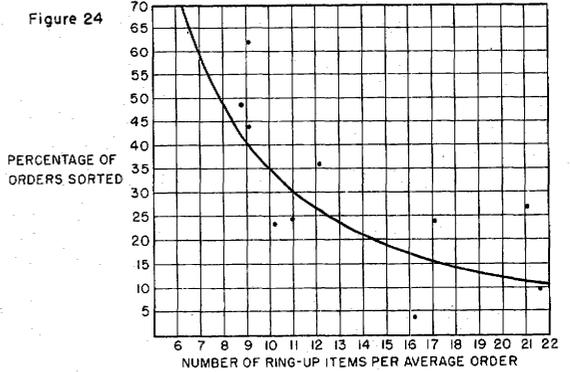


Figure 23.--Relationship between percentage of orders sorted after using presorter and the size of the average order for the Conventional check-out counter in self-service food stores.

Figure 24.--Relationship between percentage of orders sorted as/after placed on counter and size of the average order handled at the check-out counter in self-service food stores.

NUMBER OF RING-UP ITEMS PER BAG

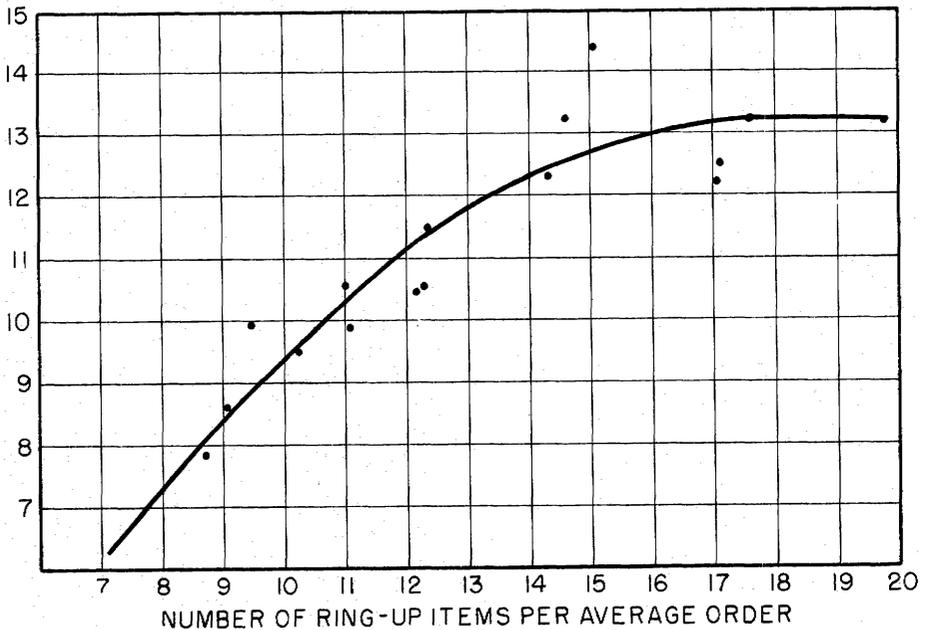


Figure 25.--Relationship between number of ring-up items per bag and size of the average order handled at the check-out counter in the self-service food store.

INSTRUCTIONS FOR THE OPERATION OF THE SIMPLEX CHECK-OUT COUNTER

1. Position cart at side:
 - a. Combine operation with positioning bag or turning on vacuum.
 - b. Baskart should be at side of the cashier and adjacent to the cashier's bagging well.
2. Obtain and position bag:
 - a. Pick up with left hand.
 - b. Transfer lip to right hand and forefinger.
 - c. Open bag by inserting left arm.
 - d. Position in well with left hand and arm, simultaneously applying vacuum by means of the foot switch.
3. Ring-up and bag order:
 - a. Use thumb and forefinger to depress individual numerical key, and middle finger to actuate departmental key.
 - b. Place items in bag simultaneously with the ring-up.
 - c. Select items from baskart to obtain a well-sacked order.
 - d. If necessary, place fragile or perishable items aside (all items must be rung up as they are removed from the baskart), and place in container while waiting for money from the customer.
4. Make change:
 - a. Tell customer amount of the bill as soon as possible.
 - b. Dispose of full bags and/or obtain and position empty bag in well while waiting for money from the customer.
 - c. Place bill on ledge and open register drawer. Depress appropriate key on automatic coin changer. Obtain bill change and count out to customer.
5. Small orders: (1 to 3 items)
 - a. Ring and bag items separately.
 - b. Ring immediately, obtain bag and then bag while awaiting change.
6. When box is used in place of a bag, open hinged door on well and position box. Place items in box simultaneously with the ring-up.
7. Coin changer:
 - a. Use coin changer at all times, unless cashier is working only periodically, occasionally checking out one or two customers.
 - b. Where registers are cleared during operating hours, have coin magazine delivered to cashiers full of change.
 - c. *Lock coin changer magazine whenever you leave the check stand.*
8. Miscellaneous instructions:

The dimensions of the bag holders and bag storage areas may vary with the sizes of the bags most frequently used. The use of a vacuum to hold the mouth of the bag open is optional. The sides of the well will constrict the large bag (#60 or 1/6) and tend to hold the mouth open. The application of a vacuum to the sides of the bag gives better results. A tank-type vacuum cleaner can be placed under the counter and hooked up with the vacuum cups. A foot switch should be used to activate the vacuum.

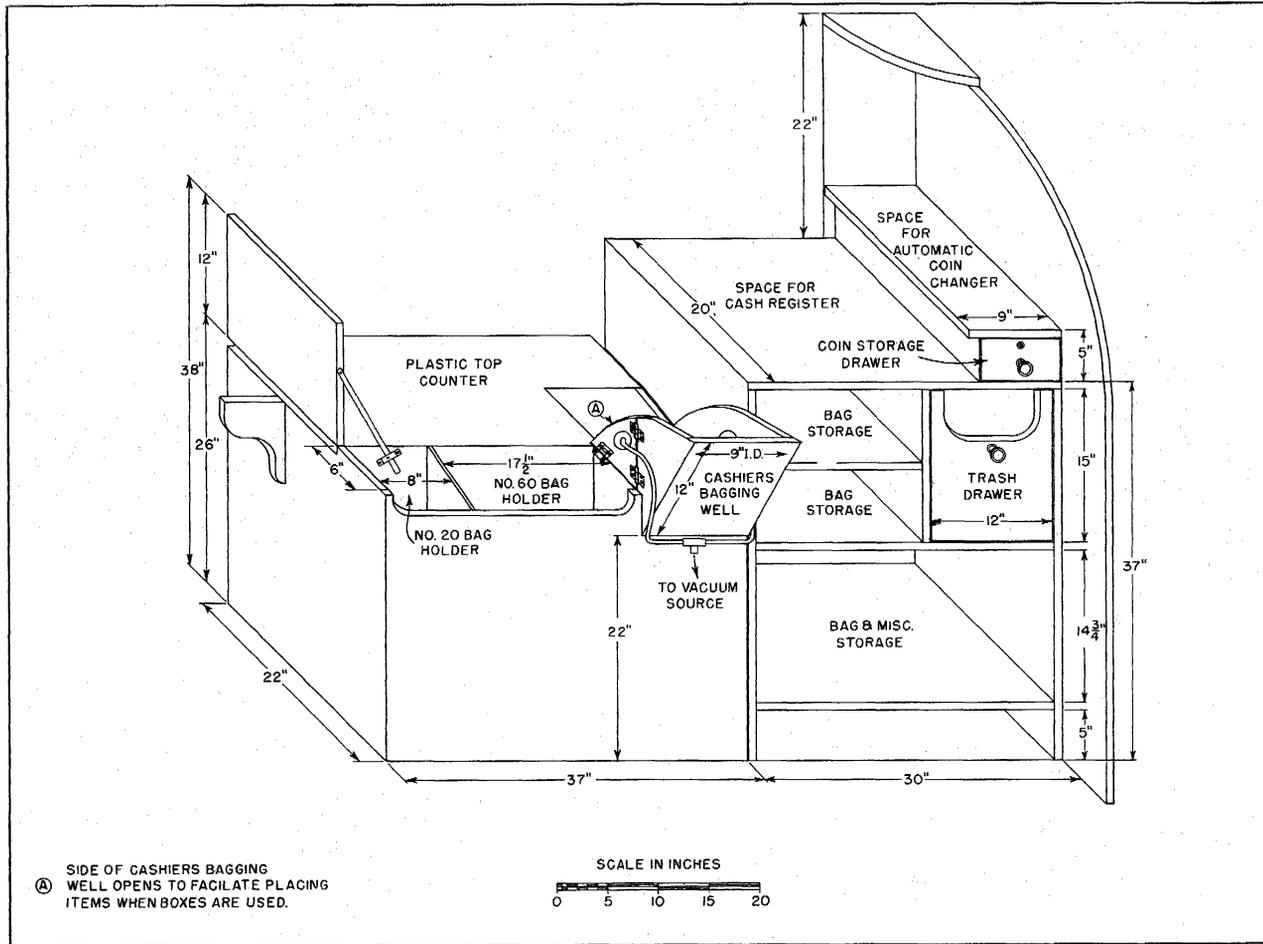


Figure 26.--Specifications for the Simplex check-out counter (public patent applied for).

INSTRUCTIONS FOR THE OPERATION OF THE
REDI-CHEK CHECK-OUT COUNTER

A. Cashier

1. When working alone:

a. Obtain and position bag:

- (1) Pick up with left hand.
- (2) Transfer lip to right hand and forefinger.
- (3) Open bag by inserting left arm.
- (4) Position in well with left hand and arm.

b. Ring-up and bag order:

- (1) Use thumb and forefinger to depress individual numerical key, and middle finger to actuate departmental key.
- (2) *Place items in bag simultaneously with the ring-up.*
- (3) Select items off belt to obtain a well-sacked order.
- (4) Operate foot pedal with right foot to move items down belt while performing the ring-up and sacking operation.
- (5) If produce is weighed at check stand, try to weigh produce items last, as they will go on top of the bag.

c. Make change:

- (1) Tell customer amount of the bill as soon as possible.
- (2) Dispose of full bags and/or obtain and position empty bag in well while waiting for money from the customer.
- (3) Place bill on ledge and obtain coin change in right hand. Next, obtain bill change. Give coin change to customer--*do not count.*

d. Small orders: (1 to 3 items)

- (1) Ring and bag items separately.
- (2) Ring immediately, obtain bag, and then bag while awaiting change.

e. When box is used in place of a sack, continue to place items in box simultaneously with the item ring-up.

f. Coin changer:

- (1) Use coin changer at all times, unless cashier is working only periodically, occasionally checking out one or two customers.
- (2) Where registers are cleared during store operating hours, have coin magazines delivered to cashiers full of change.
- (3) *Lock coin changer magazine in drawer whenever you leave the checkstand.*

2. Cashier--when working with a bagger:

- a. When possible, request customer to place items on belt, prices up.
- b. Remember bagger has to sack the order properly, therefore, try to select items in succession, as though you were bagging them yourself. (Canned goods and heavy items first, and fragile items last.)
- c. While ringing up item, place hand on item and push toward bagger.

3. Cashier--when working with bagger and expediter:

- a. Ring up items as they come down the belt and push each item on to the bagger.
- b. The expediter will be placing the next order on the belt while you are making change, so remember to occasionally operate foot switch and move belt forward during this period. This will prevent order being crowded on only a part of belt, and will bring items to a convenient location for immediately starting on the next order after you have made change.

B. Bagger

1. Use idle time to obtain and place bags in bag wells.
2. Place all completed orders on bag rack.
3. *Use both hands to handle items*; do not transfer items hand-to-hand.
4. When two bags are to be needed for one customer, fill bags simultaneously, or at least fill the bases of both bags as the items come from the checker.
5. Place every completed order on rack--do not wait for customer to pick up.
6. Use smallest bag possible for all orders.
7. Baggers are not to be used for carry-outs, as this upsets routine of the operation.

C. Expediter

1. Always use deadplate.
2. Order of placing merchandise on belt: Canned goods, glass, cartons, meat, produce, bakery, and other perishable items.
3. Place merchandise on belt with price up.
4. Space items 4 to 6 inches apart.
5. For multiple price items, set single units on deadplate until other item or items are located, and then push off *together* immediately. (Do not wait until end of order to remove multiple items--if they are together and readily accessible, place on belt with other canned goods.)
6. Instruct or *request* the customer to move along the counter. There she can observe the ring-up and obtain money for payment of bill.
7. Dispose cart behind last customer (the following customer will push it on through.)

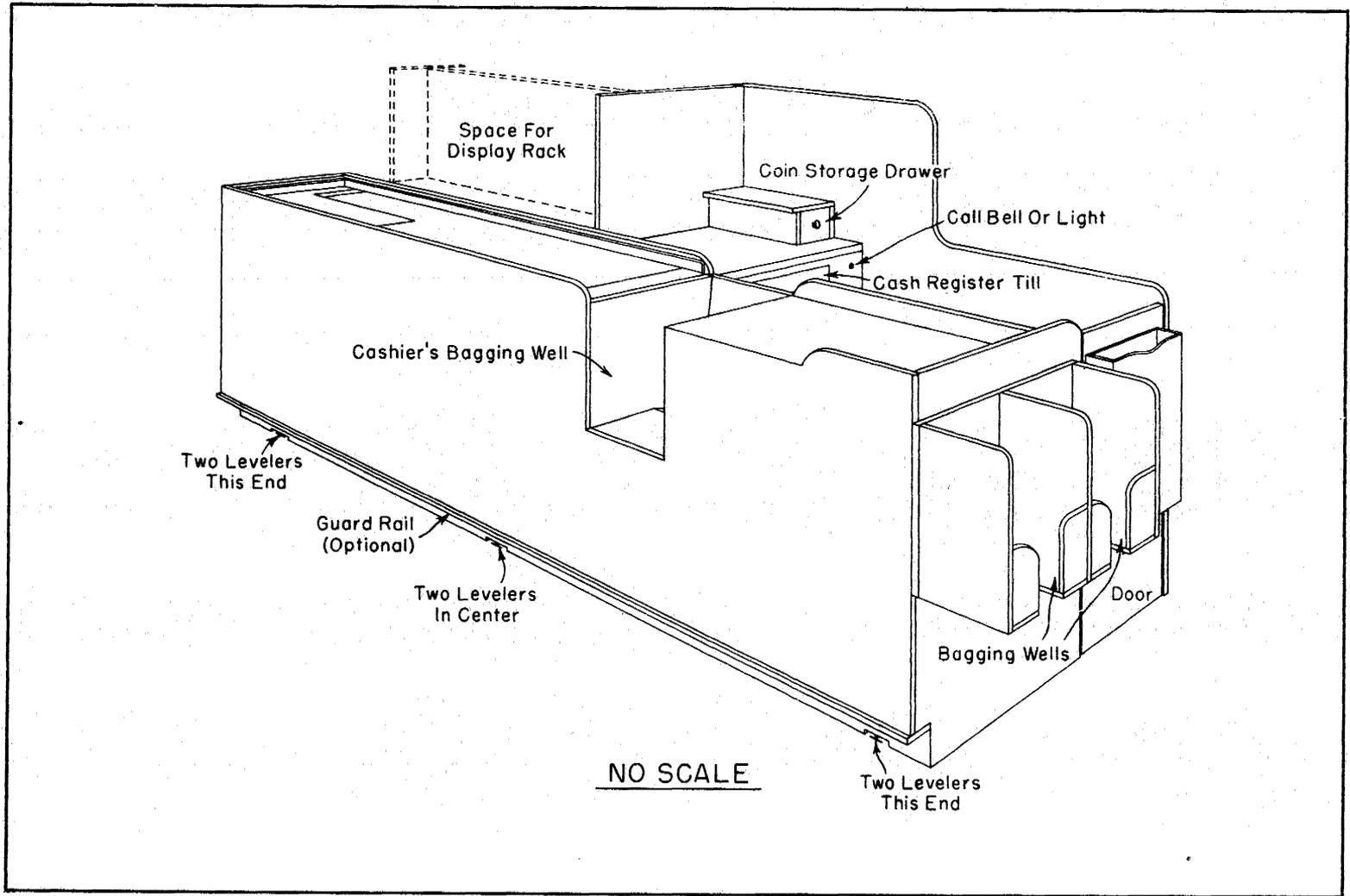


Figure 27.--Perspective view of the Redi-check conveyor check-out counter (public patent applied for).

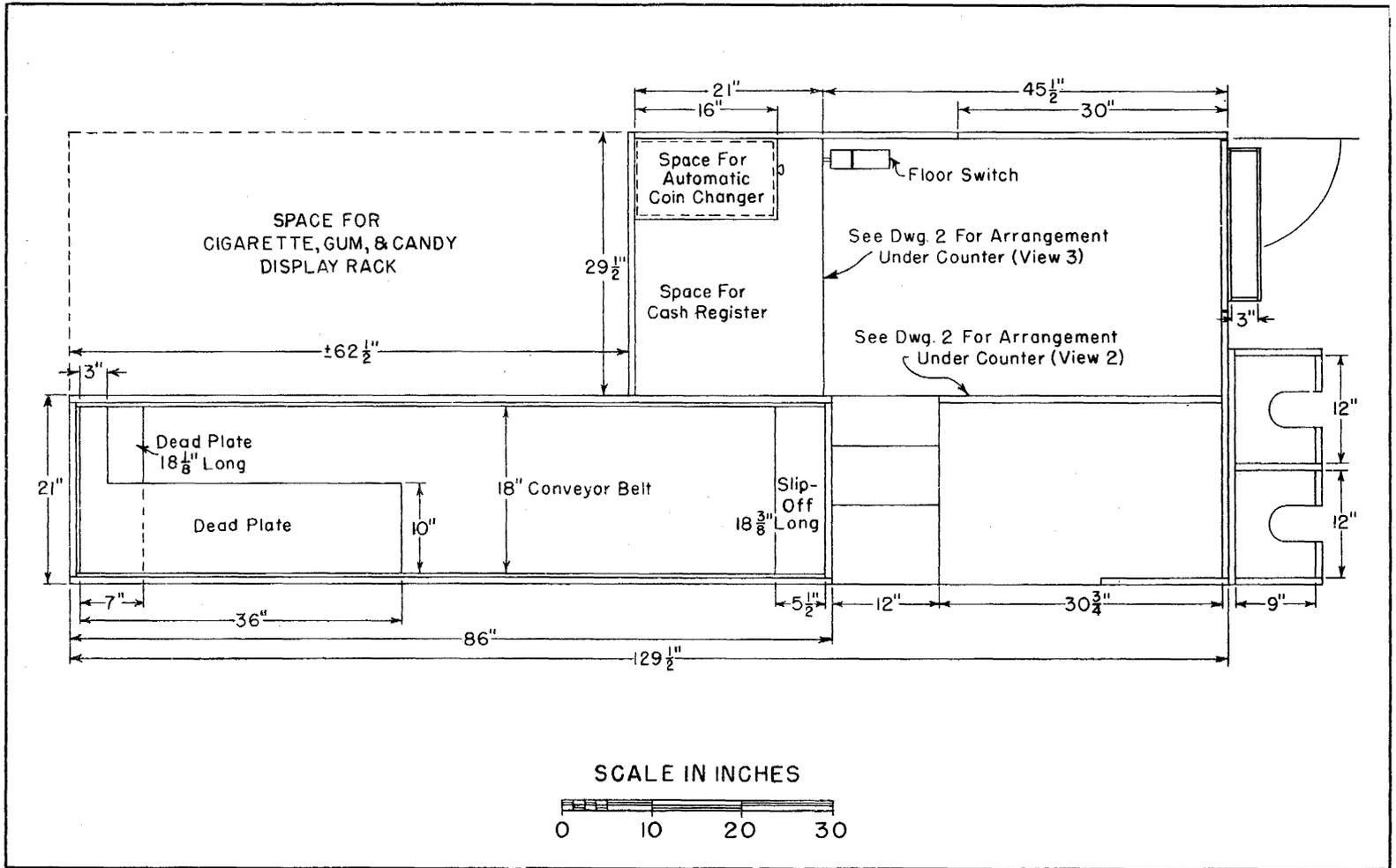


Figure 28.--Top view of Redi-chek conveyor check-out counter.

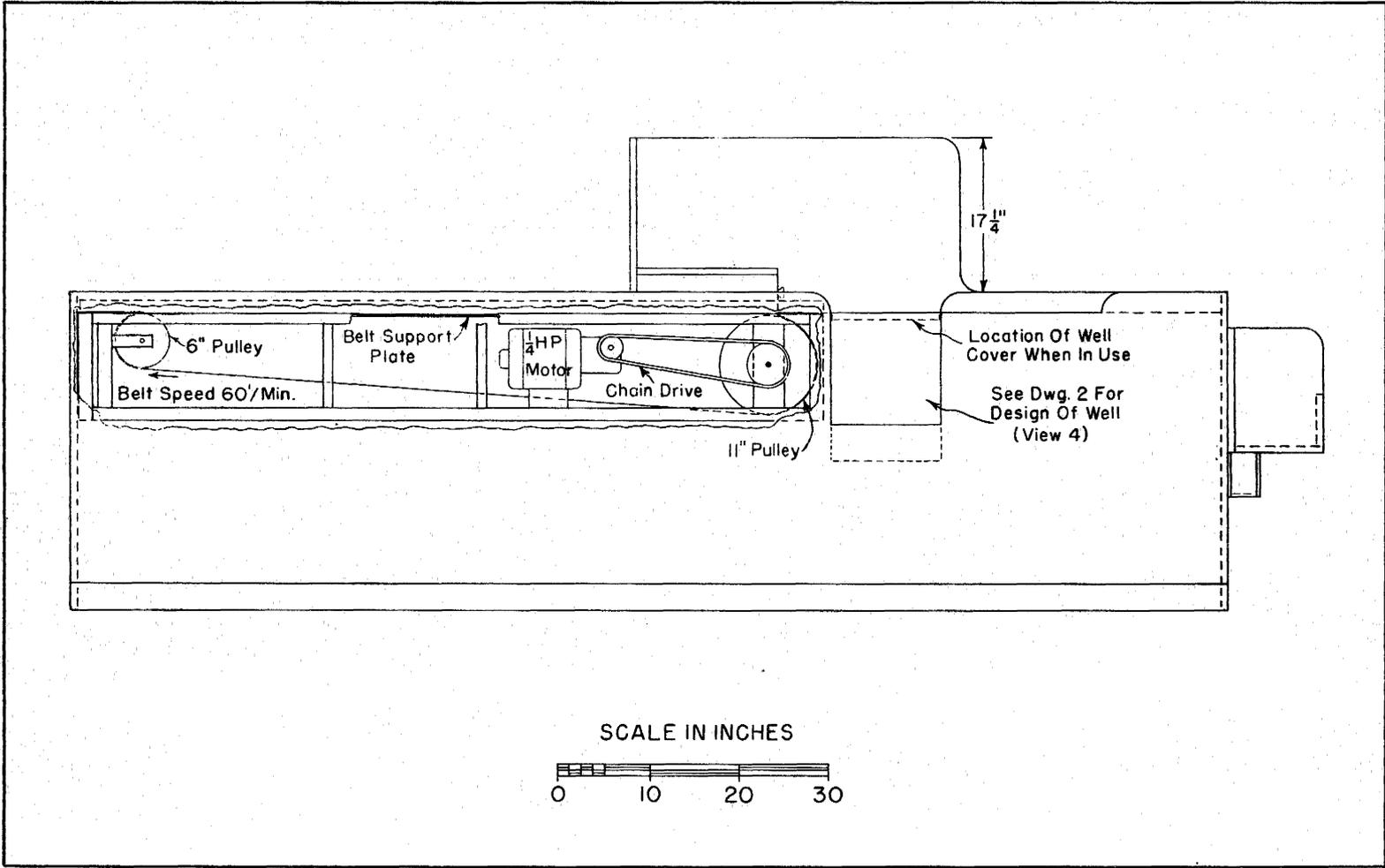
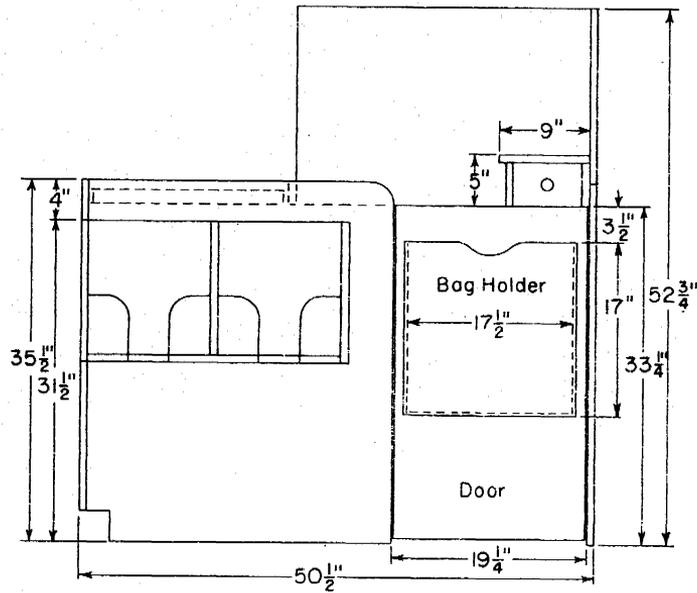


Figure 29.--Side view of Redi-chek conveyor check-out counter.



SCALE IN INCHES



Figure 30.--End view of Redi-chek conveyor check-out counter.

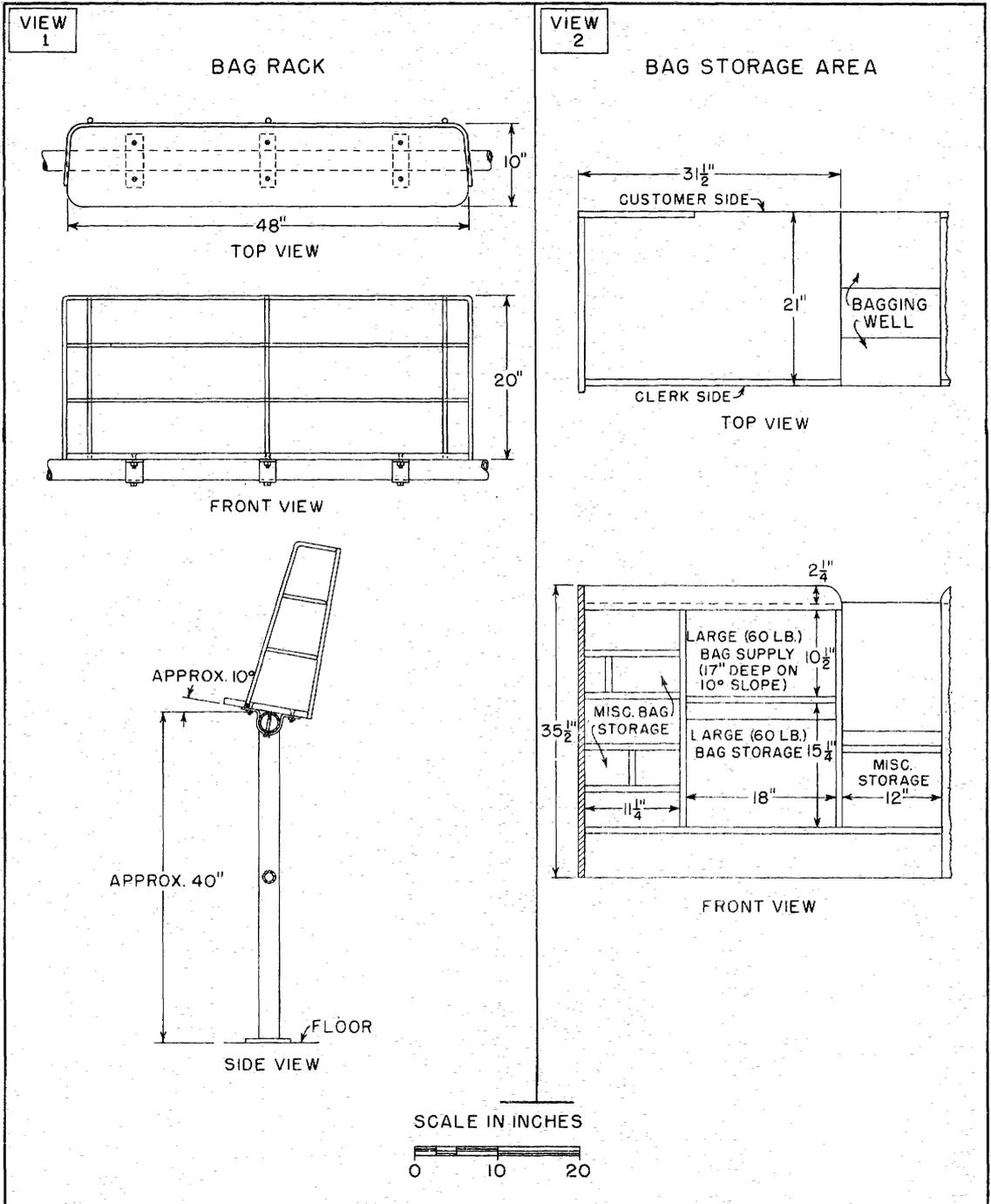


Figure 31.--Detailed view of bag rack and bag storage area on Redi-chek conveyor check-out counter.

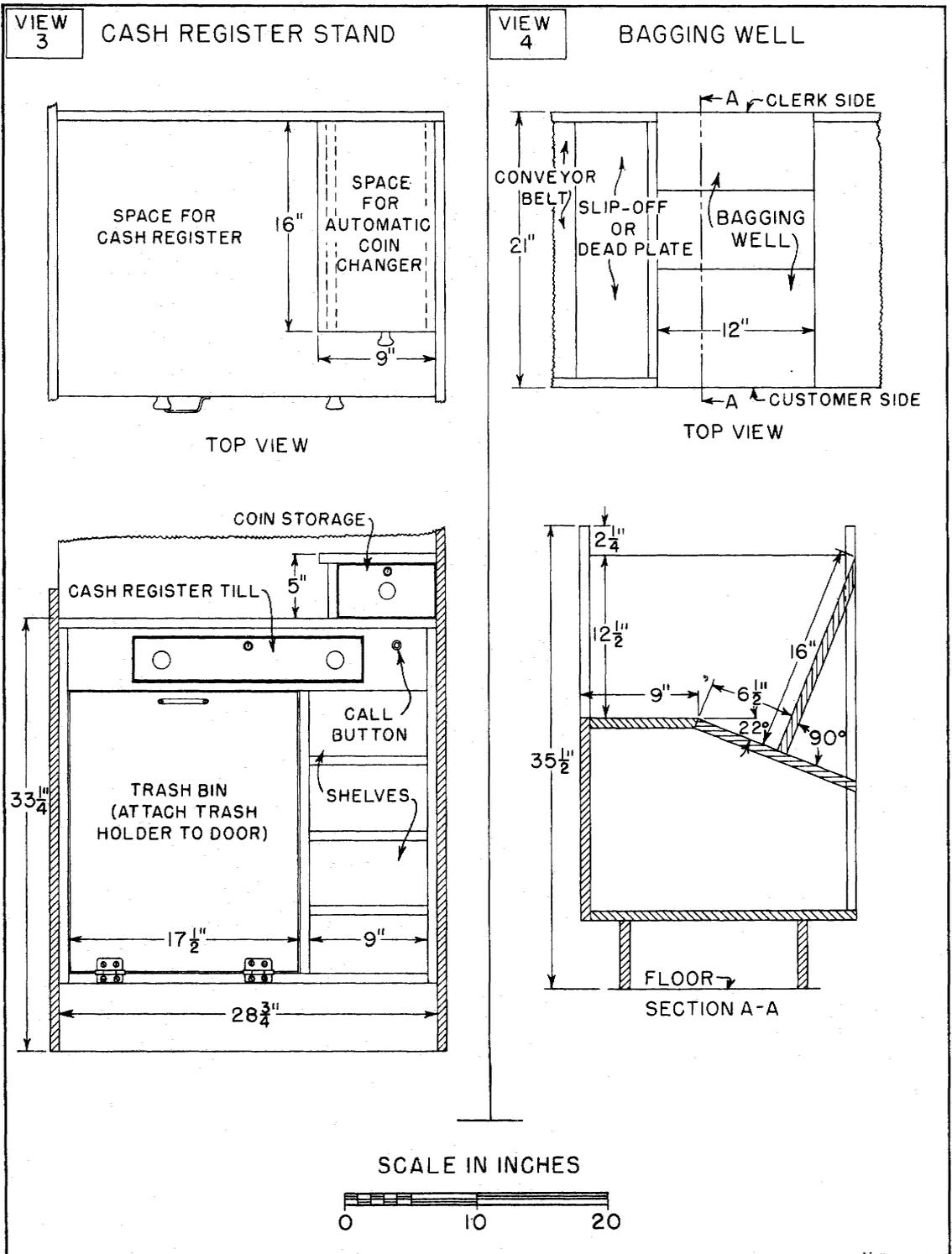


Figure 32.--Detailed views of cash register stand and bagging well of Redi-chek conveyor check-out counter.



Figure 33.--Installation of the Redi-chek conveyor check-out counter.