

# Changes in Hardware

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## Abstract

Hardware, i.e., washing machines and associated dispensers represent a vital part of the clothes' laundering process. The home laundry process involves more time of the housewife than any other single household activity. Increasing numbers of wash bath additives, plus growth of fabric inventory and associated complexity of washing recipes can increase this involvement with the washing process. Improved dispensers, timers and controls offer means to reduce this involvement and provide truly automatic clothes washing.

Hardware-washing machines and associated dispensers represent an important part of the laundering process. Dispensers and their importance to improving the convenience of the laundering process are the responsibility of the washing machine manufacturer.

In order to better understand the current industry practices in this area, and to set into proper perspective anticipated developments in the next few years, two areas are discussed: the home laundry industry, and the housewife who uses this industry's products.

The home laundry business is a very important segment of a very large business—major appliances. Total major appliance sales for the year 1967 were over 20,000,000 units. Total laundry appliances accounted for 6,793,000 units, or 30.6% of this total. (Association of Home Appliance Mfg., Chicago, Ill.) In addition to being a big business, the appliance business, as a whole, and particularly the home laundry segment of it, is one of the most highly competitive consumer-oriented businesses in the country today. An examination of washer prices and feature content in 1958 and 1968 supports this contention (Table 1). Dollar values shown are in terms of actual dollars; no allowance is made for the effects of inflation and the eroded purchasing power of the dollar.

Cost control through design improvements, manufacturing efficiencies, distribution economies and

automation are paramount if a company is to remain profitable. The addition of costly features as such, that do not have corresponding value to the consumer, can very quickly denigrate this profit picture.

The washer industry has been an evolutionary one. In the past 100 years it has come from washers powered by muscle, to early electric powered designs, to the wringer type washer, to the automatic two, three or infinite speed washer of today. All of these designs have employed an agitator in a tub with a water bath. This agitation provides soil removal from the clothes by the scrubbing action of the clothes fibers. To this bath the operator adds soap or detergent to dissolve the soils. For at least the next ten years, people will continue to clean soiled clothes in essentially this same method. Ultrasonics and other exotic methods will not provide the means for soil removal from most clothes by most people for many years.

Of the housewife's total waking hours, laundry typically involves a greater portion of her time than any other single household task (Table 2). Approximately 17½% of her time is spent in tasks associated with home laundry; over half of it is involved with ironing clothes (Table 3). (Appliance Manufacturer, Chicago, Ill.) However, it is also interesting to note that while laundering takes a considerable portion of the housewife's time, it is a task from which she derives considerable personal satisfaction. It also is relatively easy compared to other housekeeping jobs. Specifically, washing is the most enjoyable. This changes when washer owners with dryers are included in the survey. As noted previously, ironing continues to be the most onerous of all home laundry jobs. (Housewives' Attitudes Toward Future Home Laundry Equipment Needs, research prepared by U.S. Steel Corp., Pittsburgh, Pa.)

A brief summary of the housewife's greatest desire concerning home laundry might be stated as follows: "reduce my total involvement with the laundry process." This has become more difficult in recent years, for despite the improvements in washers, in terms of agitator design, cycles, speed selection, etc., manu-

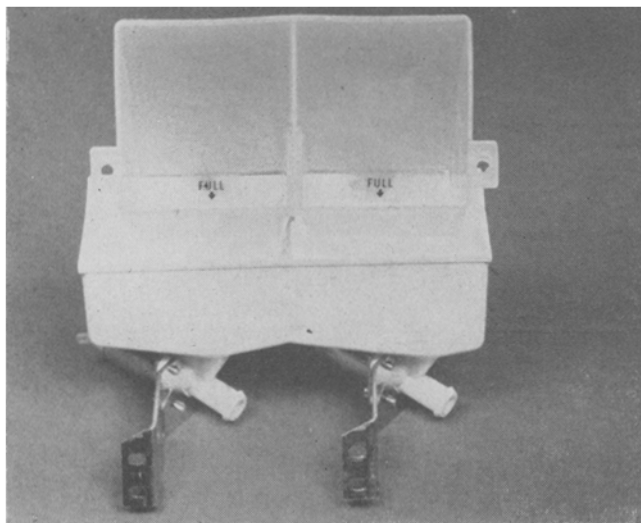


FIG. 1. Top view of a backsplash mounted liquid dispenser and fabric softener dispenser.

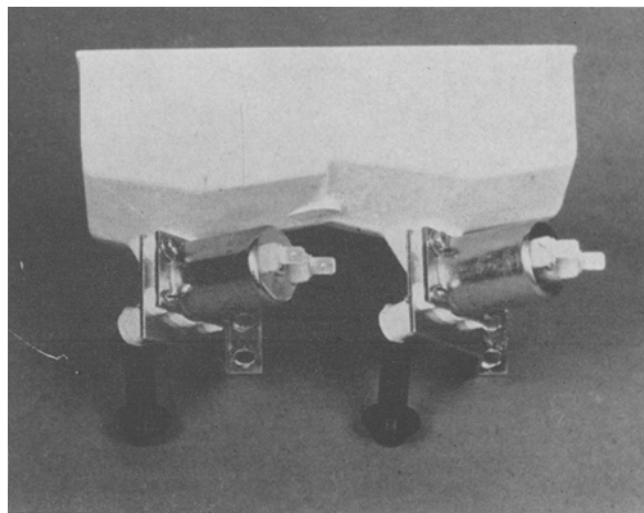


FIG. 2. Bottom view of combination dispenser shown in Figure 4. Note solenoid operated valves for dispensing additives at properly programmed time in wash cycle.

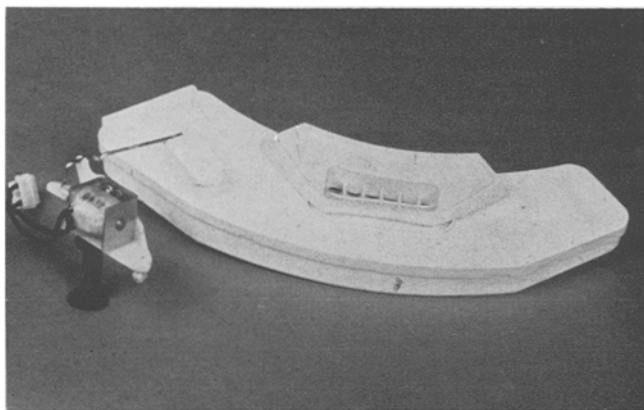


FIG. 3. Typical cover mounted timed bleach dispenser. Note solenoid operated valve which is programmed from washer timer. Bleach dumping is delayed to permit detergent brighteners to work on fabrics in wash bath.

facturers have been confronted with an accelerating "fabric explosion." The proliferation of fabrics, with a variety of washing recipes, plus the demand of women for cleaner washes plus the problems in dirt and stain removal in many of the newer fabrics have made washers more complicated, not less.

Because of competitive pressures manufacturers have been reluctant to add more complex controls and mechanisms to meet this need. Couple this reluctance with the number one concern of the washer buyer, dependability, usually expressed in terms of a buyer's distrust of extra gadgets and devices on a washer, and some measure of the dichotomy facing the washer manufacturer is evident. On the one hand is an often expressed desire for less involvement (more automaticity) while on the other hand is a deep-seated distrust of washers with extra features and mechanisms. Despite this problem, manufacturers have developed reliable dispensers with automatic operating mechanisms which provide automatic addition of additives to the wash cycle at the proper time. These can serve as an important means of reducing the housewife's involvement with the laundering process (Fig. 1-4).

Revolutionary changes in wash methods are unlikely in the next 5 to 10 years, for example, ultrasonics, and neither are revolutionary changes in additive dispensing anticipated in this period. Currently there are at least four additives used some of the time by most housewives. These include: bleach; fabric softeners; detergents, powdered and liquid; and bioenzymes. To demonstrate the importance of these additives, note their current usage: detergent, all loads (unless dyeing); fabric softener, 43% of women use in 25% of loads; bleach, 85% of women add to about 28% of loads; enzyme soak, possibly 25% in countries where extensively available and promoted. (Detergent Manufacturer, restricted source.)

TABLE I

Comparison of Feature Content and Price Levels of Popularly Priced Automatic Washers—1958 vs. 1968

Feature content	1958	1968
Capacity	10 lb	14-16 lb
Speeds	1 or 2	2 Programmed
Water level	Manual	Preset
Wash temperatures	2	5 Combinations
Wash cycles	2	4
Fill	Time	Positive
Bleach dispensing	.....	Delayed automatic
Lint filtering	.....	Self cleaning
Soak cycles	.....	Automatic
Lid switch	.....	Interlock
Small-load systems	.....	Yes
Approximate retail price level	\$280	\$230

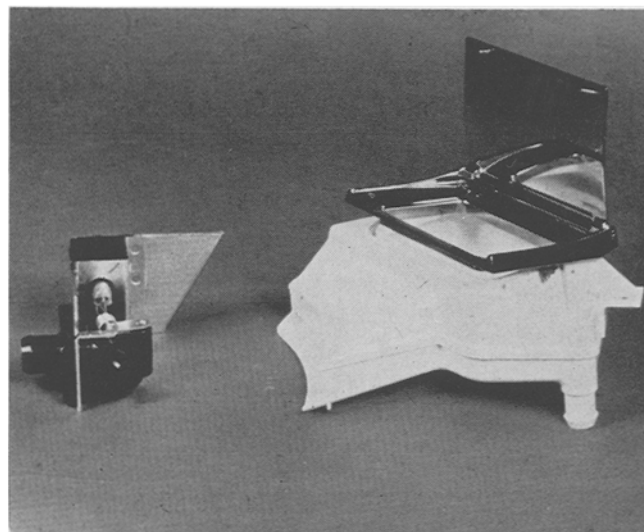


FIG. 4. Cover mounted powdered detergent dispenser and associated solenoid operated valve. This provides automatic dispensing of detergent for a second wash.

The immediate discussion is confined primarily to detergents and bioenzymes, but hardware in some form or other must be provided within the geometry of the washer for all these additives if they are to be dispensed automatically, accurately and safely. Thus bleaches and bioenzymes, for example, cannot be isolated in terms of their cost to the total product, nor can their need for automaticity be overlooked.

Soaking of clothes is not new. Women have done it for years. Bioenzyme preparations commercially prepared, though, are a recent development, and some background on them may be helpful. They have been marketed in Europe for about two years, and in those countries where they are available and promoted they may be used in as many as 25% of the washers. (Estimate by restricted source.) There are two types of preparations, one requiring a pre-soak prior to washing with regular detergent, the second product has the enzymes compounded with the detergent. Of bacterial origin, these enzymes of themselves are not cleaning agents, but when combined with detergents they produce a synergistic effect. The enzymes function as cleaning agents by attacking proteinaceous soils which frequently resist soap and detergents.

Two American laundry products containing enzymes are currently being test marketed. The label of the package of one product states that it contains enzymes and that the product is for pre-soaking laundry. The other says nothing except that the detergent "gets wash cleaner than ever before." Other US detergent makers are known to be investigating the feasibility of reformulating their products to include enzymes.

Enzyme products represent an exciting new dimension in home laundry practice. Their efficacy in pro-

TABLE II

Housewife Activity—Per Cent of Housework Time Spent in Various Activities

Activity	Per cent of time
Laundry	17.5
Communications	15.5
Housework	14.5
Child Care	12.5
Personal Care	12.0
Food Preparation	11.0
Kitchen	8.5
Sew	3.5
Miscellaneous	5.0
Total	100.0

tein stain removal has been established. Their market potential appears to be excellent. From the point of view of the washer manufacturer, their success may mean changed wash cycles, perhaps a soak with intermittent periods of slow agitation. It may also mean improved temperature control; the enzyme activity flourishes best in wash bath temperatures of 90 to 140 F.

Tests indicate that pre-soak followed by regular wash gives significantly improved soil removal. Intermittent agitation with soak periods gives best performance. (General Electric Major Appliance Laboratories, Louisville, Ky.) A typical wash cycle offers an agitation period of up to 19 min, followed by an extraction, a rinse fill, rinse agitation and final extraction (spin) of up to 7 min. A somewhat more complex cycle which would necessitate automatic dispensing of a detergent would be a cycle which included a pre-wash (an additional wash agitation and extraction). This kind of cycle is recommended for particularly soiled or dirty clothes loads. A third cycle might involve the use of a soak with a brief period of agitation, followed by a regular wash cycle in which the detergent is automatically added in the wash portion of the cycle. Both the second and third cycles described above require a detergent dispenser.

If these are to be fully automatic washers, that is, all additives are to be automatically dispensed at the proper time in the wash cycle, reservoirs or tanks should be combined with solenoid operated valves on the water supply or recirculating water system and/or at the tank and container. All detergent dispensers require intelligence from a control system which will permit the dispensing of the detergent at the proper moment in the wash cycle. Current automatic dispensing means for detergent are found principally in more expensive models by most manufacturers. These include powdered detergent dispensers and liquid detergent dispensers as well as fabric softener and bleach dispensers. Today, the retail cost of such systems is on the order of \$8.00 to \$20.00 depending on their complexity. If more customers are to get the benefits of improved wash cycles, plus the automaticity that will reduce their involvement with the

TABLE III  
Housewife Activity Study—Per Cent of Time Spent on Tasks  
Associated With Home Laundry

Home Laundry Activity	
Ironing	10.0%
Folding	1.8%
Load Washer	0.8%
Hang Clothes	0.7%
Put Away	0.6%
Dampen	0.6%
Sort	0.5%
Hand Laundry	0.3%
Other	2.5%
Total	17.5%

laundering process, more economical means to handle dispensing must be found. Possibilities include: Improved hardware, utilizing lower cost materials, e.g., plastics. (See Figures 1-4 for systems in current use.); simplified control mechanisms; the use of solid state controls.

The utilization of solid state devices for control of the dispensing of detergents and other additives can only come about when the application of solid state devices on major appliances becomes broader. Their inherently greater flexibility can be utilized to operate the washer timer and to control mechanisms that dispense detergents and other additives. It is probably safe to say that with time, and increased volumes plus reduced costs of solid state and integrated circuits, the application of solid state to timers will be employed more generally. These solid state devices can then be utilized for the operation of controls that dispense the additives utilized in the wash.

Automatic dispensing of a single detergent and soaking compound, rather than a combination of an enzyme soak followed by a detergent wash is already possible. Perhaps liquid detergents offer the best answer since they are more easily dispensed, not requiring water systems. They must be self cleaning, leaving no residue and competitive in price with powdered detergents. This kind of product together with improved automatic dispensers can make possible washers with the features women say they want, namely, washers in which all additives are automatically dispensed from storage bins, in exactly the right amount, at exactly the right times.

[Received September 10, 1968]