

## NEW DRIED FRUIT PRODUCTS FOR USE IN DRY CEREALS

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Have you seen the chocolate milk shake that comes in an aerosol can? Simply press the button and out comes a thick, foamy milk shake. Or, have you seen the new lines of frozen dinners in pouches? Just drop the plastic bag in boiling water for a few minutes and serve. The result is a gourmet serving of Beef Stroganoff. These give us an idea of some of the new products being introduced. In our modern technology new products are being displayed and tested constantly for the consumers' consideration and these consumers have become quite sophisticated in expecting novel and exotic offerings. Therefore, new product development must be done to promote utilization of any particular agricultural commodity. Even though dried fruits are succulent, energy-rich foods, they must be displayed in new forms to continue their wide consumer acceptance. One type of new product approach is to emphasize the compatability of certain food items. A possibility for dried fruits is the combination with dry breakfast cereals such as the popular raisins-in-branflakes. The objective of the project which we shall discuss today was to find additional outlets for several of our California dried fruits.

Low moisture dried fruits should have a natural market in conjunction with cereals. A dehydrated low-moisture flake has been made from prunes, but this product isn't as flavorful as it should be. Also, in recent months, marketing tests have been made on ready-to-eat cereals containing whole or sliced, freeze-dried strawberries, peaches, and blueberries. The principal disadvantage of freeze-drying is that the process is expensive. We began to investigate various other methods of preparing a dried fruit product that would be compatible with cereals. The criteria that we set were:

1. The process must be economical.
2. The finished product must have a good flavor.
3. The finished product must have about 2% moisture.

Different methods of producing dried fruit chips were investigated with varying results. In one, a thin film of pureed fruit was dried using a conventional tunnel dryer, but drying time was too long and the product had a burnt taste. In another procedure, microwave energy was used as the heat source, but the heating pattern was irregular because of slight variation in the spreading of the pureed fruit, and also, the product was hard to remove from the drying tray. A good flavored, low moisture dried fruit product was obtained, however, by use of a modified double drum dryer.

A 12 x 18 in. double drum dryer was modified (see figure 1) so that a rapid air flow across the film of fruit accelerated moisture transfer. In addition, cool dehumidified air was blown on the product just before it reached the doctor blade. Without a cool curtain of air at this point, the product would still be molten because of the high sugar content. This cool, dehumidified air lowered the temperatures of most of the products sufficiently so they could be removed from the drum by the take-off reels. With raisins, even the cool air didn't allow them to leave the doctor blade but an additional air blast had to be incorporated in order to force the molten mass off the doctor blade. The dried fruits came off as a sheet into a dehumidified chamber. In some cases, such as figs, the sheet could be chipped into small pieces and incorporated directly into cereals in that form. With other fruits, the film was too thin and brittle to be used directly and had to be pulverized into a powder, and then this powder shaped into the type of product desired.

In the actual drying procedure, the fruit was ground through an ordinary food grinder and dropped directly onto the drums. Some batches of fruits were also dried after pureeing in a Waring blender with water. There was no noticeable difference in the final product between the blended and nonblended samples.

The drying times for each product varied depending upon how the drum was set. Adjustments which affected the drying were:

1. Temperature
2. Drum speed
3. Drum clearance

Settings used for prunes, figs, apricots, and raisins are shown in Table 1.

Another important adjustment is the speed of the take-off rollers. The faster the take-off roller rotation, the thinner will be the final sheet of fruit. However, if the roller goes too fast the sheet will pull apart before it has a chance to cool. Some products, such as figs, had to be taken off very slowly or they wouldn't come off at all.

The powders obtained were formed in a commercial pellet press into disks 5/8 in. in diameter by 1/8 in. thick in the middle. The moisture was maintained at approximately 2% to permit proper pressing. If the powder is too wet, further drying could be accomplished by storing in a chamber with dehumidified air blowing over it. If the powder is too dry the flakes will not adhere together, and if it is too wet the press will clog quickly. It is possible that starch and sucrose or other press lubricants might improve the operation. Figure 2 shows the broken or ground up sheets and the pressed disks made from apricots, figs, and prunes.

Some specific products that we have prepared are shown in Figures 3 and 4.



Storage studies on these fruit disks indicated that they remained intact when packed with cereal flakes. When poured, they were well distributed and attractive in appearance. The fruit disks also maintained their shape even when immersed in milk for a considerable time. This type of product could provide an additional market for dried fruits. Inquiries have been received from both domestic and foreign manufacturers of dry cereals who are interested in this new product.

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Double Drum Dryer Settings for Preparing Low-Moisture Dried Fruits

Table 1

Dried fruit	Temperature	Rotation	Clearance
Prunes	330° F.	1 rpm	0.008 in.
Figs	270	1/2	0.006
Apricots	270	3	0.006
Raisins*	310	1/2	0.006

\*20% sucrose added.

(10/21/65)

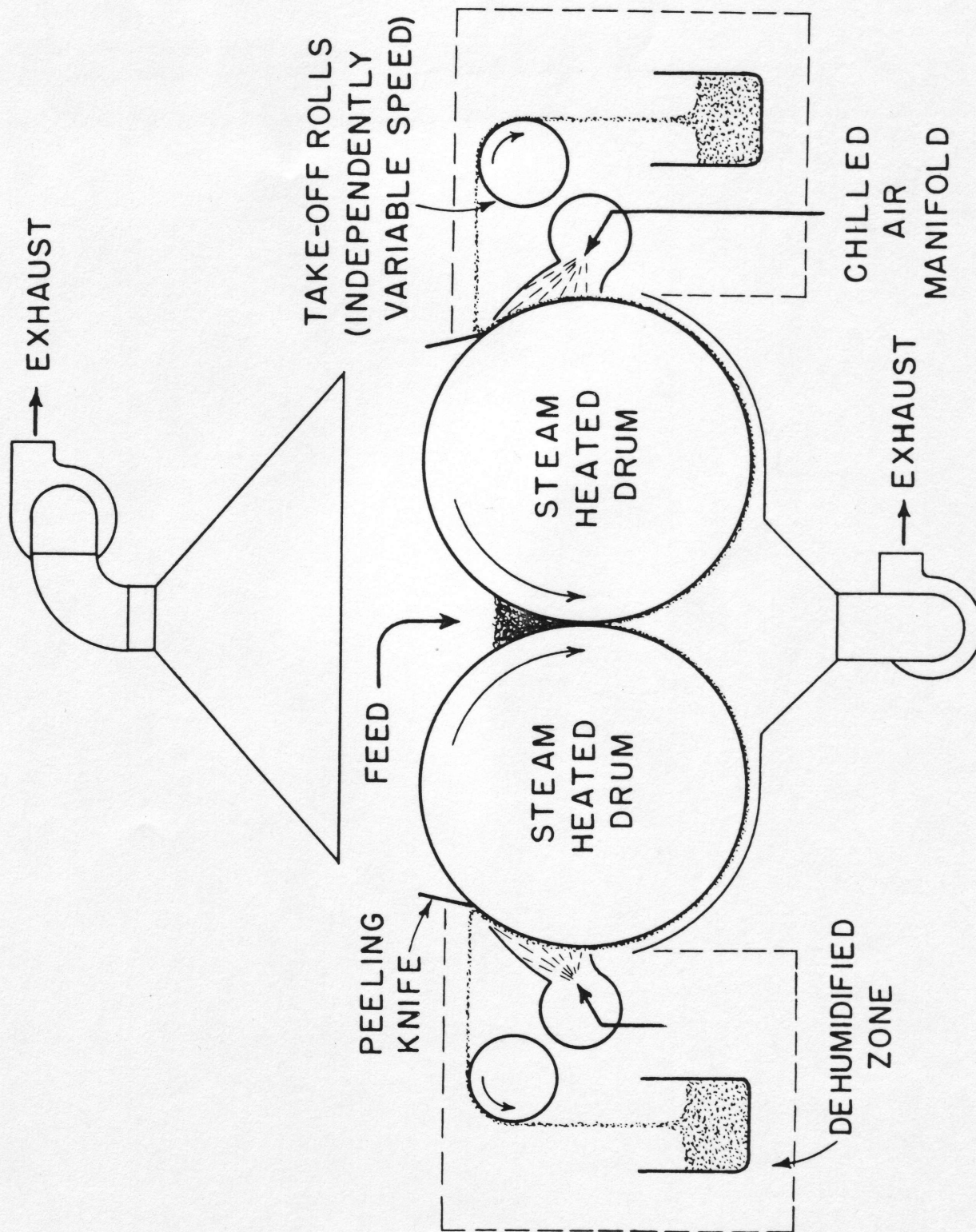


Figure 1. Modified double drum dryer.



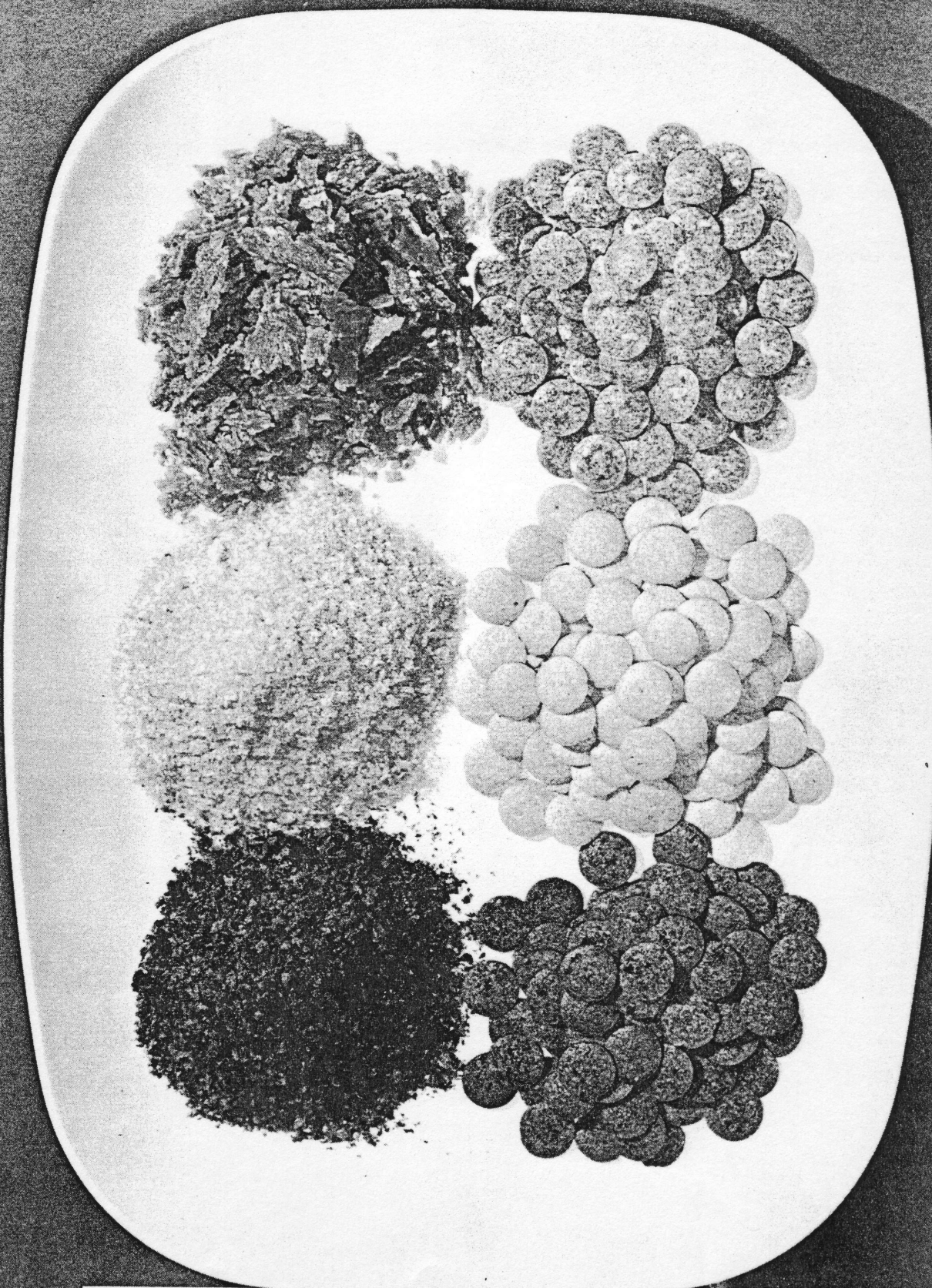


Figure 2. Left - fruit powders from drum dried sheets.

Right - pressed disks of prune, apricot and fig.



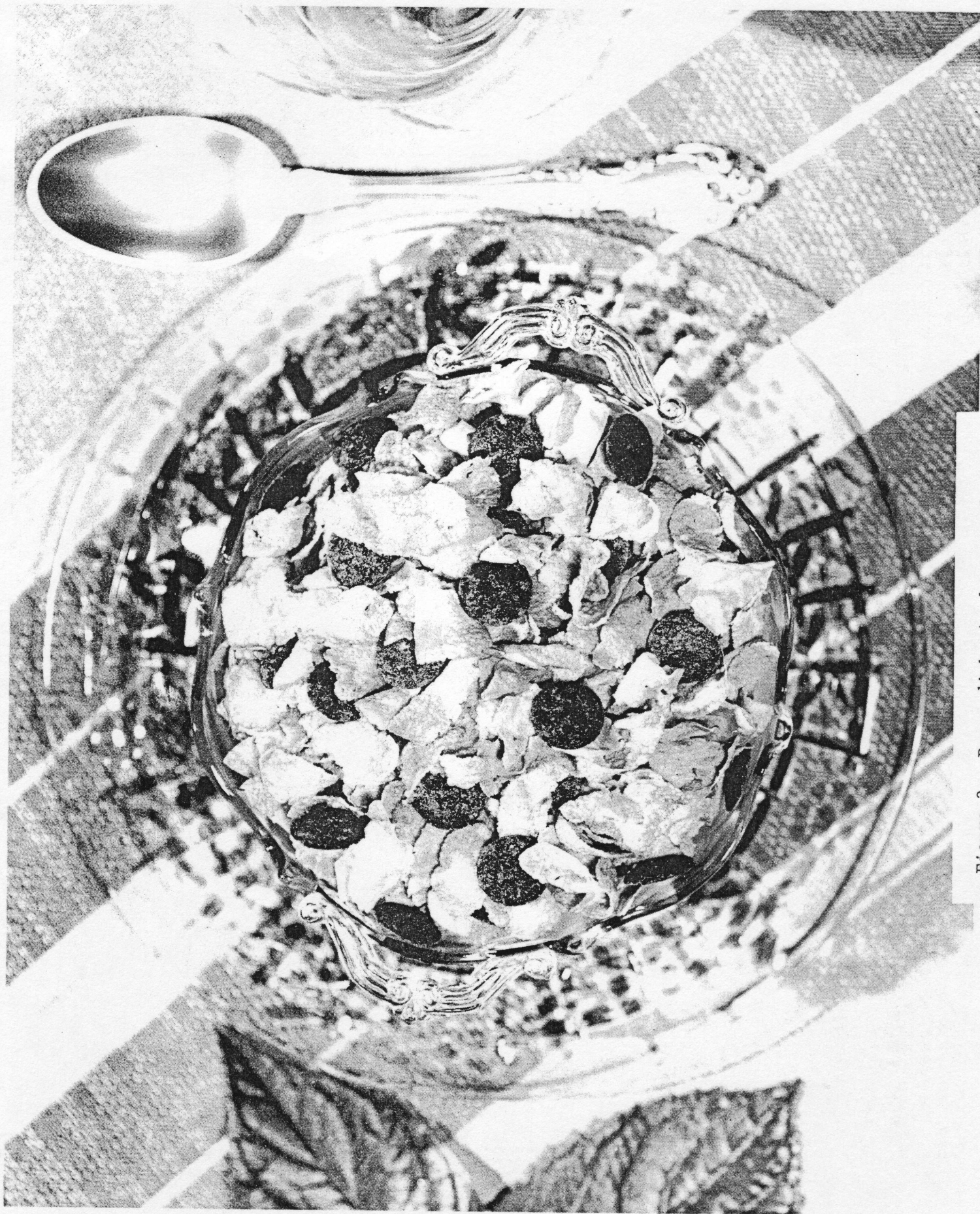


Figure 3. Prune disks in dry cereal.



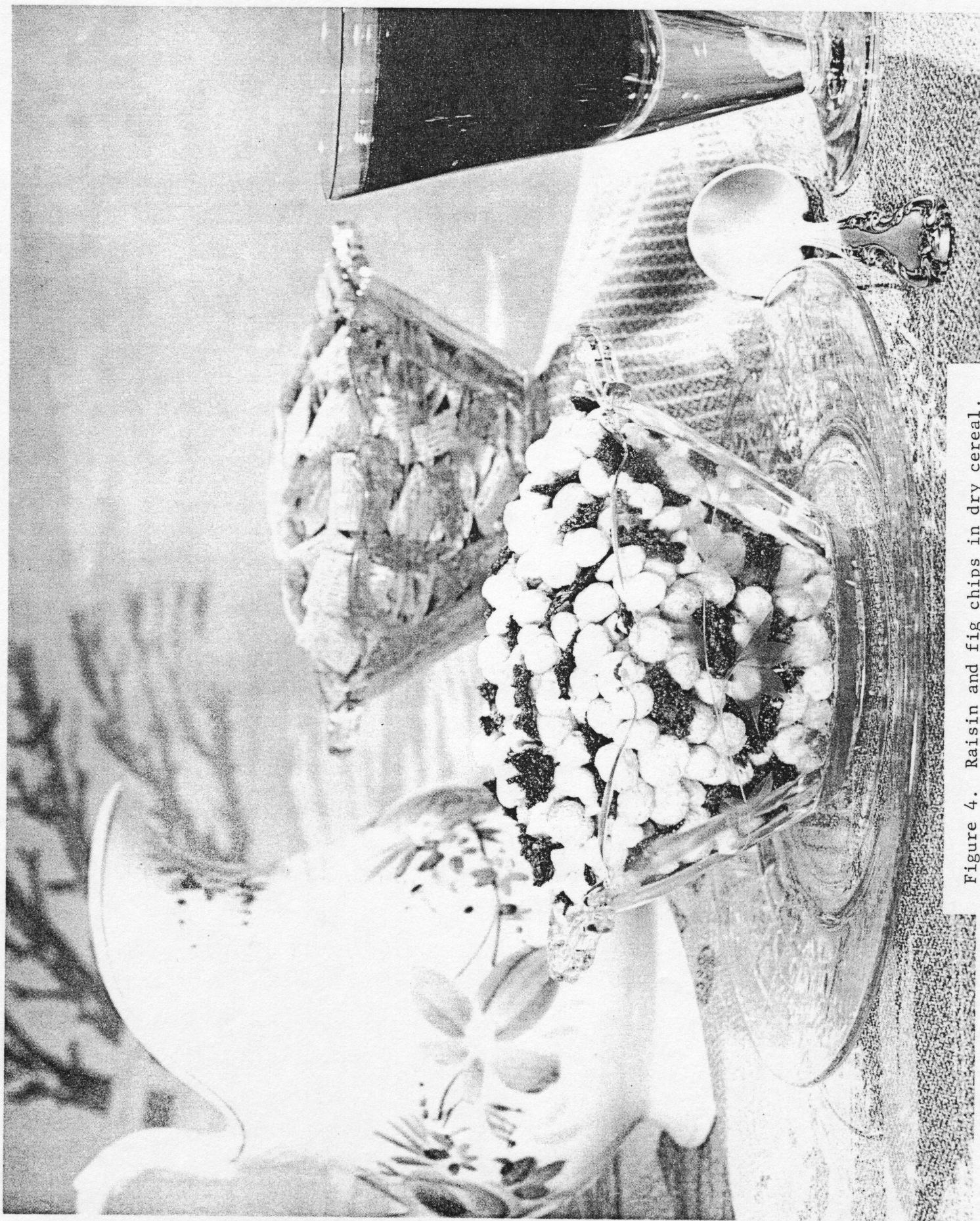


Figure 4. Raisin and fig chips in dry cereal.