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AUTOMATIC MERCHANDISING

by

D. Kenneth Winebrenner

Candidate for the
Master of Fine Arts
in the College of Fine and Applied Arts
of the Rochester Institute of Technology.

Date of Submission:
June 3, 1967

Adviser:
Mr. J. Smith

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I wish to express my appreciation to Mr. James Smith and Mr. Ben Taylor for their resourcefulness, encouragement and interest.

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M. Winebrenner
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Title Page

Title: Automatic Merchandising

Thesis Proposal for the Master of Fine Arts

College of Fine and Applied Arts

Rochester Institute of Technology

Submitted by: D. Kenneth Winebrenner Date: 3/1/67

Advisor: James D. Smith

Approved by Graduate Committee: Date: 3/16/67

Chairman: [Signature]

I. Purpose of the Thesis:

The purpose of this thesis is to explore the designs of coin operated, automatic merchandising and to apply my findings to the creation of my own designs.

II. Scope of the Thesis:

- A. to examine automatic merchandising - past and present methods
- B. to determine what products and services are best served by automatic merchandising
- C. to include research of the various machines involved - as various types of vending machines
- D. to experiment with a personal approach to:
 1. coin handling mechanisms
 2. product dispensing mechanisms
 3. exterior designs
 4. security designs
- E. to create from studies a functional and attractively designed machine

III. Procedures:

The presentation will include readings and research into applied designs and principles of established designs, as well as experimental designs; it will also include illustrative material pertinent to the problems, and prototypes of experimental designs. A summary and conclusions will be based upon research and experiments.

IV. Alternative Proposals:

Inexpensive Photographic Equipment for the Dark Room
Light Fixtures from Plastic Foams

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INTRODUCTION

In this thesis I wished to explore the designs of various coin operated mechanisms and to study some of the aspects of automatic merchandising. It was my aim to apply my findings to the creation of my own designs of automatic venders.

THE HISTORY OF VENDING

According to a manuscript entitled, PNEUMATIKA, which is a copy of an original manuscript dating back to 215 B.C., the first coin operated machine was invented in Egypt around this time. The volume was published by a mathematician named, Hero; in it he described his own inventions as well as those of his teacher, Tesibius. Although the original volume was lost, a copy of it was made. In 1587 it was translated into Italian and was illustrated. The coin operated mechanism is described as:

... a coin - actuated device to be used for vending sacraficial water in Egyptian temples. The device was completely automatic and was set in operation by the insertion of ' a coin of five drachmas,' equivalent in modern money to approximately 75 cents. Whether the holy water vending machine was the invention of Hero or Tesibius cannot be determined from the manuscript. Nor is there any evidence that the device was widely used.l.

The next recorded appearance of vending devices was in 1615; taverns and inns in England vended snuff and tobacco to their customers. Perhaps it was the translation of the PNEUMATIKA which revised an interest in selling by "machine." What the tobacco vendor actually

amounted to was a box like affair ($9\frac{1}{2}$ inches long, $4\frac{1}{2}$ inches wide, and 4 inches deep) which had a handle and held about a pound of tobacco. A half pence was inserted in the top of the device which flipped a trigger causing the lid to open. A pinch of snuff could then be retrieved by the customer for his pipe; it was the barmaid's duty to shut the lid and pass the device to the next customer.².

Some 200 years later, another type of vending machine appeared in England. Richard Carlile, a free-thinker and book seller, in hopes of outwitting the police and censors constructed a device for selling books.³ Carlile and some of his employees had been jailed for selling books such as Thomas Paine's, THE AGE OF REASON. It was Carlile's idea to sell the books by machine, so that no employee or dealer could be legally identified and prosecuted.

Unfortunately, the courts held Carlile responsible nevertheless and convicted one of his employees of selling blasphemous literature through the device. Whether the device was truly automatic cannot be established today, but it was clearly an application of the vending principle.⁴.

In Europe, England, France and Germany, inventors apparently intrigued by the idea of the vending principle, began to design and build a number of machines which

would dispense tobacco, gum and candy; Carl Ade, a German inventor built machines which would vend handkerchiefs, confections and cigarettes. "Many of the inventors took the precaution of patenting their devices throughout the world --- in India, Luxembourg, Spain, New South Wales, Tasmania, Cape of Good Hope, South Australia, Canada, New Zealand."5.

In the United States in 1884, the first patent was issued to W.H. Fruen for an "Automatic Drawin Device." The machine bore a remarkable resemblance to Hero's dispenser of holy water, but it was never produced in any large numbers.6.

After Fruen's invention, other various models of vending machines were patented. At this time, however, the manufacturers of the machines encountered a problem which was to plague the vending machine serviceman to this date. The inventor of various coin operated devices, Percival Everitt, on July 28, 1885 stated the following:

It has been found in practice, ... that although the apparatus is perfectly successful when not designedly misused, articles such as paper, orange-peel, and other rubbish have been maliciously placed in the slit provided for the admission of the coin, and that in consequence the channel provided for the passage of coins from the slit became blocked.7.

Although against the law, there still is something compelling in the game of "beating the machine," which tempts its customers to try to outsmart it by various unorthodox means.

In 1888 the Adams Gum Company, under the management of Thomas Adams, successfully installed its Tutti Frutti gum machines in New York City's elevated platforms. It was this step which prompted the actual beginnings of practical vending in the United States. Europe, in turn, namely the French government, in 1889 in a philanthropic gesture allowed bon-bon machines to be installed in the railroad stations in the Paris-Marsailles line. The profits from the machines went to the Society of the Stores for the Blind, which was a charitable organization responsible for the idea of installing the machines. In France the idea of coin vending goods spread, and by 1893, French manufacturers beside vending bon-bons, were vending boiling water, coffee, ices, wine, and perfume.⁸

Back in the United States the SCIENTIFIC AMERICAN, impressed with coin operated machines wrote this opinion for its readers.

To the consumer, the automatic distributor offers the advantage of

immediately delivering, for a moderate sum, and without any loss of time, an accurately measured quantity of a hot or cold beverage furnished directly by the producer. The latter, selling his merchandise directly, can deliver it at a very low but remunerative price, and, through the aid of the apparatus with placards, circulars, etc., put at the customer's disposal, can obtain the best of advertisements.⁹

Germany was first in installing its first automatic restaurant in 1895. The restaurant, although not as efficient or sanitary as today's, strongly resembled the Automat.

Perhaps the most unusual use for a vending machine was innovated by a law firm; the machine was based upon the same principle as a book vendor, however, this machine served the purpose of an "Automatic Divorce Machine."

For a while at least, divorce papers --- entirely legal --- were service items which one could buy from a vending machine in Corinne, Utah. Any citizen bent on obtaining a divorce could insert \$2.50 in half or silver dollars, pull a lever on the side of the machine, and pick up his papers from a delivery drawer which popped out cash register fashion. Then the papers could be taken to the local law firm, whose name was imprinted on the form, where the names of the divorcing parties were appropriately written in and witnessed.¹⁰

After the turn of the century, other more mundane machines were being patented. The National Postage -

Service stamp vendor appeared; this company is the oldest vending company still in business today in the United States. Several manufacturers were making penny scales; some had crude recording devices installed which thanked the customer for stepping on it, while others told the customer his fortune. The Pulver Company of Rochester, New York almost revolutionized the design of the gum machine by placing mirrors on on the faces of their machines. This trend of installing a mirror on a vendor continued for half a century thereafter. A machine which amazed and intrigued its customers was first introduced at the Pan American Exposition in Buffalo by the Mills Novelty Company; the machine sold, for a penny, a measured amount of peanuts.¹¹

Since vending machines had become a familiar sight on the American Scene, the vending industry began to encounter certain problems. The first, that of cheating the machine, was unwittingly promoted by R.I. Clegg who in an article in the AMERICAN MACHINIST described various means by which to cheat coin operated machines. The fact that one could "beat" the machine by using various devices such as, slugs, adhesive coins, and so on, discouraged some manufacturers. "The struggle, of course, was and is a long one, but the perfection of the slug rejector during the 1930's and Federal legislation aimed at slugs

in 1944, made the vending machine a less attractive target for larceny." 12.

Another problem which harassed the vending industry was that of gambling. Although most vending manufacturers did not build slot machines and other types of gambling devices, the public held coin operated machines suspect of being illegal. The manufacturers in a joint effort formed the National Automatic Merchandising Association. The Association did not, however, become affective until 1945.

This program, started as recently as 1945, was augmented in the following years by the growing number of vending companies who placed their stock on the market. With the publication of quarterly and annual reports, much of the mystery went out of vending. A stenographer-stockholder in one of the listed companies was in position to know information which a few years earlier had been held in strictest secrecy. As the mystery and secrecy were removed from vending, so, too, was much of the suspicion. 13.

A new phenomenon was introduced to the United States in 1902 by the Horn and Hardart Baking Company of Philadelphia; the first Automat was opened in America. By the next year, the company had opened numerous automatic restaurants in New York City and in Chicago. The SCIENTIFIC AMERICAN, which had been following the growth of the vending industry quite closely, proceeded to describe this new marvel.

The man who walks into the automatic restaurant with the idea that he can sit down at a table and order what he likes from a waiter will be sadly mistaken. There are no waiters in the usually accepted term. The two or three white-aproned men who nonchalantly roam around without apparently much to do are there not to serve meals, but to remove the empty dishes. You must serve yourself. You buy your portion of meat or soup, your glass or beer or wine, or your cup of coffee, and you carry what you have bought to your table. If you are in a hurry, you may stand and eat, and enjoy what is popularly known as a 'perpendicular meal.'¹⁴.

With the idea of a food vendor, the Mills Novelty Company experimented with a ten selection soda machine. The operation was contained in a barrel shaped container. Since these days predated the invention of paper cups, the customer had to rinse his own glass at a trough provided beside machine. The soda was not refrigerated, and the glasses were not clean; still the machine was a success. To help solve the problems of sanitation, a company, now known as the Dixie Cup Company, marketed the first paper cups for use in the vending machines.¹⁵.

Since the vending machine was providing numerous small services, the manufacturers of coin operated machines tried to persuade the United States Government, namely the United States Post Office, to purchase

models of stamp vendors. After investigating the advantages of vending stamps, the Post Office finally agreed to purchase a number of machines on a trial basis. However, the idea of using machines to sell stamps, envelopes, etc.. on a large scale was rejected when the Post Office Department found that the machines were not slug proof.¹⁶

Some of the other machines being patented were ones which dealt in small but practical services. Mr. Bolden, of Morris, Illinois, invented a small bar-top device called the Yankee; the Yankee dispensed and lit in one operation kitchen matches for a tavern's smoking customers. Among others, the Nick - O - Lock Company, which got its start by manufacturing coin operated locks became a flourishing business. The company installed locks first in public facilities, and later, in the lockers in train and bus stations.

As new products appeared on the American market, so new ideas came to the manufacturers of vending machines. Hyman Goldman purchased the Macke Vending Company after he found out that cigarettes could be sold by machine at a three to four cent markup in price. Today the most profitable item sold by vending machines, next to hot and cold drinks, are cigarettes.

In the late 1920⁴ies the vending industry expanded still further with the formation of C.A.M.C.O., the Consolidated Automatic Merchandising Corporation. The corporation consisted of a variety of manufacturers who had formed a merger. The aims of C.A.M.C.O. were stated by one of its organizers, Mr. A. Granat, vice - president of United Cigar Company.

After we got the company started, we began to discuss the probability of consolidating the different aspects of our business, namely, the manufacturing, the servicing, and the selling. Therefore, we formed the general organization we now have, which overshadows all of the companies which heretofore have been engaged in the business of vending merchandise by machines.17.

The future of C.A.M.C.O. was short lived, however, for in 1933, the whole operation was forced into bankruptcy by the depression.

Two years before C.A.M.C.O. went out of business, N. Robert Harvey of Manhattan attempted a new step in vending. Harvey installed a twenty four hour coin operated delicatessen in the Beaux Arts Apartments in Manhattan. It was his idea to provide the residents of the building with a variety of foods, including those requiring refrigeration. Unfortunately, due to the high spoilage rate of the refrigerated foodstuffs, the project failed. Som years later, the installing

of milk and egg machines in apartment houses in New York City became a very profitable business.

Although many of the companies formed during the 1930'ies went into bankruptcy or remained dormant during the war years, they did lay the groundwork for the boom which occurred in the industry after the war. Strangely enough, after the suspension of operations in the vending industry, plant managers found that, "the vending machine was an invaluable tool for keeping workers on the job,"^{18.} in defense plants. Instead of keeping workers from doing their jobs, the accessibility of a soft drink or candy bar provided the extra break and energy needed by the workers.^{19.}

After the war, more sophisticated types of machines were developed.

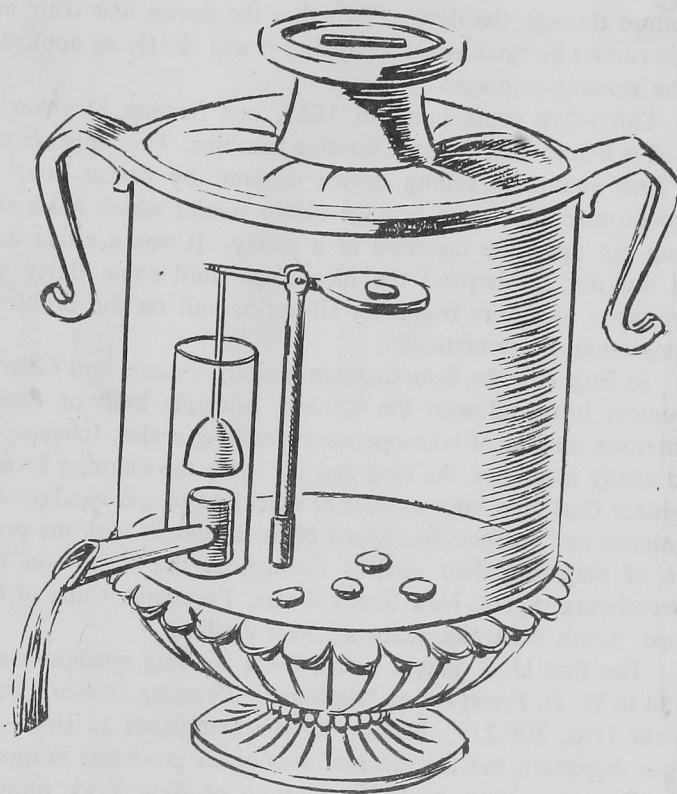
Refrigeration and heat were added to the vending machines so that hot and cold foods could be vendrd. Coin mechanisms were perfected so that machines could accept all popular denominations. Chagemakers were introduced --- first as service machines, then built in as part of the machine itself until the chagemaker is now a standard piece of equipment on most major vending machines.^{20.}

To show the growth of the vending industry, the total volume vendrd in 1946, amounted to \$600,000,000; the number had grown to \$2,586,000,000 by 1960. Today the vending machine is so much a part of our daily

environment that we take it for granted. Whether we favor the fact or not, vending machines are going to take over many areas of sales and service. The cup of coffee vended may not be as good as home brewed, but it is always available.

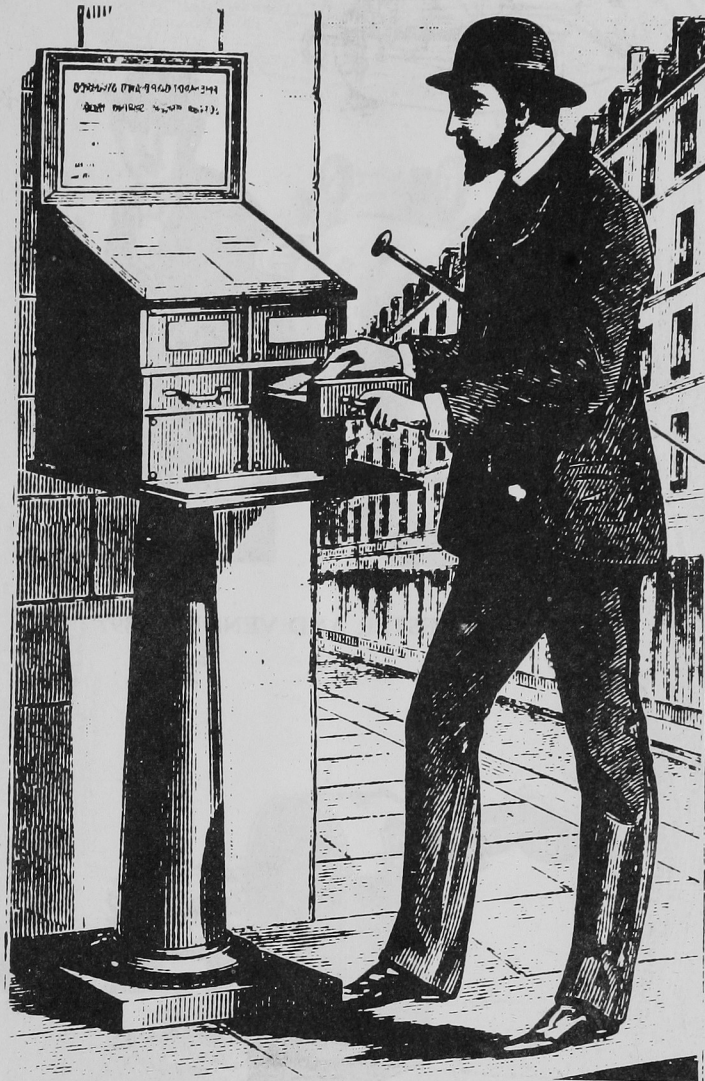
FOOTNOTES

1. G.R. Schreiber, A CONSISE HISTORY OF VENDING
IN THE U.S.A., p. 9.
2. Ibid. p.9.
3. Ibid. p. 10.
4. Ibid. p. 12.
5. Ibid. p. 12.
6. Ibid. p. 12.
7. Ibid. p. 13.
8. Ibid. p. 19.
9. Ibid. pp. 19-20
10. Ibid. p.21.
11. Ibid. p. 22.
12. Ibid. p. 23.
13. Ibid. p. 24.
14. Ibid. p. 24.
15. Ibid. p. 26.
16. Ibid. p. 25.
17. Ibid. p. 36.
18. Ibid. p. 44.
19. Ibid. p. 44.
20. Ibid. p. 45.



HERO'S SACRIFICIAL WATER DISPENSER

fig. 1.



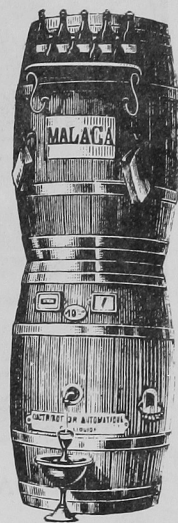
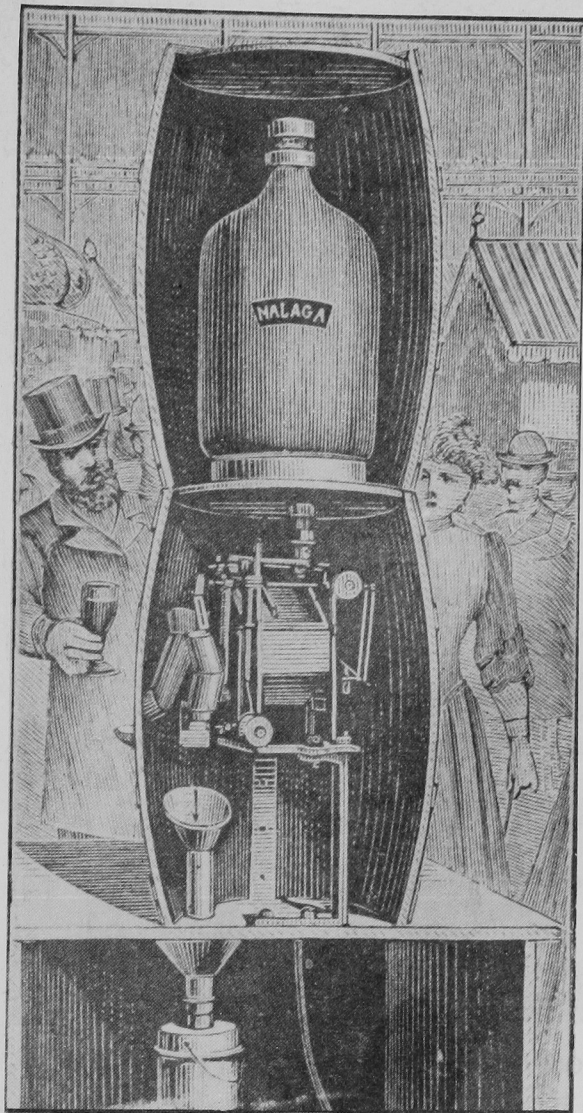
EARLY POSTAL CARD VENDER IN 1886

fig. 2.



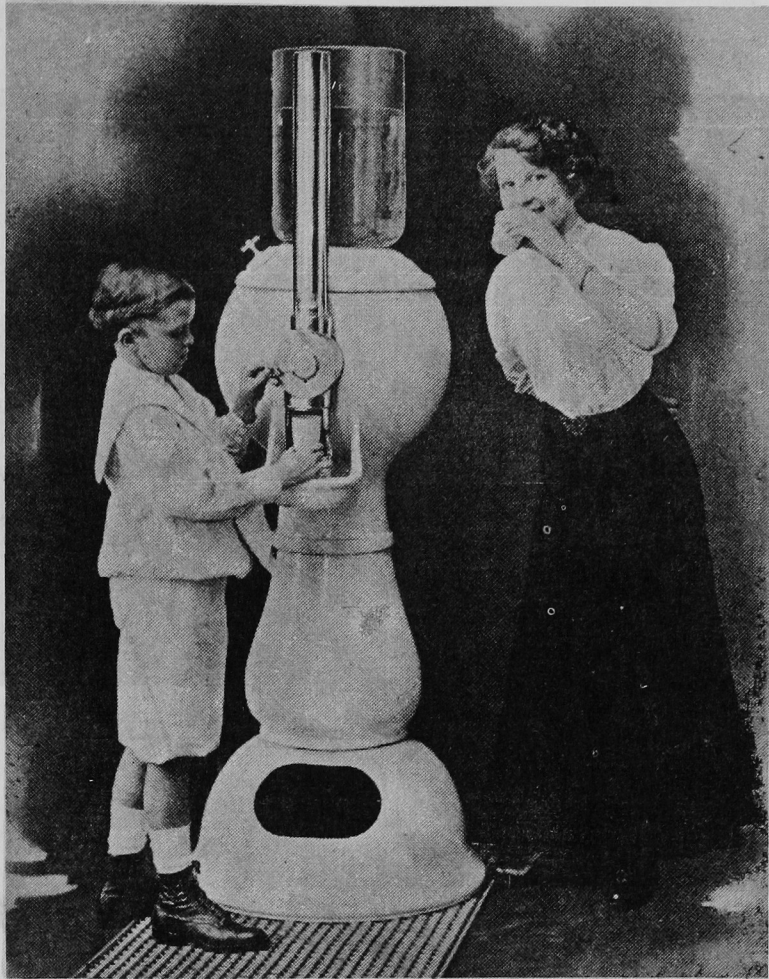
ENVELOPE AND PAPER VENDER IN NEW YORK 1896

fig. 3.



WINE VENDER USED IN FRANCE DURING 1891

fig. 4.



FIRST CUP DISPENSER, 1908, SOLD WATER

fig. 5.



VIEW OF AUTOMATIC BAR IN PARIS 1891



C.A.M.C.O. UNITED CIGAR INSTALLATION

TRENDS IN AUTOMATIC SELLING TODAY

Today, the trend toward product distribution by automatic selling seems to be moving in several directions. Since most "cost minded" managers want to find cheaper methods of selling, items which are considered "nuisance" or convenience items are ones being sold more and more by vending machines. These items are often found in the notions departments of retail stores and include such products as combs, thread, tissues, etc.; they take up space and a salesperson's time, yet draw little profit. With the help of vending machines, a customer may purchase these without waiting for the help of a salesperson. The vending machine also relieves the salesperson to attend to the sale of more profitable items.

Automatic selling has one big advantage; it provides a service in situations which would not require a full time salesperson. Places such as theaters, lobbies, as well as industrial establishments have made extensive use of vending machines. Recently schools have introduced vending cafeterias for students rather than the customary type of school cafeterias.

Perhaps the greatest advantage offered by automatic selling is the venders' ability to serve customers twenty-four hours a day without involving the high cost of a

sales attendant.

There are factors which, obviously, limit automatic selling: price, packaging, consumer reaction, and paper currency all cause limitations. Since most people like to examine what they are buying, items such as dry goods are difficult to vend. The problem of how to display the items inside the vending machine also tends to limit the automatic sales approach.

Customer reaction often determines the success of a product sold via machine. Most people would think nothing of spending more than a dollar on an item which they purchase at a retail store; however, the customer would be most wary of depositing several dollars into a machine from which he has no guarantee of either receiving the goods for which he paid or getting his money back. New technical advances in coin mechanisms are helping to overcome this problem, and helping to build the customer's confidence in machines. In the United States there are several fully automated department stores; the U-Serv-U center in Minneapolis and Feline's of Boston have been in operation since the fifties. In Europe, vending machines are extremely popular; since the stores' closing hours are set by the government, vending machines serve customers after hours.

The volume of sales which the coin operated machines handle each year runs into millions of dollars. (For statistics - see enclosed operating ratio report.)

The highest profit of sales comes from consumable products, such as, cigarettes, food, drinks, candy, etc.. (For statistics - see enclosed operating ratio report.)

EXPERIMENTS AND SOLUTIONS

Following my research on automatic merchandising, I became interested in the outside designs of the machines now in use. Formerly, vending machine's had a certain charm and character of their own. Companies made many elaborately designed outside casings for their venders, which often were forms unrelated to the product vended. Among these novel venders is one which is shaped like a human head and spews candy from its mouth at the insert of a coin. The individuality, although not always in the best of taste, is what gives the antique vending machines their appeal. Unfortunately, or fortunately depending on ones opinion, the process of modern industry has been more concerned with efficiency and mass production more than with novelty. In my thesis I have tried to incorporate some of the free form aspects of previous designs.

One way to achieve a flowing surface relief was by using plastic; the vacuum forming process which I employed is being used extensively in commercial sign work, although not to its best advantage. I felt that this material could be applicable to my problem if included in the design were burglar proof steel casings for the working parts of the machine.

Since vacuum forming offered the most direct method of achieving the kind of surface treatment that I was

after, I decided to explore the vacuum forming process more extensively. My decision was to approach the thesis problem as one would a realistic design problem; that is, I would take into consideration the aspects of mass production in the design.

In my research, I could find little information on vacuum forming which would be practical or applicable for my purposes; most of the information was for extensive industrial use. I spoke with persons who had some experience with vacuum forming; Mr. James Smith was a great source of information. I also visited the B-Mex Company, in Rochester, and watched several vacuum process machines in operation. From my observations I was encouraged to attempt to build a vacuum forming unit.

A vacuum forming machine for plastics consists of three main parts:

1. a heat source to heat the plastic
2. a vacuum table or box with air holes which supports the mold and distributes the suction of air.
3. a vacuum pump

Most professional equipment is made of steel, a powerful heat source and a frighteningly efficient vacuum pump. I was forced by lack of time and finances to devise a simpler than the industrial model. The resulting machine was the product of many frustrating attempts at engineering

The vacuum table and pump were my first concern, for those were needed in order to test the efficiency of my heat source. Convinced that I could use a vacuum cleaner motor, I obtained an old "Eureka" vacuum cleaner and adapted it to my purposes. The first model of the vacuum table was a crude plaster block with the vacuum cleaner attached by the hose to one end of the block. The whole affair was lashed down, turned on and a piece of special vacuum forming plastic was placed over the hole in the plaster. Heat was applied by means of a space heater; as Mr. J. Smith and I watched, approximately twenty minutes passed before there was a perceptible bulge in the plastic --- which, if nothing else, confirmed our theories. It was decided that the main problem lay in the heat source. More trial and error engineering ensued. Finally, after trying every method, including an open flamed torch, an effective heat source was devised. This heat source spread an even layer of heat over the entire surface of the plastic.

This heater which I used for my thesis is comprised of the following units:

1. two welding rods sheathed in heat resistant glass tubing. These rods are placed approximately 13 inches apart.
2. Alternately between these rods are wound - two 25 feet long 1000 watt heating unicoils.

3. Each of the wires is attached to either end of the unit. They are wound from the ends to join at the center. Both wires are connected in parallel to a heavy duty cord by a nichrome wire.
4. A continuous strip of asbestos insulation prevents the individual coils from touching and shorting out.
5. The heating unit is encased in a highly reflective box measuring 15 x 24 inches. (this limits the size of the formed surface to these dimensions)

The heating unit heats the plastic by forming an evenly heated pocket of air between the heater and the plastic sheet. For my purposes this has proven to be adequate.

The vacuum table is a shallow box measuring 2 x 37 $\frac{1}{4}$ x 25 $\frac{1}{2}$ inches. It consists of the following units: a 2' X 2' frame sandwiched between a sheet of $\frac{1}{2}$ inch plywood on the bottom and 1/8 inch masonite peg board on the top. The vacuum is attached underneath the plywood sheet in a wood and aluminum housing. All tolerances are closely fitting to give maximum suction through a center hole in the plywood. To prevent its collapsing under the force of the vacuum, the peg board is supported at intervals by 2 inch wooden blocks. The heater is suspended 7 inches above the vacuum table by four wooden dowels, placed in each corner of the vacuum table. Riding these dowels is a frame which holds the plastic; this consists of a sheet of 1/8 inch masonite with a 15 x 24 inch hole cut in the center.

The procedures for forming the plastic are:

1. The plastic sheet is taped to the frame with masking tape no less than 2 inches wide.
2. The whole frame is pushed up against the heater where it rests in notches in the dowels.
3. The heater is turned on.
4. When the plastic dips about 4 inches, the frame is pulled down over the mold; the mold rests on the peg board vacuum table.
5. The vacuum is turned on.

For the sake of speed and convenience, the heater and vacuum switches should be placed within easy reach of the operator. In this vacuum forming process timing and sequence of procedure vary but are essential for the successful outcome of the final product. Since there is quite a variance between plastics, size of molds and other factors, practice and trial are the only rules insuring success.

After I had become interested in writing my thesis on vending machines and automatic merchandising, I was fortunate in obtaining a pencil vender. I decided to incorporate the working parts of the pencil vender into an actual model. Since some of the vending mechanisms were broken, I had to make several adjustments, and new parts for the machine. This was a difficult task, because I had to learn how the machine functioned before I could begin to repair it. However, this process enabled me to learn much about this type of vending mechanism.

The outside of the machine was of metal and was not particularly attractive or well designed. I decided to explore the possibility of making a better designed front for the mechanism. Since I had been interested in vacuum forming, I decided to incorporate this process in making the outside casing.

My aims for designing the front of the machine were: to make the machine appealing to use, to enhance the product which it contained, to identify the product, in some way, with the machine, and to identify the contents by the use of simple graphics.

One of the problems of vending is that of display; this particular problem was one which I also wanted to resolve in my design. The idea which I decided to use involved the placement of a window in such a way as to

display the merchandise inside the machine. I also decided to use a reflective material on the inside of the machine which would give one an illusion of quantity of the product and which would capture the customers fascination for the function of the machine.

In designing the actual case, my main problem was to construct a functional outer shell. I worked under the assumption that a case which contains the working parts and mechanism has to be made of metal; this is for reasons of security and stability. Because of the lack of proper metal stamping equipment, I chose to build the mock up case from wood and masonite. If this particular model were a counter vender, close to the salesperson's supervision, it could in actuality be made of masonite, vacuum formed plastic or injected plastic.

My next step was to design the front of the machine. Because of the time factor involved, I decided to limit the design to only the front and top components. Before I could begin to plan the actual design, I had to experiment with a number of processes. First, I had to test the limitations and the flexibilities of the vacuum forming process; in addition to this, the mold to be used had to be made and tested under the vacuum former. All of the results from these experiments were vital in determining the final design.

During the experimental stages of the design, I encountered numerous problems. Perhaps the most frustrating, aspect was that the plastic did not always react to the mold in the anticipated manner. The most successful molds were ones made from masonite and wood; they are compatible with the plastic, and one can create a pleasing relief surface by using shapes cut from wood or masonite. When the hot plastic sheet is layed over the mold, it takes on its configurations. At the same time, the plastic will sag in tent like folds around the objects forming pleasing sensual surfaces. By designing the mold carefully, one can control the positioning of the sags. Bridging, which also occurs between objects on a mold, can also be controlled; the bridging resembles folds in cloth when it is draped over or between two objects. The sagging and bridging of the plastic are natural properties of the plastic and of the process; in my design I decided to take advantage of them.

I made the various molds by using cut masonite; the various cuts were positioned exactly where the protrusions and recesses had to conform to the actual mechanics of the machine. This final mold was a result of trial and error experiments with previous molds. When vacuum forming over the molds, I had discovered that the plastic shrunk and mislined the

openings to the machine; the planned window in the front was also too large, exposing some of the inside mechanics. The mechanism had to be covered in order to help prevent theft and tampering with the machine. From this mold a series of machine fronts were made for further experimental purposes. The final and successful mold was also built of relief surfaces to conform to the recesses and protrusions of the mechanism; outer surfaces of this mold were reshaped until the overall design became visually pleasing. To check the correct fit, I placed the mold on the machine and made needed adjustments.

Modifications had to be made for the vacuum forming process. The air suction of the machine determines much of the shape of the product. Adjustment in the diameter of air ducts in the mold helped to simplify the design; by controlling timing and methods of procedure, when working with the vacuum former, I learned to anticipate the desired result. I found that by eliminating air suction holes around some of the relief areas, a gentle slope would be formed where the plastic fell around the object. The tent like structure formed by the plastic gives an illusion of an object or form trying to push through the surface; visually this resembles canvas stretched beyond the rectangular two dimensional plane. The overall effect becomes

sculptural and inviting to the touch.

Beside experimenting with numerous molds, I worked with various gauges and colors of plastic; each color and gauge reacts differently when subjected to the vacuum forming process. If the final product were made of cast plexiglas or one of the other new durable plastics now on the market, this could be a very permanent type of vending machine.

Once I had made a series of plastic fronts, I painted the various surfaces. I discovered that spray paint gives the most successful color and surface quality. When the paint is sprayed on the reverse side of the plastic, permanence of the painted surface is insured. Some of the diverse effects which can be gained are: spraying one color over another; fading colors into each other, striping, and so on.

The most difficult problem which I encountered in making the front of the machine was that of bending the plastic at a right angle. A clear heavy gauge of plastic was used for the final product. I found this to be most suitable for the presentation of the actual machine since this most resembled what a mass produced product would look like. Other advantages were the transparency of the plastic and the durability of the heavier gauge when subjected to heat.

After using the trial and error method, I found that the front part of the machine could be formed first by using the vacuum heater. In order to form the top of the vending machine, I used the heat source from the vacuum heater as well as an open flame from a burnomatic torch; the open localized heat source proved to be most efficient in making the bend. After making an elaborate masonite jig, the preformed plastic front was clamped to it in an upright position; the jig kept the flame of the torch from the front and prevented its distortion. By stretching the excess plastic back from the front at a right angle and concentrating the heat on the bend, I found, after many scorched and distorted pieces, how to shape the remaining plastic for the top.

Learning to apply the torch correctly took much time and practice. Once the top was bent back, it was formed by placing the whole unit under the heater of the vacuum former. The recessed shape on the top was made by pressing a preshaped paddle into the hot plastic which then folded into a precut die. While the plastic was still malleable, the lip around the top was formed by pressing the plastic down along the sides of the jig.

The necessary openings in the front could be cut, for my purposes, in the plastic by using a high speed

drill. The drill will pierce the plastic and form a burr around the bit. When the plastic was pierced, the desired shape could be cut gradually by allowing the plastic to melt slightly under the friction of the the bit's motion. The openings were then touched up and smoothed with an abrasive.

In essence, this pencil vender was formed by using two processes, vacuum forming and hot press molding. On a mass production basis, the manufacturer could duplicate the process used here. He could do so with more sophisticated, but inexpensive machinery. I do believe that this process has great possibilities in this particular application.

During my research, I visited the Anderson - Paramount Company of Rochester. Mr. Bennet Taylor was very helpful in providing information about the vending industry. Mr. Taylor also provided me with an actual model of a Coca - Cola machine. Apparently the Coke machine had been damaged by a truck. In the process of repairing it, I learned, as with the pencil vender, a great deal about the machine. It took two days to disassemble the machine and to carefully number the pieces; it took only half that time to reassemble it. When the machine was repaired, I hammered the case roughly back into shape and began to work out a design for a new outer casing. As with the pencil vender, I had to deal with a working piece of equipment which had already been tried and tested.

All of the mechanical parts were prelocated; in designing the outer casing I had to conform to the design aspects of the permanent engineering. In our conversations, Mr. Anderson acquainted me with some of the problems which have not been fully solved by the vending industry. Among other aspects, it would be an advantage to the distributor if the vending machines were more flexible than they are now.

If the fascade of a machine could be changed to harmonize with a particular environment or a client's needs and tastes, they would be more desirable items in business establishments. This problem can be solved by the use of an easily changable fascade which would fit over a rudimentary steel casing; the fascade would serve two purposes. It would allow the unit to become more adaptable to a location, and if the front of the machine became battered by use, it could be replaced easily and inexpensively. This would provide a new source of income for the manufacturer and save money for the operator since the refurbishment and repair of machine fronts is now an expensive proposition.

Present machines are often large and cumbersome to relocate; if one were to break the machine into modular units, several advantages could be gained. A route man could handle the units by himself; a potential operator could start by purchasing a modestly priced machine. The new machine would be comprised of three units; the main or mother unit would have a modest product capacity but would contain either a heating or cooling unit capable of servicing three times its own capacity. Once the basic unit was in operation, if the need for a greater operating capacity arose, the operator could attach additional storage units to the basic unit.

The parent unit would provide the heating or cooling system to the supporting units. By using styrofoam and other plastic parts, these storage units would be provided with light weight, durable, easily installable insulation for cooling and light weight handling.

In my mock up model of the Coke machine, I have attempted to describe what the three section unit would look like. A small capacity machine was what I used as the working unit. When designing and building the mock up, I made the basic casings of the main and the two supporting units from masonite and wood. The molds for the fascade were also made from the same materials; with the experience gained from building the molds for the pencil vender, the molds for the Coke machine, although more complex, were faster and easier to make. The fascade of the Coke machine had to be 45 inches long, 15 inches wide and $4\frac{1}{2}$ inches deep. I underestimated the size of the vacuum former and found, after forming the first units, that I could combine two of the sections of the mold.

Nearly thirty modifications were made on the molds; the appearance as well as the practicability of the fascade was adjusted with each modification. The end result was the product of the manufacturing technique the practical accessibility to components and my visual

design applications. The seam for the two plastic components converges at the operating lever which releases the bottle. Both sections divide at the lever and may be pulled apart for replacement. At this point, the division is not visually disturbing; its location is practical in that the lever is the only protrusion on the face of the machine. Perhaps another better solution could be found for the removal of the fascade, but as stated earlier, it was necessary for me to make two units because of the limited size of the vacuum former.

For the fascade, a red metallic plastic was used; red is the color presently used for Coca - Cola and is a color associated with this particular product. Since it is a trademark, I also decided to retain the same typography now used for the words, "Coca - Cola," in my design. The trade mark name is vacuum formed from a mold; however, other graphics could be printed or placed directly on the plastic during the manufacturing process. The finished plastic units of the fascade are attached over the steel cabinet with U - shaped metal channeling.

CONCLUSION

From this thesis project I have gained a great interest in automatic merchandising. Although the libraries in this vicinity contain very little information, I have been overwhelmed by the amount of information and the response that the people in the industry have been able to furnish.

Although I have spent the past quarter on an intensive study of this topic, I feel as if I have just begun. I have finished two working models of vending machines and have explored the process of vacuum forming. From this endeavor I have gained much more than a finished product. I feel that I now understand some of the problems involved in designing and making a mass produced object.

In the future, I am sure, we shall see a great increase in the utilization of automatic merchandising. If we are to learn to live with these machines, it will be necessary to make them adaptable to human needs. I feel that my attempts have been worthwhile, because my concern has not been sales oriented; it has been an attempt to create a machine which is functional and yet aesthetically pleasing.

MAGAZINES

- Hardy, B. "Get the Big Bite With Your Own Vender."
FARM JOURNAL. 88: 36-7 April, 1964.
- Jones, S.V. "The Cup That Orders Its Own Coffee."
SCIENCE DIGEST. 54:56 Dec. 1963.
- Morse, L. "Sales and Distribution - Vending Revitalized."
DUN'S REVIEW, 83:65 May, 1964.
- Rosen, Gerald R. "Vending Revitalized". DUN'S REVIEW.
83:65. May, 1964.
- "Antique Vending Machines" FORTUNE. 67:115 17F * 63.
- "Automatic Millionaires". TIME 78:88 Nov., 10, 1961
- "Automatic Vending Exhibition" ENGINEERING. 199:476
April 9, 1965.
- "Hard Fight Over Soft Drinks." BUSINESS WEEK. p.4
Aug. 4, 1962.
- "How a Coffee Machine Works." POPULAR SCIENCE. 178:104-5
May, 1961.
- "How Coin Machines Detect Phoney Money." POPULAR SCIENCE.
180:66-9 March, 1962.
- "Push Button Grocer." BUSINESS WEEK. p:62 May 4, 1962.
- "Push Button Sake." NEWSWEEK. 62:91. Nov. 18, 1963.
- "Sahagian's Automatic Money Maker." FORTUNE. 65:176
Jan. 1962.
- "Sales and Distribution." DUN'S REVIEW. 77:95-6.
April, 1961.
- "Supermarket in a Bending Machine." BUSINESS WEEK.
P.100-5. Sept. 14, 1963.
- "Ticket Vending Machines." ELECTRONIC ENGINEER.
36:823. Dec. 1964.
- "Ubiquitous Salesman." TIME. 84:100. Oct. 23, 1964.

- "Vending Machines and Children - Amusements as a Danger to Children." CONSUMER BULLETIN. 45:43.
Feb. 1962.
- "Vending Machines Work for Food Service" ARCHITECTURAL REVIEW. 133:194-6. May, 1963.
- "Vending Machines - From Bubble Gum to Vitamin Pills." CONSUMER REPORTS. 31:7 Jan. 1966.
- "Vending Service for Readers." LIBRARY JOURNAL. 83:372-3.
Oct. 1, 1964.
- "Vendors Outgrow Machines." BUSINESS WEEK. p. 136
Oct. 10, 1964.

MAGAZINES

- Delia, M.A. "Computerized Moldmaking." PLASTICS WORLD.
24: 38-42 November, 1966.
- Geragoisian, S.E.. "Continuous Mold Venting". MODERN
PLASTICS. 44:122 November, 1966.
- Hunt, A.W. "Vacuum Transfer Encapsulation". MODERN
PLASTICS. 43:128-30. March, 1966.
- John, F.W.. "Blow Molding Fundamentals". PLASTICS WORLD.
24: 54-7. July, 1966.
- Ringwood, A.F. "Behavior of Plastics in Space Environments".
MODERN PLASTICS. 41:173-4. January, 1964.
- West, P.. "Plastics Get New Image in Metals Old Domains".
PRODUCT ENGINEERING. 37:56-62. November 7, 1966.
- "Amazing Design Variation in Musical Instrument Cases".
MODERN PLASTICS. 43: 109-11 December, 1965.
- "Complete Bottle Flow Mold System". PLASTICS WORLD.
23:46-7 November, 1965.
- "Daniels Encapsulation Presses". BRITISH PLASTICS.
39:402. July, 1966.
- "Homemade High Vacuum Techniques". AMERICAN JUNIOR PHYSICS.
32:483-90. June, 1964.
- "Kantex B3 Blow Moulding Machine". BRITISH PLASTICS.
39: 403 July, 1966.
- "Now Thin Wall Thermoforms From Polyethelyne". MODERN
PLASTICS. 43: 101. March, 1966.
- "The New Vigor in Thermoforming". MODERN PLASTICS.
44: 86-90. December, 1966.
- "What's Happening in Machinery for PVC". MODERN PLASTICS.
44:102-6 October, 1966.

CORPORATION AND COMPANY
INFORMATION AND MATERIAL

COLLEGE AND UNIVERSITY BUSINESS. "How to Expand Food Service Automatically" September, 1962.

General Motors Public Relations Staff. A TO ZERO OF REFRIGERATION. Detroit: General Motors Corp. 1964.

Price Waterhouse & Co. (Compiled Firm Reports Submitted To.) 1962 OPERATING RATIO REPORT - NATIONAL AUTOMATIC MERCHANDISING ASSOCIATION. Chicago: National Automatic Merchandising Association, 1963.

The Northwestern Corporation. THE PENNY BUSINESS IS BIG BUSINESS TODAY. Morris, Illinois: The Northwestern Corp., 1960.

The Vendo Company. AUTOMATIC FOOD AND REFRESHMENT MERCHANDISERS - THEIR APPLICATION IN JUNIOR AND SENIOR HIGH SCHOOLS. Kansas City: Mo. The Vendo Company.

The Vendo Company, Marketing Services Division. SAMPLE BOOK OF MERCHANDISING AIDS. Kansas City, Mo: The Vendo Company.

The Vendo Company. SANTA ANA SCHOOL CONTRACT. Kansas City, MO.: The Vendo Company.

VEND - Food and Vending Service Management. 1967 CENSUS OF THE INDUSTRY. Chicago: VEND; March 15, 1967.

ERASABLE
COTTON CONT

The development of this single item, the coin selector (or slug rejector) has permitted the vending industry its tremendous growth; this small 6"x 5" x 2" component is nearly foolproof. It is the product of much engineering and constant updating modifications.

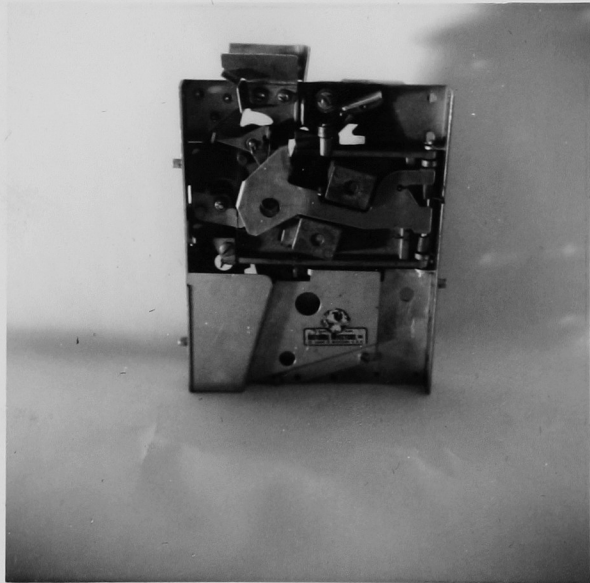
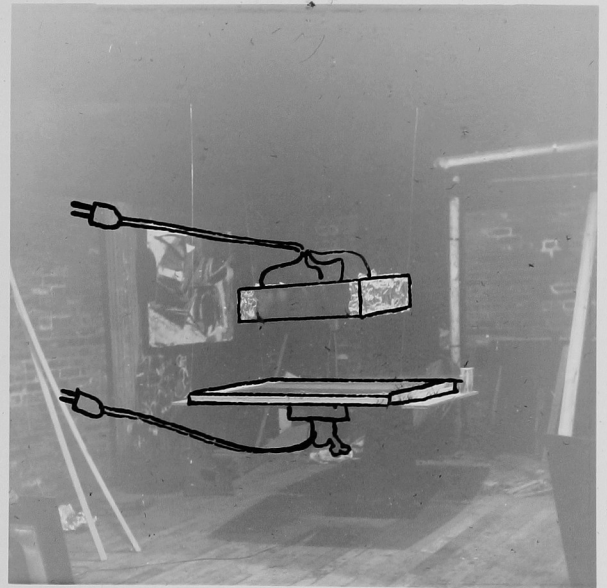
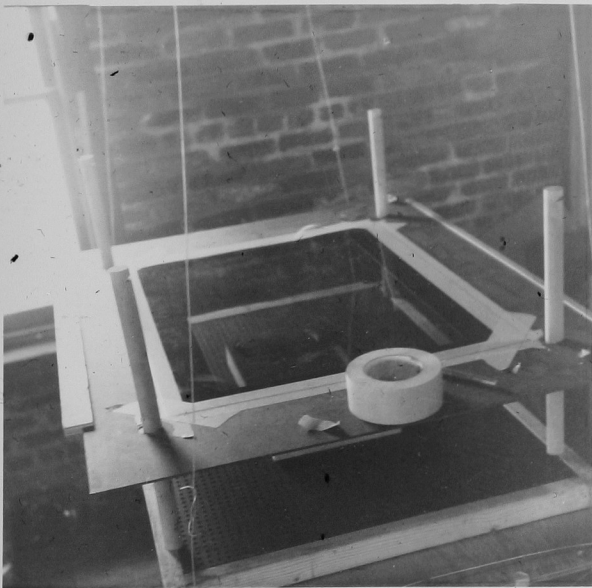
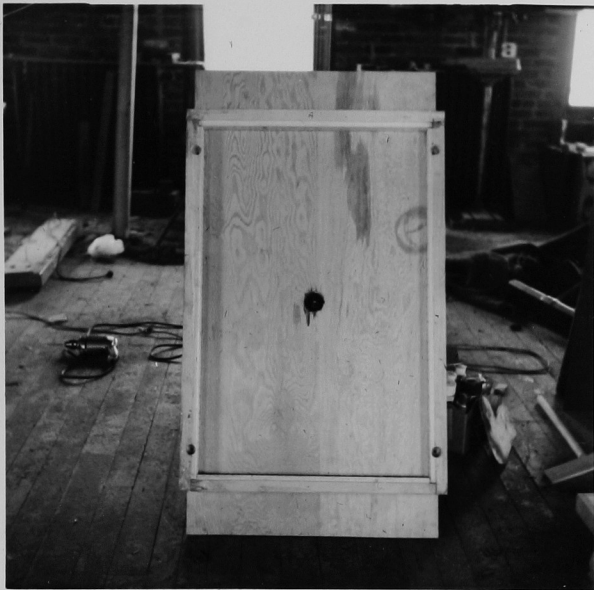


fig. 7.



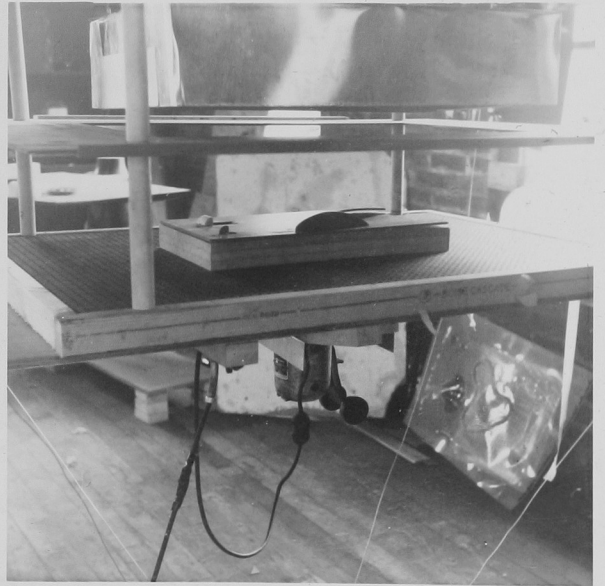
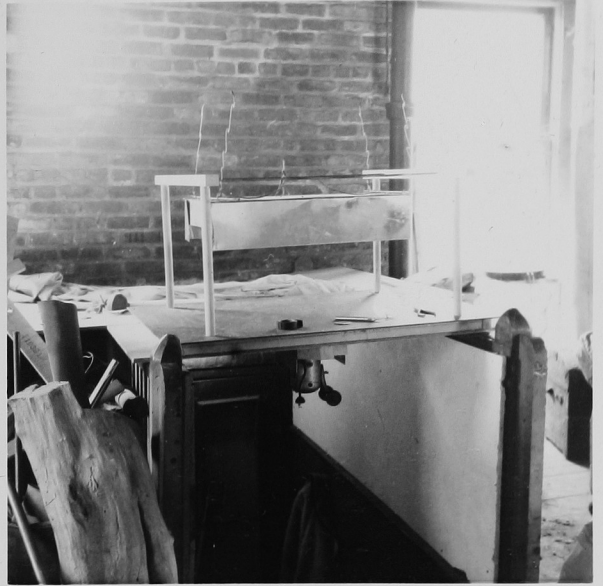


fig. 9.



fig. 10.

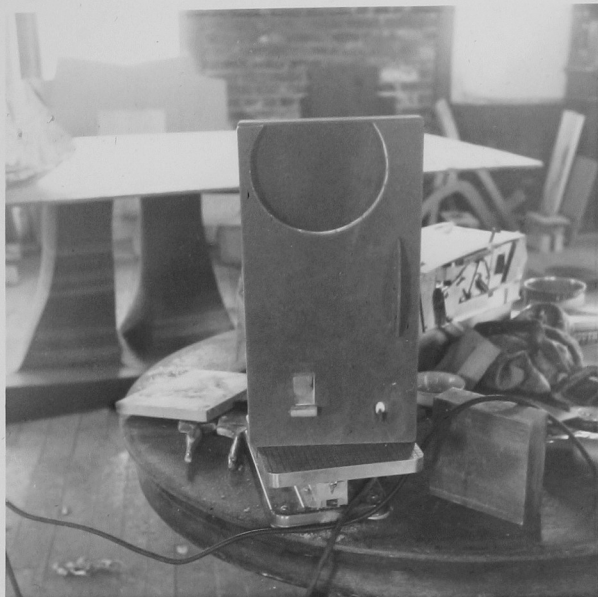
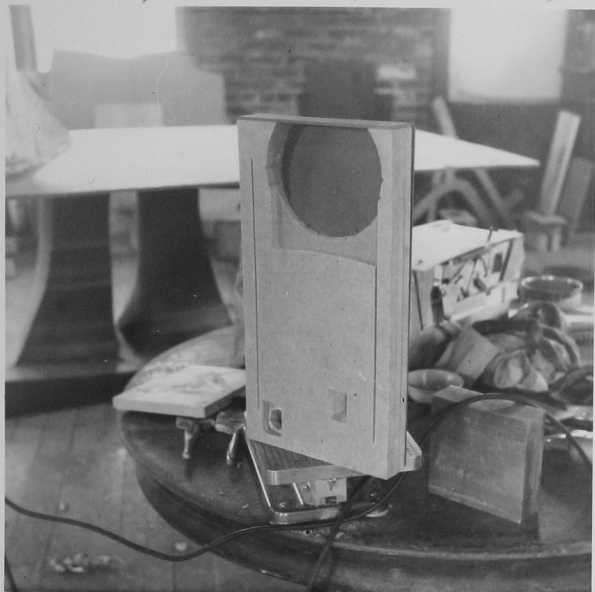
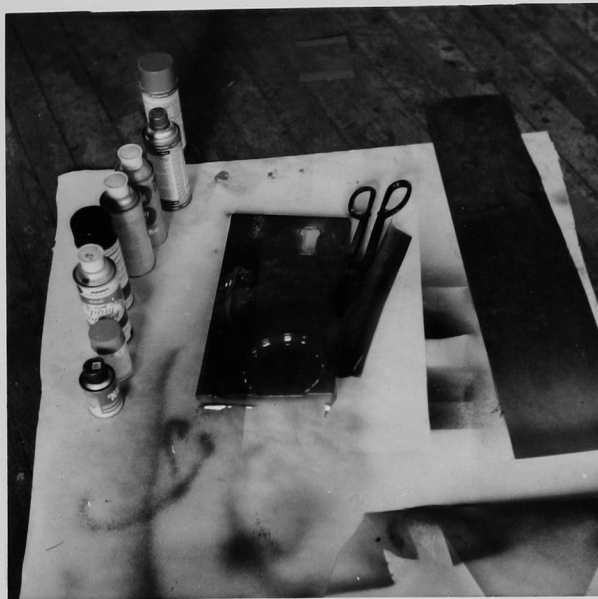
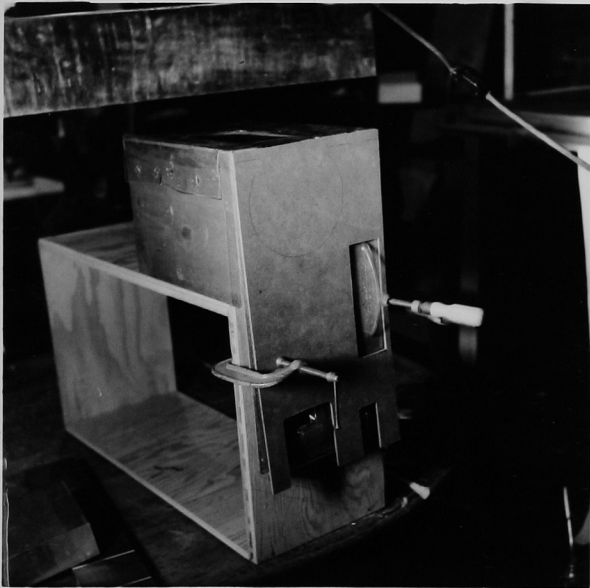


fig. 11.





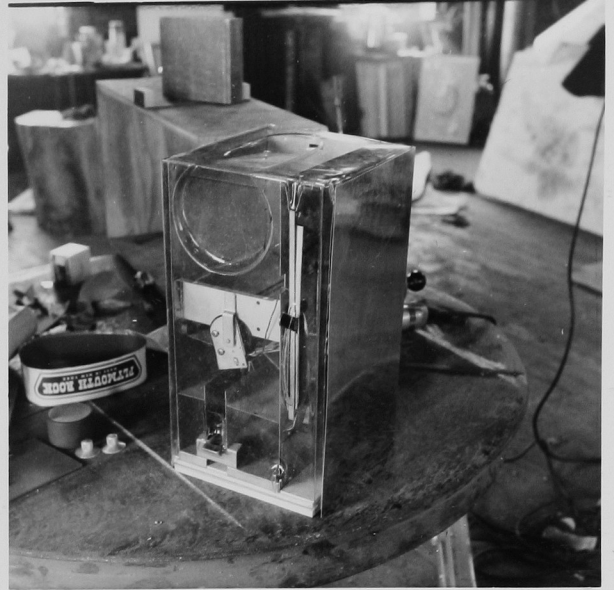
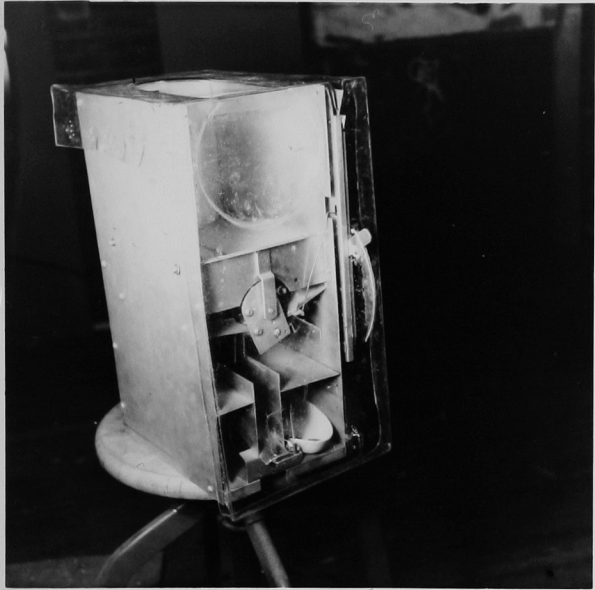


fig. 14.

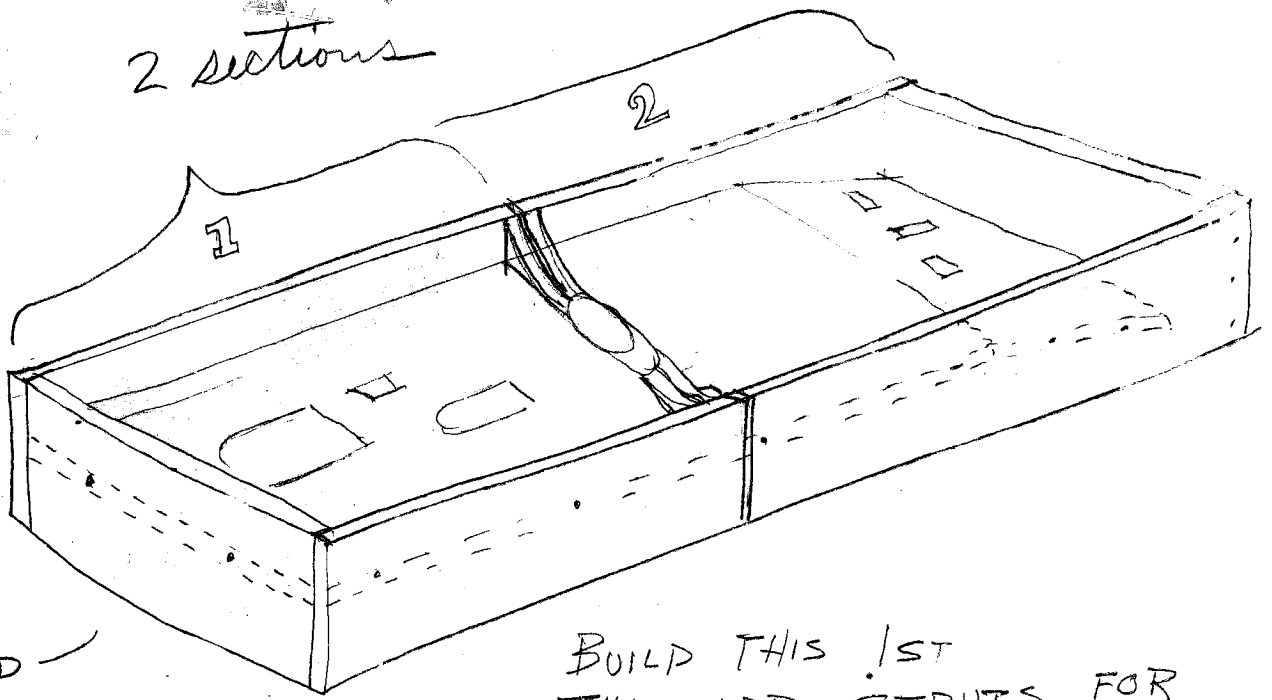


fig. 15.



fig. 16.

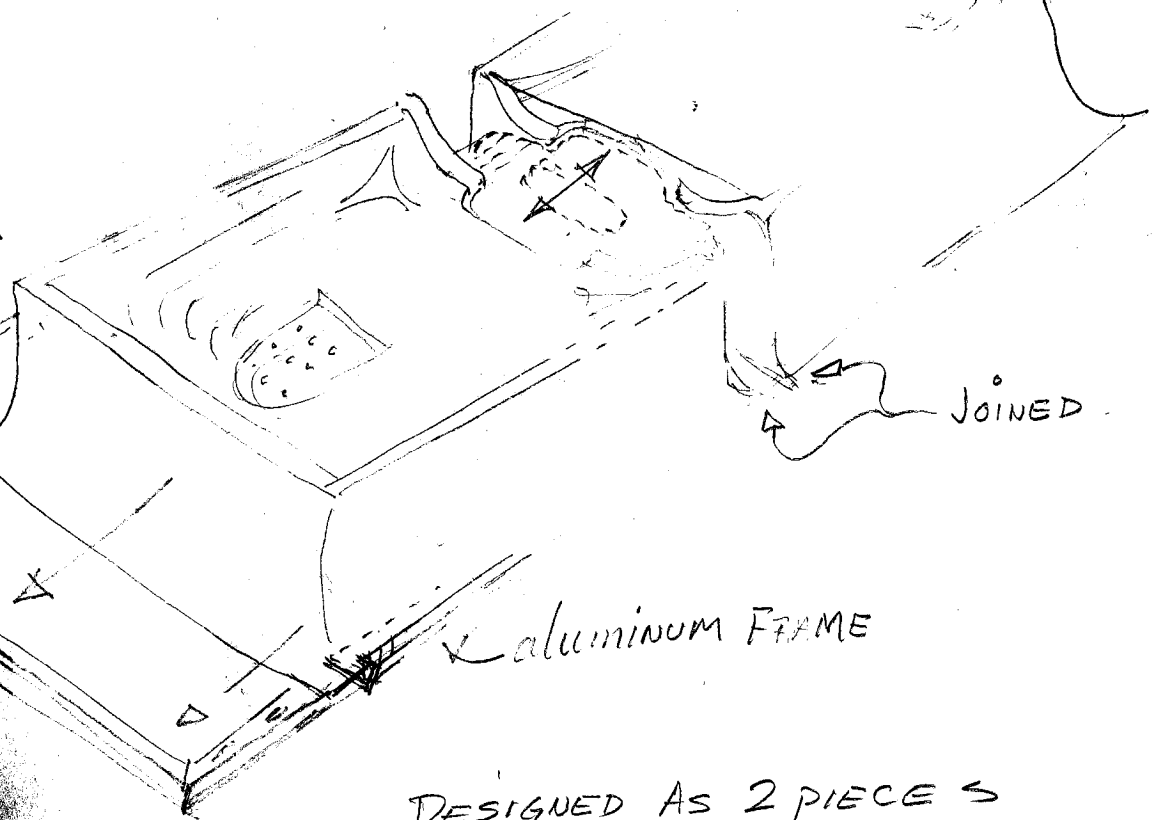
2 sections



BUILD THIS 1ST
THAN ADD STRUTS FOR
INTEREST

MOLD

SHELL

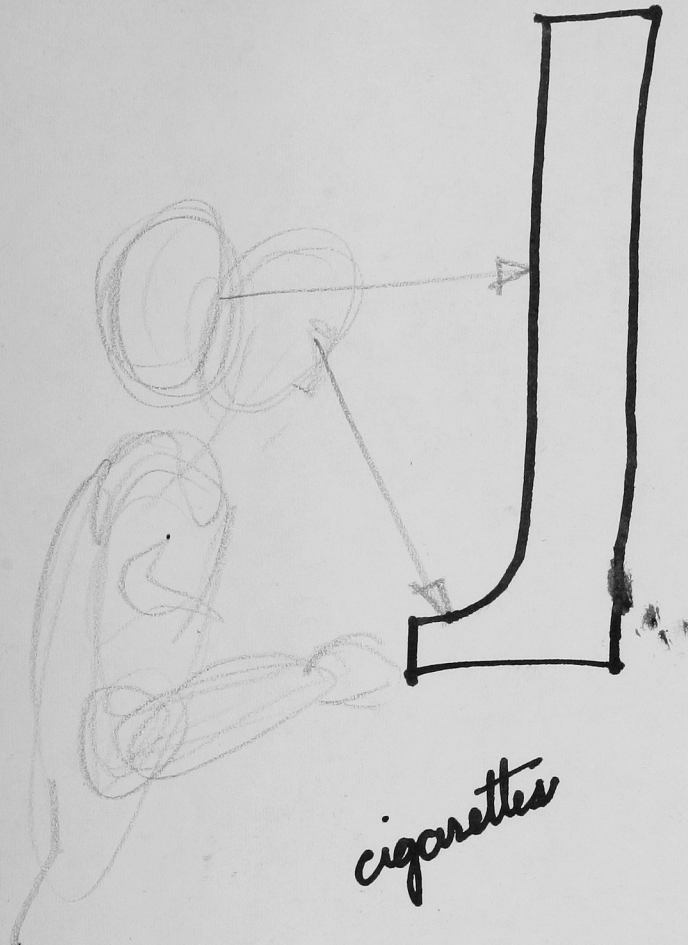


aluminum FRAME

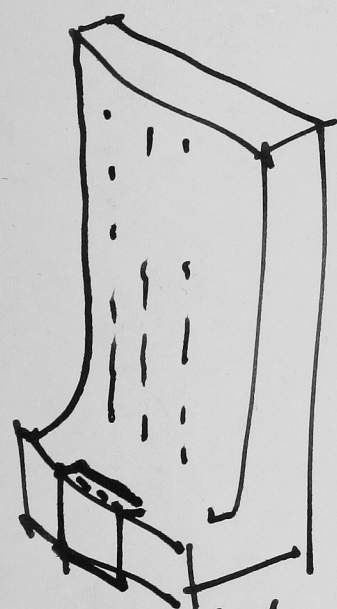
JOINED

DESIGNED AS 2 PIECES
BECAUSE MACOMN FORMER
CAN ONLY TAKE 15" X 24"

fig. 17.



cigarettes



Brand indicator

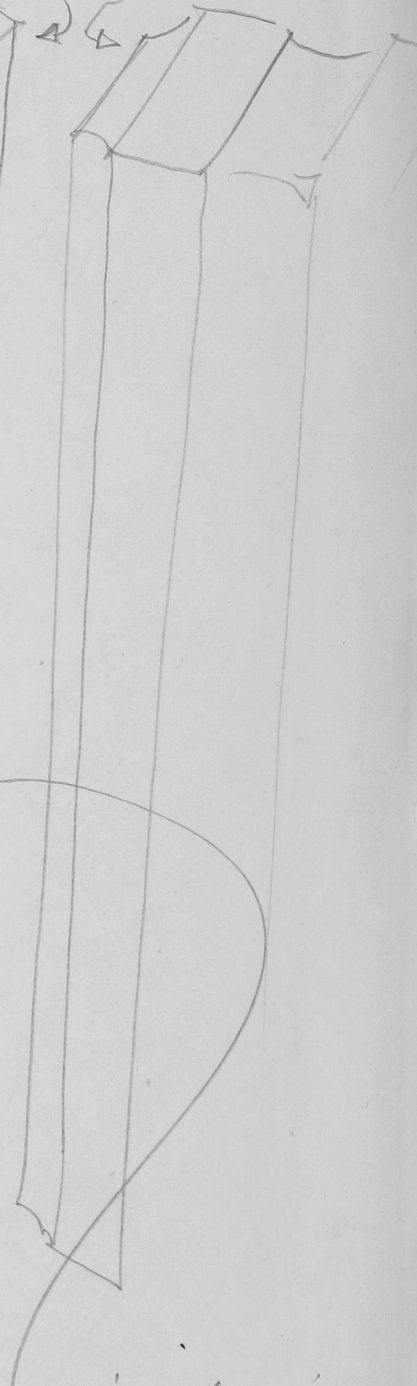
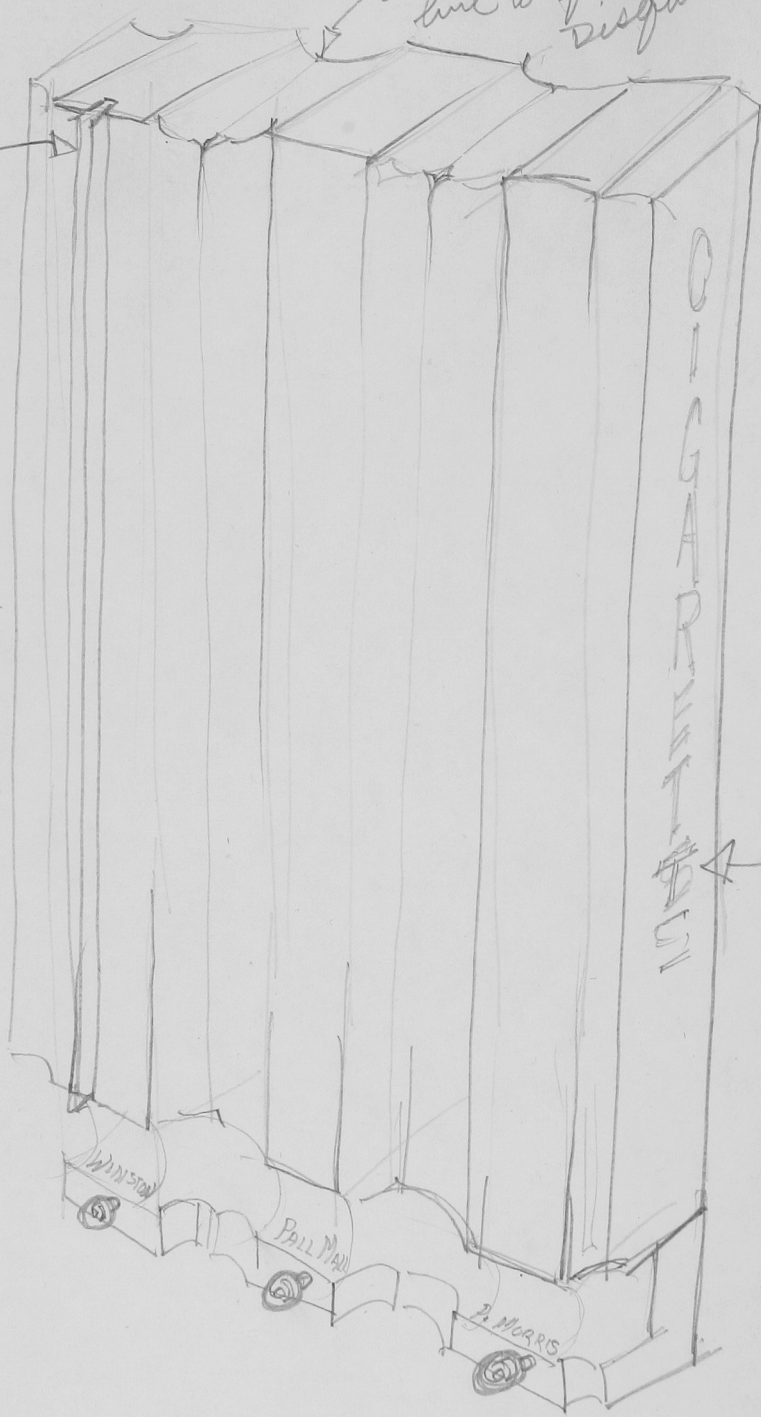
*sliding selector
and coin key all
one unit*

MODULAR CIGARETTE VENDOR

added indented
line to further
disguise

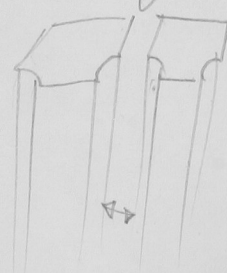
JOINTS
JOINED
WITH ADDED
VOLUME

Strips
insert
will form
NYC STAMP
INSPECTION
VIEWER
IF COLORED
FROSTED
PLASTIC
IS USED
THAN EXPOSE
HIGH SPOT
TO EXTREME
HEAT TO
FUSE FROSTING
INTO GLOSSY
WINDOW



BANKS OF 3.

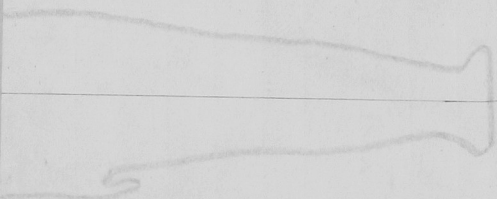
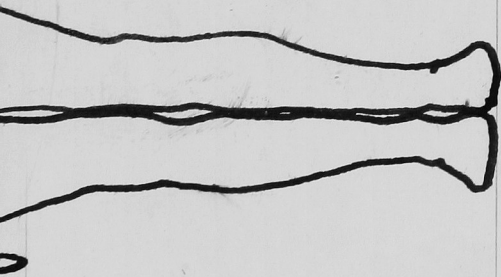
CUT WOOD ON SHAPER
and glued



SIDE GRAPHICS
FOR NARROW
HALLWAY
LOCATION

(THIS DESIGN A SPACE SAVER)
& NOT DISPLEASING IN OFFICE
DECOR

24 mm



CHILD 8-14

⊗ MAKE ACETATE OVERLAY

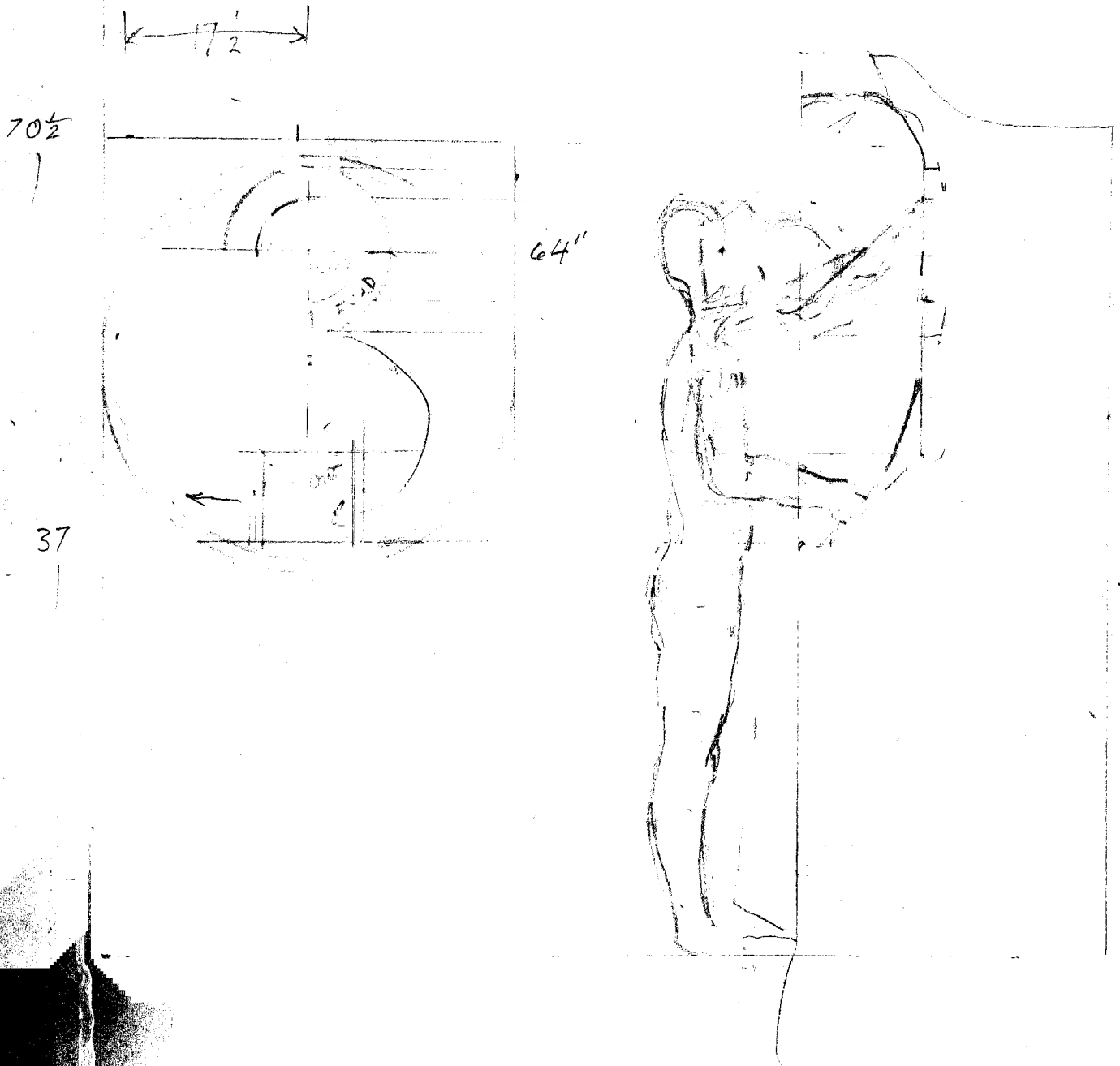


fig. 21.

Idealized working
Area for
Customer.
Everything above
stooping height
and in easy view
a short counter
to rest other
items while
operating machine

Using a sliding,
rather than "falling"
door to prevent
accidents

Working area would
conform nicely to vacuum forming.

