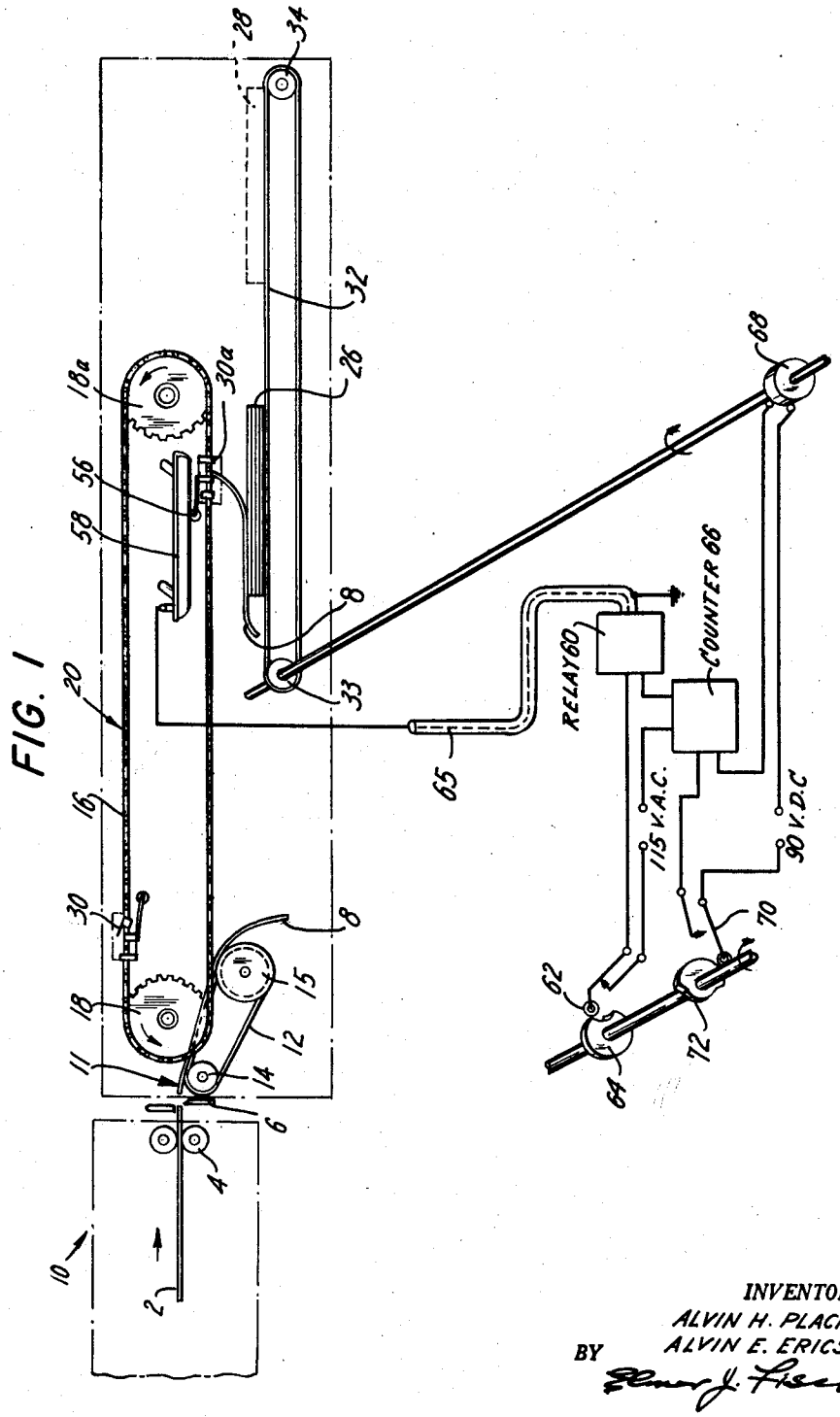
March 19, 1963 A. H. PLACH ETAL 3,081,861

ACCURATE BAG COUNTER

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FIG. 1



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FIG. 2

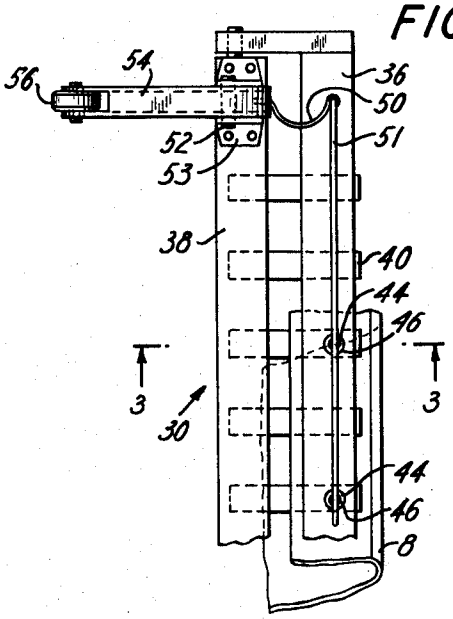


FIG. 3

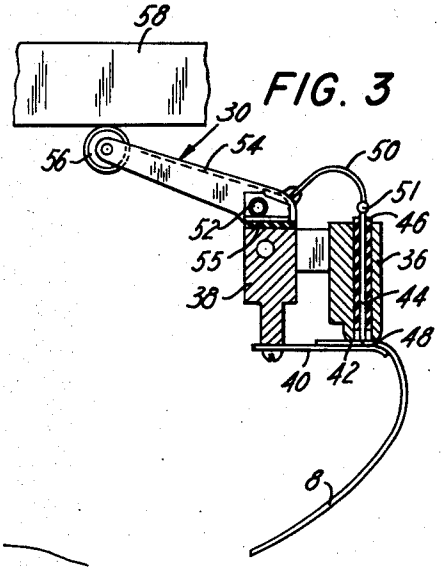
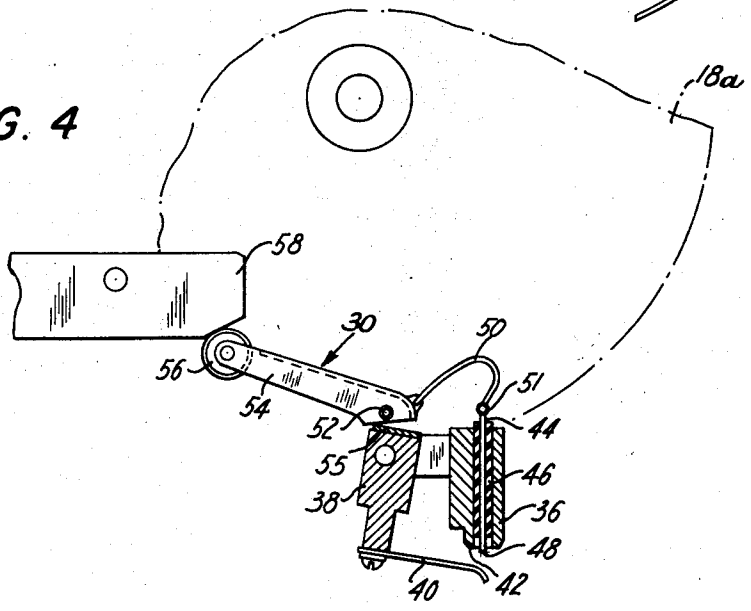


FIG. 4



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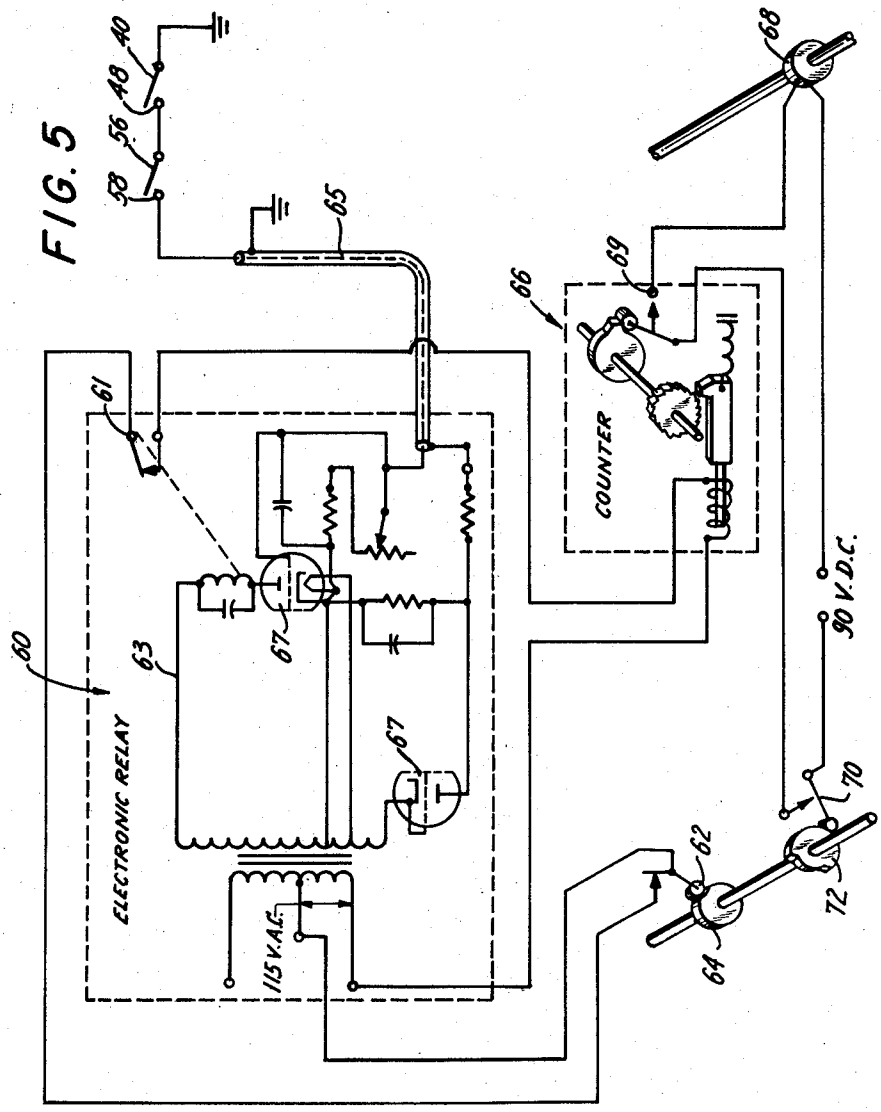
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ACCURATE BAG COUNTER

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FIG. 5



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3,081,861

ACCURATE BAG COUNTER

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7 Claims. (Cl. 198—40)

This invention relates to apparatus for exact counting of plastic film units as for example, the counting of plastic bags as they are discharged from an automatic bag-making machine. More particularly, this invention relates to a device utilizing the electrical insulating property of the film comprising the unit bags as a control means to accurately count the bags as they are deposited on a pile by a bag stacker. This invention additionally relates to means for signaling the transfer of an accurate count of bags, from a stacking station to a collection station when a predetermined batch count has been registered.

It is extremely difficult to handle, count and stack bags of thermoplastic film such as polyethylene or polyvinyl chloride film because such materials, being excellent electrical insulators, readily build up a charge of static electricity from frictional contact, and by contact with and separation from other surfaces. The static charge on the film tends to cause the bags to stick to any surface with which they come in contact. Moreover, the limpness of the thin, unsupported film used for economical production of bags also interferes with handling, stacking and counting.

Apparatus for stacking bags is usually provided with mechanical means for counting the cumulative number of mechanical cycles of the stacker unit. Such means are generally operated by a cam attached to the input drive of the stacker unit in such a way that it counts the cycles of the stacker mechanism, regardless of the presence or absence of unit bags in gripper members which normally transport the finished bags from the bag-making machine to a stacking station. A batch counter connected to such indicating means will frequently short-count such batches, since finished bags are not invariably delivered at each traverse of a gripper member of the stacker. "Coasting" of the machine upon startup and stopping, improper cutoff adjustment and gripper maladjustment are several reasons for such miscounts.

Consequently, a need exists for an accurate bag counter which will ensure an exact count of stacked bags which is not attainable using the counting means furnished in the described bag-stacking assembly.

Accordingly, it is one object of this invention to provide an accurate bag counter for a bag stacking assembly.

Another object of this invention is to provide means for counting the exact number of units discharged from an automatic machine for making bags of thermoplastic film.

Another object is to provide means for signaling the transfer of an accurate count of bags, from a stacking station to a collection station when a predetermined batch count has been registered.

Other and additional objects of this invention will become apparent hereinafter.

According to the present invention, an accurate bag counter is provided for use in combination with a bag stacking assembly having a member for preferably gripping a thermoplastic bag as it is discharged from a bag making machine and transporting it to a stacking station where the bags are deposited in a pile. The accurate bag counter comprises in association with said gripper member an electrical circuit having a resistance greater than a predetermined resistance value when a bag is gripped by the gripping member at the stacking station and a lower resistance value when a bag is not gripped by said gripping

member. Resistance sensitive means are connected in the electrical circuit and in circuit relation with a counter, and wherein the resistance sensitive means causes said counter to register a count only when such electrical circuit has an electrical resistance greater than the predetermined electrical resistance value. Means associated with the bag stacking assembly connects the resistance sensitive means in circuit relation with the counter only when the gripping member is at the stacking station. Thus, before a count will be registered, the electrical circuit must have a resistance greater than the predetermined resistance value, and the gripping member must be at the stacking station.

Conveying means are also provided for transporting a pile of bags from the stacking station to a collection station when a predetermined count of bags is reached. More particularly, when the counter reaches such count, it is connected in circuit relation with means which thereby actuate said conveying means.

The nature of the invention and the manner in which the invention may be practiced will become clear from the detailed description when taken in conjunction with the accompanying drawings forming a part of the specification and wherein:

FIG. 1 is a schematic elevation and fragmentary wiring diagram of a bag-making machine and bag-stacking assembly;

FIG. 2 is a fragmentary enlarged plan view of a gripper member of the bag-stacking assembly;

FIG. 3 is a transverse vertical section taken along line 3—3 of FIG. 2;

FIG. 4 is a transverse vertical section of an open gripper member taken along line 3—3 of FIG. 2; and

FIG. 5 is a schematic wiring diagram of the control circuits shown in FIG. 1 and fragmentary perspective of the cam shaft and switches connected thereto.

Referring now to FIG. 1, bag-making machine **10** advances continuous tubular thermoplastic film **2** intermittently to and through indicia, heat-sealing stations (not shown), to draw rolls **4** and severing knife **6**, where it is cut into a unit bag **8**. Unit bags **8** are discharged from the severing knife **6** of the bag-making machine **10** onto bag-delivery assembly **11**, which presents the bags to bag-stacking unit assembly **20**. Bag-delivery assembly **11** comprises a plurality of round conveyor belts **12** driven by pulleys **14, 15**.

The bag assembly **20** is driven by a conventional machine drive, not shown, and includes gripper members **30**, **30***a* attached intermediate two spaced parallel roller chains **16** only one of which is shown, the chains being driven continuously over pairs of sprockets **18**, **18***a*, and synchronized to cooperate with the bag-making machine cutoff knife **6**. Gripper members **30**, **30***a* are each successively pivotally opened and closed to grip the trailing end of a unit bag **8**, while it is being advanced and supported on the upper flight of the plurality of spaced round belts **12**.

The gripper members **30**, **30***a* grip the bag's trailing end and transport each bag **8** from bag-delivery assembly **11** to an advance station **26** where bags are deposited onto a pile, which is supported on the upper flight of a belt **32** intermittently driven by pulleys **33, 34**. Bags **8** at the advance station **26** are successively deposited onto a pile until a predetermined count has been registered, whereupon belt **32** is advanced to collection station **28** and the pile can be removed for packing. This clears station **26**, at which position a new pile of bags can be stacked and counted out.

Referring now to FIGS. 2, 3, and 4, gripper members **30**, **30***a* of assembly **20** are each comprised of a gripper carriage bar **36** and coacting finger bar **38**. Finger bar **38** is rotatably mounted and spring loaded so that a plurality of electrically conductive spaced fingers **40** affixed

thereon are normally in pressing engagement with machine surface **42** of gripper carriage bar **36**. The finger bar **38** is rotated to disengage fingers **40** from surface **42** at the loading and discharge stacking stations by an appropriate bar linkage (not shown) connected to chain **16**, which linkage is actuated as the chain passes around sprockets **18**, **18***a*.

As hereinbefore mentioned, the predetermined count was formerly registered by mechanically counting the machine cycles, whether or not unit bags were actually delivered to the pile, which of course, frequently resulted in an inaccurate bag count. However, the bag-counter of this invention, which is to be described presently in detail, actually detects the presence of a bag in the gripper member **30**, or **30***a* at the stacking or advance station **26** before a unit of the count can be registered, and thereby furnishes an accurate bag count. Moreover, the bag counter of this invention detects the absence of a bag in the gripper fingers **40**, regardless of the varying amounts of dirt or anti-blocking powder which may have been on the plastic film and deposited between the gripper fingers **40** and a sensing electrode **44** hereinafter described. It is to be noted that anti-blocking powder such as a chemically and physically treated mixture of 50% potato starch and 50% corn starch is customarily used in liberal quantities on the interior and exterior surfaces of thermoplastic bags, to prevent blocking of a pile of bags and to facilitate withdrawal of single bags by a customer.

One or a plurality of electrodes **44** interior to insulating sleeves **46** are vertically set into gripper carriage bar **36** and spaced so that electrode ends **48** electrically contact the upper surface of opposing electrically conductive gripping fingers **40** when there is no film intervening between fingers **40** and surface **42**. When a film bag **8** is gripped between surface **42** and fingers **40** which are at ground potential (see FIG. 5), electrode **48** is thereby insulated from the machine ground potential. Insulated electrodes **44** are electrically connected by collector wires **50**, **51** to an electrically conductive rolling contact assembly affixed to one end of the gripper bar assembly and insulated therefrom. The contact assembly is comprised of an arm **54** rotatable around pivot pin **52**, which has a contact roller **56** at the free end. Pivot pin **52** is affixed to finger bar **38** by angle clips **53** insulated by pads **55**.

An electrically conductive contact bar **58** electrically insulated from the stacker frame is positioned in line with contact roller **56** near bag-stacking station **26**. Bar **58** is electrically connected to an electronic resistance sensitive relay **60**, such as General Electric's CR7511A126GI electronic relay. Resistance of the circuit from relay **60** to contact bar **58** is high because it is insulated from ground. Referring to FIG. 5, the resistance sensitive relay **60** is a magnetic relay, controlled by an electron tube amplifier. It is comprised of normally closed contacts **61**, and actuating circuit means **63** connected in circuit relation with contact bar **58** and ground through a coaxial cable **65**. The relay actuating circuit means **63** includes an electron tube amplifier **67** which can be regulated to respond to a change in resistance in an external circuit, such as the combination of contact bar **58** and roller **56**, electrode end **48**, gripper finger **40**, and ground to open the normally closed contacts **61**. One side of contacts **61** is connected in circuit relation with a cam actuated switch **62** and one side of a 115 v. A.C. source. The other side of said contacts **61** is connected in circuit relation with a counter **66** and the other side of said 115 v. A.C. source. The response of relay **60** controls the actuation of counter **66**. In the application of this invention, the relay is used in direct operation—that is, the magnetic relay energizes counter **66** when the external resistance increases above a reference value of resistance preset with the potentiometer, such as 5 megohms (5,000,000 ohms). It is to be noted that a direct contact sensing device is not suitable in the accurate counting application on a bag machine handling thermoplastic bags, because the anti-blocking powder generally used on the bags in liberal quantities, gets into electrical contacts, thereby insulating the contact points and thus creating a resistance which may vary from 1000 ohms to 10,000 ohms. The insulation provided by a thermoplastic bag between the same electrical contacts is of the order of 500 megohms (500,000,000 ohms).

When either gripper assembly **30** or **30***a* is advanced to stacking station **26**, roller **56** engages insulated contact bar **58** thereby electrically connecting electrode end **48** to the actuating circuit means **63** of relay **60**. When a bag is held in either gripper **30** or **30***a*, thereby insulating electrode end **48** from ground which is connected to gripping finger **40**, resistance at the input of relay **60** remains high, such as in the order of 500 megohms, even when gripper contact roller **56** engages insulated contact bar **58**; and the normally closed relay contacts **61** are not operated. Thus, each revolution of counter cam **64**, arranged to coincide with the traverse of each gripper bar **30**, **30***a*, actuates switch **62** which registers a bag count on counter **66**.

When no bag is held in gripper **30**, **30***a*, as it traverses insulated contact bar **58**, electrode **44** is short-circuited to gripping finger **40** which is at ground potential. Resistance at input of relay **60** becomes very low, such as up to about 10,000 ohms and the normally closed contacts **61** open, thereby opening the circuit to counter **66** and no count is registered. Counter **66** is a unit, such as "Acratrol" Series C–35–3, Count Selector and Controller made by Counter and Control Corporation. The "Acratrol" counter is a solenoid-operated ratchet device. Each pulse of current from relay **60** actuates the solenoid to move the ratchet wheel one tooth, thereby operating the cam connected to the ratchet on a common shaft. In the commercial device, there is a change gear arrangement interposed between the ratchet and cam and adjustable so that the cam may turn one revolution for either of 25 or 50 or 100 or 200 pulses fed to the counter. Thus, the traverse of each bag in a gripper assembly registers a count on counter **66**.

Referring now to means for advancing a predetermined count of a pile of bags from stacking station **26** to collection station **28**, one side of normally open cam actuated contacts **69** in the counter **66** is connected in circuit relation with an electrically operated clutch **68** and one side of a 90 v. D.C. source. The other side of the contacts **69** is in circuit relation with a cam actuated switch **70** and the other side of said 90 v. D.C. source.

When the predetermined count for a pile of bags has been registered, counter **66** closes normally open contacts **69** for that portion of the machine cycle determined by transport cam **72** actuating switch **70**. Transport cam **72** is adjustable to control the length of travel of belt **32**. The closed contacts in counter **66** and switch **70** actuate electrically operated clutch **68** to engage belt **32** with the conventional machine drive, thereby advancing the pile of casings from stacking station **26** to collection station **28**.

Since it is obvious that various changes and modifications may be made in the described accurate bag counter without departing from the nature and spirit thereof, it is to be understood that the invention is not limited thereto except as set out in the appended claims.

What is claimed is:

1. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing it at a stacking station, means for counting the bags comprising an electrical circuit associated with said gripper member, said circuit having a resistance greater than a predetermined resistance when a bag is gripped by said gripping member at the stacking station and a different resistance when a bag is not gripped by said gripping member at the stacking station, a counter, and resistance sensitive means in circuit relation with said electrical circuit and adapted to

cause said counter to register a count when said electrical circuit has a resistance greater than said predetermined resistance.

2. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing it at a stacking station, means for counting the bags comprising an electrical circuit associated with said gripper member, said circuit having a resistance greater than a predetermined resistance when a bag is gripped by said gripping member at the stacking station and a different resistance when a bag is not gripped by said gripping member at the stacking station, a counter, and resistance sensitive means in circuit relation with said electrical circuit and adapted to cause said counter to register a count when said electrical circuit has a resistance greater than said predetermined resistance, and means associated with said bag stacking assembly for connecting said counter in circuit relation with said resistance sensitive means when the gripper member is at the stacking station.

3. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing it at a stacking station, means for counting bags comprising an electrical circuit associated with said gripper member having a relatively high electrical resistance when a bag is gripped by said gripping member at the stacking station and a lower electrical resistance when a bag is not gripped by said gripping member at the stacking station, a counter, resistance sensitive means in circuit relation with said electrical circuit and adapted to cause said counter to register a count when said electrical circuit is at said high electrical resistance, means for connecting said resistance sensitive means in circuit relation with said counter, and means associated with the bag stacking assembly for actuating said connecting means when the gripping member is at the stacking station.

4. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing it at a stacking station, means for counting bags comprising an electrical circuit associated with said gripper member having a relatively high resistance when a bag is gripped by said gripping member at the stacking station and a lower electrical resistance when a bag is not gripped by said gripping member at the stacking station, a counter, resistance sensitive means in circuit relation with said electrical circuit and adapted to cause said counter to register a count when said electrical circuit is at said first resistance, a normally open switch adapted to connect said resistance sensitive means in circuit relation with said counter, and means associated with the bag stacking assembly for closing said switch when the gripping member is at the stacking station.

5. In combination with a bag stacking assembly having a gripper including a member and a coacting finger between which a bag is gripped at one station and transported to and released at a stacking station and wherein said member and coacting finger are adapted to contact one another when no bag is held therebetween at said stacking station, means for counting bags comprising a fixed contact bar at the stacking station normally insulated from ground, an electrode normally insulated from ground in said member and adapted to contact said coacting finger when no bag is gripped therebetween, means for connecting said electrode in circuit relation with said contact bar when the gripper member is at the stacking station, means for connecting said gripper coacting finger in circuit relation with ground, said contact bar and electrode thereby being insulated from ground when a bag is gripped between said member and coacting finger at the stacking station and being at ground when no bag is held therebetween at the stacking station because of the contact between said electrode and coacting finger, a counter resistance sensitive means in circuit relation with said contact bar and ground and adapted to cause said counter to register a count only when said contact bar is insulated from ground, and means associated with said bag stacking assembly for connecting said counter in circuit relation with said resistance sensitive means when the gripper is at the stacking station.

6. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing at a stacking station, means for counting comprising an electrical circuit associated with said gripper member, said circuit having a resistance greater than a predetermined resistance when a bag is gripped by said gripping member at the stacking station and a different resistance when a bag is not gripped by said gripping member at the stacking station, a counter, resistance sensitive means in circuit relation with said electrical circuit and adapted to cause said counter to register a count when said electrical circuit has a resistance greater than said predetermined resistance, means associated with said bag stacking assembly for connecting said counter in circuit relation with said resistance sensitive means when the gripper member is at the stacking station, means for transporting a pile of bags from the stacking station to a collection station, and means for connecting the counter in circuit relation with said transporting means, said counter adapted to actuate said moving means when a predetermined count of bags is reached.

7. In combination with a bag stacking assembly having a member for gripping a thermoplastic bag at one station and transporting it to and depositing at a stacking station, means for counting comprising an electrical circuit associated with said gripper member, said circuit having a resistance greater than a predetermined resistance when a bag is gripped by said gripping member at the stacking station and a different resistance when a bag is not gripped by said gripping member at the stacking station, a counter, resistance sensitive means in circuit relation with said electrical circuit and adapted to cause said counter to register a count when said electrical circuit has a resistance greater than said predetermined resistance, means associated with said bag stacking assembly for connecting said counter in circuit relation with said resistance sensitive means when the gripper member is at the stacking station, means for transporting a pile of bags from the stacking station to a collection station, a normally open switch adapted to connect said counter in circuit relation with said moving means; and means associated with the bag stacking assembly for closing said switch when the gripping member is at the stacking station, said counter adapted to actuate said transporting means when a predetermined count of bags is reached.

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