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Machine for Buying Aluminum Cans

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ABSTRACT - The construction of an automatic coin-paying aluminum can acceptor. The aluminum can acceptor structure is made of 2 cm thick box steel, 100 cm long and 50 cm wide. It is a mechanical squeezer using a 24 VDC motor as the main power source. The coin dispenser uses a 6 VDC motor as the main power source and uses an infrared sensor as the control and command system. The researchercreateda can-squeezing mechanism from a normal can length, which is the standard size of a beverage can with a volume of 225 milligrams to 235 milligrams, which is 12 centimeters, to flatten it and find the efficiency of the aluminum can acceptor and coin-paying machine by testing the can squeezing 30 times. It can be squeezed according to the hypothesis. The can that can be squeezed has a size not exceeding 4.5 centimeters. The average can squeezing size is 4.21 centimeters. It takes an average of 1.9 seconds to squeeze/can. It works continuously for 6 hours and takes 7 hours to charge.

I. INTRODUCTION

It is well known that nowadays, many people like to consume beverages in aluminum cans, such as beer cans, code cans, Pepsi cans and Sponsor cans, etc. After consumption, they are thrown in the trash or on the side of the road in various places, causing problems because aluminum has the properties of not rusting, resistant to rain and sunlight, so it takes a long time to decompose. From the above, this is a serious problem for the community and the environment. However, Aluminum cans can be reused through the recycling process, which reduces pollution to the environment. Reduce energy use and reduce the use of the world's natural resources so that they are not wasted too much. Whether it is reused as the original packaging or a new product. For this reason, the researcher thought of finding a way to solve these problems. With the idea that

1. What can be done to reduce the amount of aluminum can waste that is left in the community?
2. What can be done to reduce the storage size of cans when they are brought to us?
3. What can we do to make those who collect cans give us a return on the value of the cans?

From the three concepts mentioned, the research team thought and designed The aluminum can acceptor was created to be able to accept cans anywhere, anytime. The purpose is to encourage people to conserve the environment and reduce the volume of aluminum can waste from community sources.To provide everyone with a good quality of life, the can-buying machine is 50 centimeters wide and 123 centimeters high. The can purchase machine has dimensions of width 50 centimeters, height 123 centimeters, using 2 centimeter box steel for the structure. It uses a 24 V/DC electric motor and can be removed for charging. It can only buy aluminum cans with a size of 325-335 millimeters.

Fig1.1 Aluminum can

II.EXPERIMENTAL DESIGN

1.Design and build a machine for purchasing aluminum cans.

Research study to create a machine to buy aluminum cans Studying the size of aluminum cans and limiting the scope of the machine to be able to purchase only cans with sizes ranging from 325 milligrams - 335 milligrams because the cans are of similar sizes, therefore studied the working mechanism of the machine and various equipment. used to create and equipment used to control the operation of the machine After studying the mechanisms and equipment used to control designed this can purchase machine After studying the mechanism and the equipment used in the control, this can purchasing machine was designed

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to be able to work according to its purpose. This can purchasing machine is designed to be convenient, with a slot for feeding cans, easy to move, and durable. A 12 VDC motor was selected because it is the right size and operation for a can purchasing machine. The can purchasing machine was then designed using the Solid Work program.

2. Project structure design

Project structure images before and after installation. The operating mechanism set and the operating control circuit set must create a structure to hold the various parts, as shown in the following image.

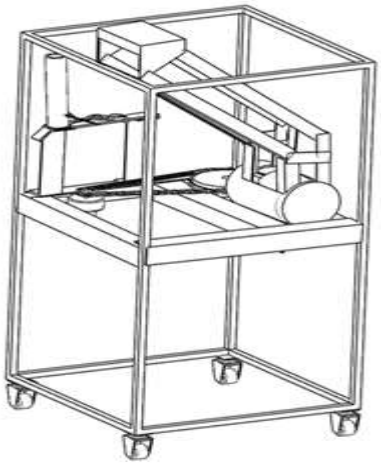

Fig 1.2 Structural dimensions image.

Fig 1.3 Image of the door opening and closing from the outside.

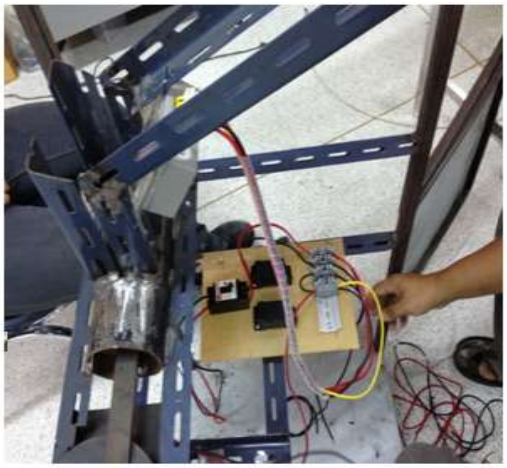

Fig 1.4 Circuit wiring diagram

Fig 1.5 Image after installation and repair of the can squeezer set.

The operation of the coin dispenser is similar to the operation of the can set by connecting the positive wire of the 6V battery to the relay that is connected from the infrared sensor to the motor of the coin dispenser set. When the can falls and blocks the infrared light and reflects back to the receiver, the receiver will work by ordering the relay switch, which is a switch that works with an electrical signal to open and close the electric motor to work and rotate the mechanism of the coin dispenser set automatically.

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Fig 1.6 Image showing the external structure of the can receiver.

III.RESULTS

In this can-buying machine operation test, the can-buying machine operation will be tested by testing the can-squeezing mechanism and the coin dispensing set in order to test the can-buying machine operation to see if it can work as intended and to find the faults of the can-buying machine. The researcher has divided the test topics as follows:

1. Infrared sensor test
2. Can-squeezing test
3. Coin dispensing test

1. Infrared sensor kit testing

To test the operation of the infrared sensor kit, the experimental steps are as follows:

1. Put a beer can or soda can into the can acceptor slot.
2. Check the operation of the motor and the coin dispenser.

Experimental results When an aluminum can, such as a beer can or soda can, is placed in the can acceptor slot, the transmitter sensor will send a signal to the receiver, ordering the motor to squeeze the can and the coin dispenser to work.

2. Can squeeze kit testing

To test the operation of the can squeeze kit, the researcher has the following experimental steps:

1. Put a beer can or soda can into the can acceptor slot.
2. Check the operation of the can squeeze mechanism.

Experimental results When an aluminum can, such as a beer can or soda can, is placed in the can acceptor slot, the can squeeze mechanism will immediately squeeze the can.

3. Coin dispenser testing

To test the operation of the coin dispenser, the researcher has the following experimental steps:

1. Put a beer can or soda can into the can acceptor slot, the can squeeze mechanism will immediately squeeze the can. Put 1 can in the can purchase box.

2. Check the operation of the coin dispenser mechanism.

Experimental results when loading aluminum cans such as beer or soft drink cans. Go into the can purchase aisle. The coin dispensing mechanism ejects the coin once into the coin slot.

IV. DISCUSSION

In order to find the results and efficiency of the aluminum can purchasing machine, the data obtained from the experiment were recorded. The experimental topics were divided as follows:

At	Number of cans fed	Number of cans squeezed	Number of cans not squeezed	Coins paid	Squeezing time (sec)	Squeezable can size (cm)
1	1	1	-	1	1.9	4.29
2	1	1	-	1	1.8	4.36
3	1	1	-	0	2.2	4.30
4	1	1	-	1	2.3	4.29

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5	1	1	-	1	1.8	4.22
6	1	1	-	1	2.2	4.17
7	1	1	-	1	1.9	4.36
8	1	1	-	0	1.7	4.08
9	1	1	-	1	1.8	4.00
10	1	1	-	1	2	4.28
11	1	1	-	1	1.8	4.15
12	1	1	-	1	1.7	4.30
13	1	1	-	1	1.8	4.15
14	1	1	-	1	2.4	4.27
15	1	1	-	1	1.9	4.13
16	1	1	-	1	2	4.27
17	1	1	-	1	1.6	4.37
18	1	1	-	1	2	4.16
19	1	1	-	1	1.8	4.19
20	1	1	-	1	2	4.26
21	1	1	-	0	1.9	4.36
22	1	1	-	1	1.7	4.35
23	1	1	-	1	1.8	4.22
24	1	1	-	1	2	4.06
25	1	1	-	1	1.9	4.25
26	1	1	-	1	1.7	3.87
27	1	1	-	1	1.8	4.11
28	1	1	-	1	2	4.22
29	1	1	-	1	1.6	4.15
30	1	1	-	1	2.2	4.25
Sum	30	30	-	27	57.2	126.44
Average					1.9	4.21
Standard Deviation					0.19	0.11

From Table 1.1, in putting 30 cans into the can receiving slot, 1 can at a time, it was found that the number of cans that the machine can squeeze is 30 cans, with the can squeezer's working capacity to squeeze 30 cans at a time or 100 percent of the total number of cans fed, and the ability to pay 27 coins, which is 90 percent, the efficiency of the time in squeezing the cans has an average of 1.9 seconds/can.

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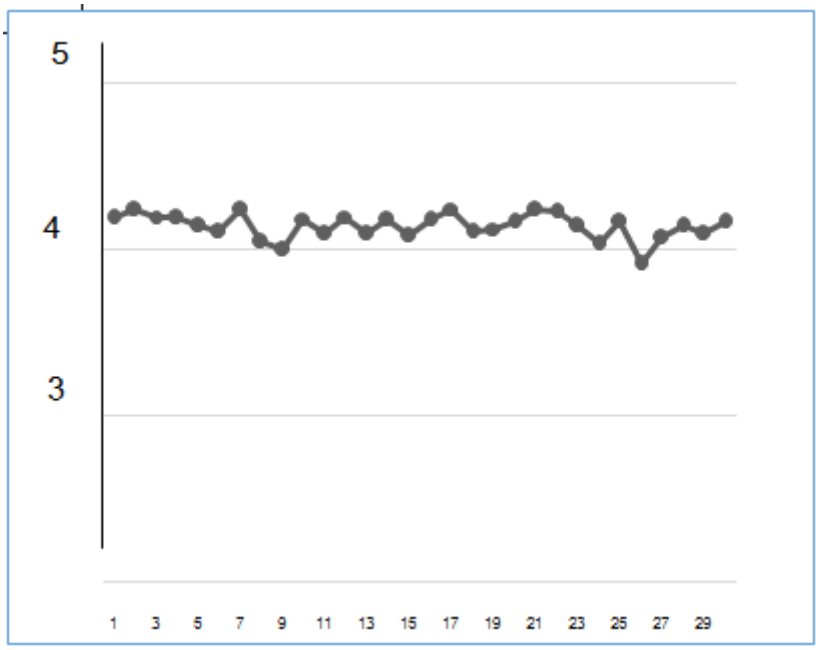

Fig 1.7 Graph showing the size of the can after squeezing with an aluminum can purchasing machine.

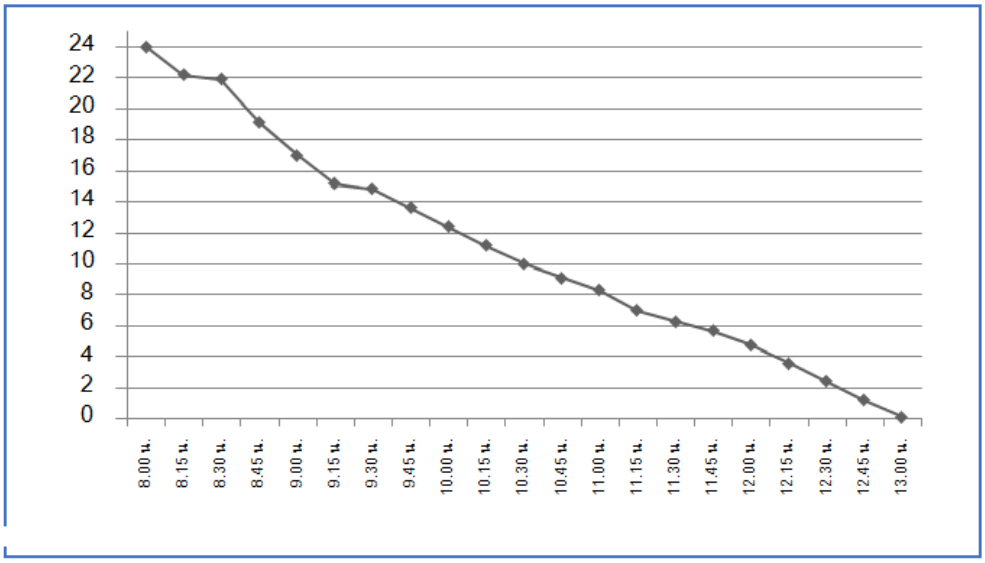

Fig 1.8 Graph showing the relationship between voltage and time.

From Graph 1.8, it shows the result of battery voltage drop. The experiment of continuous use of aluminum can receiving machine. The result of the experiment found that 24 volt battery can be used with aluminum can receiving machine for 6 hours.

V. SUMMARY

1. Machine features

The aluminum can purchasing machine that was created has the characteristics that were specified, namely, it is a newly created machine that can be used both on-site and off-site. The purchaser has never created a can purchasing machine of this type before. It can also squeeze cans into a size 3 times smaller than normal. The can crusher that was created is lightweight and easy to move and use.

2. Machine test results

Automatic coin-paying aluminum can purchasing machine by accepting aluminum cans, which is a mechanical crusher using a 24 VDC motor, etc.The coin dispenser uses a 6 VDC motor

as the power source and uses an infrared sensor as a control system to create a can squeezing mechanism from the normal can length, which is the standard size of a beverage can with a volume of 225 milligrams to 235 milligrams, which is 12 centimeters, to flatten it and find the efficiency of squeezing the can and dispensing coins. The efficiency of squeezing the can can be squeezed according to the assumption, not exceeding 4.5 centimeters. The average can squeezing is 4.21 centimeters. The average squeezing time is 1.9 seconds/can. The continuous working time is 6 hours and the charging time is 7 hours.

3. In terms of the performance of the coin dispenser

This coin dispenser is designed and built for specific use and is used in conjunction with the operation of the infrared sensor circuit. From the experiment using the coin dispenser with the infrared sensor, the results were summarized that when the sensor works and connects the 6-volt electric motor circuit, the mechanism of the coin dispenser will work and push the coins out through the coin dispenser slot. The ability to dispense coins when inserting a can into the can acceptor slot, 1 can at a time, for a total of 30 cans, found that the number of cans that the machine can squeeze out of 30 cans yields 27 coins, or 90 percent.

4. Machine design

The aluminum can purchasing machine has been designed and built with a compact size and structure, not too heavy, easy to move, but strong, durable and safe to use. It uses 1x1 inch square steel as the internal structure and uses 0.8 mm thick steel sheets for the lid and walls for safety in use. All sides of the machine are designed to be removable for easy maintenance and care.

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