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[54] **BAG SUPPLYING DEVICE**

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[58] **Field of Search** 53/188, 190, 386

[56] **References Cited**

UNITED STATES PATENTS

3,501,893	3/1970	Peterson	53/190
3,566,578	3/1971	Thorne et al.	53/190 X

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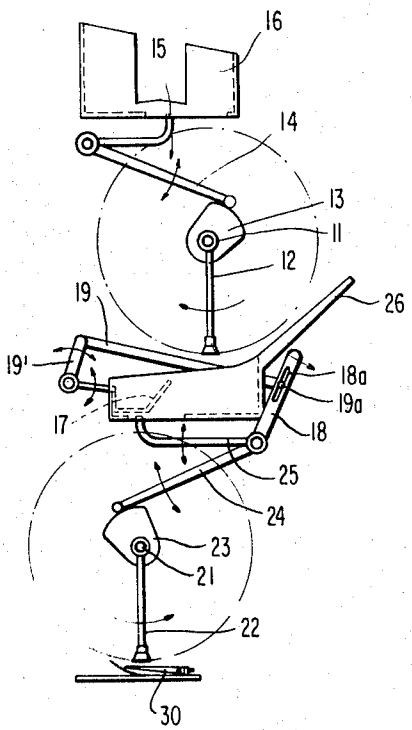
[57] **ABSTRACT**

A bag supplying device comprising a first hopper, a second hopper, and a first bag supplying unit including a suction pipe for picking up bags in the first hopper one-by-one and feeding them to the second hopper. A second bag supplying unit includes a suction pipe for picking up the bags in the second hopper and supplying them to bag receiving brackets mounted on a conveyor. The bag receiving brackets are provided with guide plates for opening the mouth of each bag to facilitate the insertion of articles therein.

11 Claims, 3 Drawing Figures



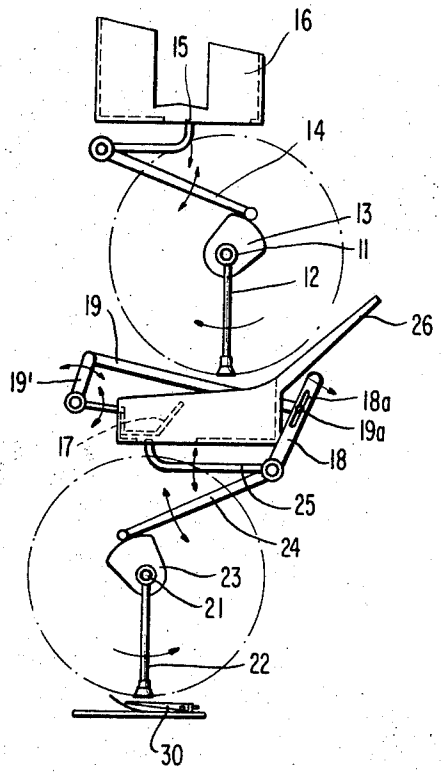


FIG. 1

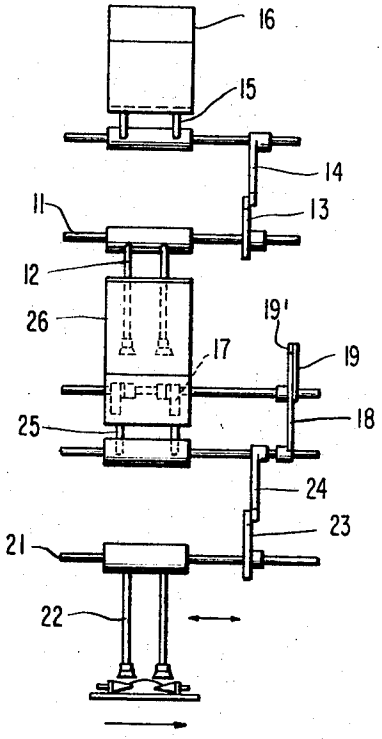
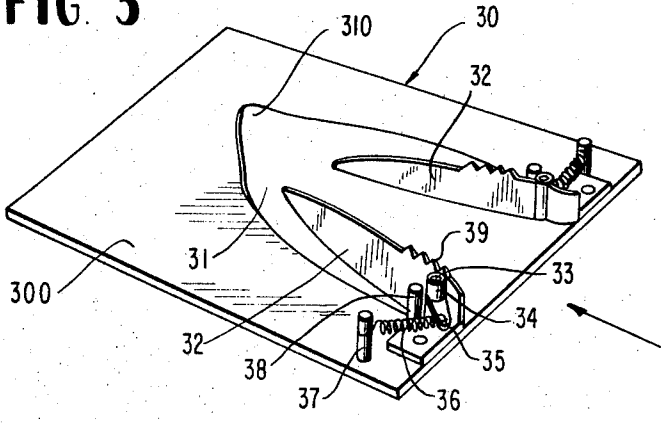


FIG. 2

FIG. 3



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BAG SUPPLYING DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a bag supplying device employed in an automatic packaging machine, and in particular to a device for supplying bags with the mouth thereof opened to bag receiving brackets provided on a conveyer continuously or intermittently fed in an automatic packaging line.

Generally, the most difficult point in automatization of a process in which solid articles are inserted into bags of polyethylene or the like lies in the supplying of the bags to the packaging line from an accumulation of the bags with the mouth thereof opened.

As one of the supplying devices of this type, it has been known to use a device in which an arm having a suction port removes bags by suction from an accumulation of the bags piled in a hopper having a bottom provided with an opening, and the arm supplies the bags to bag receiving brackets with the mouth thereof opened.

However, such a conventional device as described above is disadvantageous in that when the number of the bags piled up in the hopper increases, the upper face of the topmost bag becomes inclined because of the irregularity in the thickness of the bag and the upper bags slip out of alignment with other bags, which results in malfunctioning of the suction pipe to take the lowermost bag out of the hopper. Accordingly, the number of the bags which can be accumulated in the hopper is limited to avoid the malfunctioning of the suction pipe. This is very disadvantageous in an automatic machine from the viewpoint of speed.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a bag supplying device in which a large number of bags can be accumulated in the hopper to make the speed of the bag supplying machine higher than that of the conventional devices.

Another object of the present invention is to provide a bag supplying device in which the bags to be supplied are stored in a first hopper and then supplied to a second hopper which holds fewer bags therein than the first one.

A further object of the present invention is to provide a bag supplying device comprising first and second supplying units in which the second supplying unit is provided with a bag holding means which insures that bags are supplied therefrom one by one to the bag receiving bracket.

Still another object of the present invention is to provide a bag supplying device which makes it possible to continuously supply the bags to the bag receiving brackets which are continuously fed on a conveyer.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and features will be made apparent from the following description of the preferred embodiment of the invention taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevational view of the bag supplying device in accordance with the present invention;

FIG. 2 is a front elevational view of the device shown in FIG. 1; and

FIG. 3 is a perspective view of the bag receiving bracket used in the automatic bag supplying system employing the device in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Now referring to FIG. 1, the device in accordance with the present invention comprises the first and second bag supplying units. The upper or first unit comprises a first shaft **11**, a first suction pipe **12** rotatably mounted on the first shaft **11**, a first cam **13** secured to the first shaft **11**, a first arm **14** following the first cam **13**, and a first auxiliary suction pipe **15** secured to the shaft on which the first arm **14** is secured. Above the upper unit is disposed a first hopper **16** so that the first auxiliary suction pipe **15** and first suction pipe **12** may be brought to the bottom of the hopper **16** at which an opening is provided.

The first auxiliary suction pipe **15** and the first suction pipe **12** are connected to a vacuum pump to remove air from the outer open end thereof. The first auxiliary suction pipe **15** is made to swing up and down according to the rotation of the first suction pipe **12** around the first shaft **11**. Therefore, the lowermost bag in the accumulation of the bags in the first hopper **16** is drawn out of the hopper **16** by means of the auxiliary suction pipe **15** and further brought downward by the rotation of the first suction pipe **12**. The connection between the suction pipe **12** and the vacuum pump is broken off when the suction pipe **12** is moved downward so that the bag brought thereby may be released for downward movement. Thus, the bag carried by the suction pipe **12** is dropped on the second hopper **26** of the second bag supplying unit.

Below the upper or first bag supplying unit is disposed a lower or second bag supplying unit which receives the bags supplied by the upper unit on the second hopper **26**. The lower unit is of substantially the same construction as that of the upper bag supplying unit described above, and supplies the bags received on the second hopper **26** to the bag receiving brackets **30**. The lower bag supplying unit faces and rotates in an opposite direction to that of the upper unit. Further, the lower unit is different from the upper unit in that the second suction pipe **22** is always connected with the vacuum pump so that the bag may be firmly held by the suction pipe when the bag is fitted to the bag receiving bracket. The construction of the bag receiving bracket **30** will be hereinafter described in detail. In FIGS. **1** and **2**, the reference numeral **25** indicates the second auxiliary suction pipe to draw the bags in the second hopper **26** out of the hopper **26**, **24** indicates the second arm following the second cam **23** securely mounted on the second shaft **21**, and **22** indicates the second suction pipe for bringing the bag to the bag receiving bracket **30**. As can be seen in FIG. **2**, the suction pipes **12** and **22** may comprise a pair of pipes. The auxiliary suction pipes **15** and **25** may also comprise a pair of pipes for more efficient carrying of the bags thereby.

In the embodiment shown in FIGS. **1** and **2**, a bag holding lever **17** is provided to make it secure to supply the bag in the second hopper to the bag receiving bracket **30**. The lever **17** is disposed in the second

hopper 26 and presses lightly on the bags in the hopper 26 when the bag is drawn out thereof by the auxiliary suction pipe 25. As well shown in FIG. 1, the bag holding lever 17 is movable up and down as is in the lowermost position in the hopper 26 as shown in FIG. 1 when the auxiliary suction pipe 25 is in its highest position. The lever 17 is associated with coupling arm 18 through coupling levers 19 and 19'. The coupling arm 18 is secured to the shaft of the second arm 24 which is swung up and down in response to the rotation of the second shaft 21, and is swung together therewith. That is, the bag holding lever 17 is moved down in response to the clockwise rotation of the coupling arm 18 accompanying the upward movement of the suction pipe 25 and second arm 24, and is moved up in response to the reverse movement of the above arms and suction pipe 25. The upward movement of the bag holding lever 17 is effected through the levers 19 and 19', and the downward movement thereof is effected by the weight thereof being allowed by the movement of the levers 19 and 19'. While the lever 17 is moved up, the bags are fed into the second hopper from the upper supplying unit and accumulated therein. When the lever 17 is moved down, the lever lightly presses the bags in the hopper 26 to insure that the lowermost bag is drawn out of the hopper 26 by the second suction pipe 25.

Referring to FIG. 3, the bag receiving bracket 30 comprises a base plate 300, a stationary bag receiving plate 31 and a pair of guide plates 32 and 32 mounted on the base plate 300. The guide plates 32 serve to open the mouth of the bag when the bag is supplied to the bracket 30. The bag receiving plate 31 has an upwardly curled tip end 310 to receive the opened mouth of the bag which is opened while the bag is brought to the bracket 30 by the suction pipe 22. The bag is opened by the air blown against the mouth of the bag while the bag is moved down to the bag receiving bracket 30. The brackets 30 are arranged in series on the conveyer to feed the brackets in the direction shown by the arrow in FIG. 2. The bag is received by the receiving plate 31 and its mouth is maintained opened by the guide plates 32 so that the articles to be put therein may be easily inserted thereinto. The article is placed into the bag received on the bracket in the direction shown by the arrow in FIG. 3. If the bag supplying unit as a whole is reciprocated along the direction of the conveyer feed at the same speed as that of the conveyer, then the conveyer can be fed continuously, that is, not intermittently.

The guide plates 32 for guiding the article to be inserted into the bag and for making the opening operation easy preferably are swingable so that the bags may be easily opened and the articles may be easily inserted. For this purpose, in the embodiment of the bracket shown in FIG. 3, the guide plates 32 are welded to cylindrical members 34 rotatably mounted on stationary pivots 33. And the cylindrical members 34 are provided with projections 35 which are pulled in the direction shown by the arrow by means of springs 36 engaged at the end thereof with stationary pins 37. The pivotal movement of the plates 32 is limited by stoppers 38, and normally the plates 32 are in the position as shown in FIG. 3. When the articles are inserted into the bags, the guide plates 32 are moved outwardly to widely open the mouth of the bag.

It is preferable to provide a serrated portion on the upper edge of the guide plates 32 as shown at 39 in FIG. 3. The serrated portion 39 of the guide plates 32 prevents the bag from being disengaged from the bracket when the article is inserted thereinto. The shape of the serrated portions 39 should be formed so that the bag may easily received by the bracket and difficult to be disengaged therefrom.

The bag supplying device in accordance with the present invention as described above is operated as follows.

In operation, from several tens to several hundreds of bags are stored in the first hopper 16 and brought to the lower hopper 26 one by one by the upper bag supplying unit. Since the position of the bags stored in the first hopper 16 is not constant, it is required to position the suction pipe opening of the first auxiliary suction pipe 15 near the central portion at the bottom of the hopper 16 so that the bags may be effectively taken out thereof. The suction opening of the second auxiliary suction pipe 25 is located in the vicinity of the open end of the bags in the hopper 26 so that the mouth of the bags may be opened. Then, the second suction pipe 22 catches the bag at the portion near the open end thereof so that the bags may be easily opened while being brought down to the bag receiving bracket 30. Further, it is preferred to make the first and second suction pipes 12 and 22 stop at the position where the suction pipes are in contact with the bags at the bottom of the hoppers in order to make the sucking operation effective. In the lower hopper 26, several bags, such as ten, are stored normally. The number of the bags to be properly stored in the lower hopper 26 of course depends on the thickness of the bags or unevenness of the bag. That is, the number of the bags stored in the lower hopper can be increased if the unevenness in the thickness of the bags is decreased. This similarly applies to the upper hopper also. Further, it is of course necessary to take the friction coefficient and weight of the bags into consideration.

According to the bag supplying device of the invention as described above, significant advantages as follows can be obtained.

Based on the construction of the device with the upper and lower supplying units, there is an advantage since the number of manual operations to supply bags into the hopper can be reduced in the upper unit. Thus, the efficiency of the automatic bag supplying device can be improved. Further, based on the same construction, there is another advantage in that the bag supplying operation can be conducted at high reliability in the lower supplying unit by making the number of the bags stored in the lower hopper of a lesser number.

Further, in accordance with the bag supplying device of the invention, there is no need to stop the device when the manual bag supplying operation cannot follow the automatic operation of the device, since there are several bags stored in the last hopper.

Further, since there is provided a bag holding means in the lower supplying unit, the bag supplying operation is very reliable.

What is claimed is:

1. A bag supplying device comprising a first hopper, a second hopper, a first bag supplying unit including a suction pipe for picking up the bags in said first hopper one by one and feeding the bags to said second hopper,

a bag receiving bracket, and a second bag supplying unit including a suction pipe for picking up the bags in said second hopper one by one and supplying the bags to said bag receiving bracket.

2. A bag supplying device as defined in claim 1 wherein a bag holding means is provided in said second hopper for pressing the bags therein in response to the sucking operation of the second bag supplying unit.

3. A bag supplying device as defined in claim 2 wherein said bag holding means comprises a lever movable up and down in said second hopper, and interconnecting means associated with said lever and with said second bag supplying unit, said lever being moved downward in response to the upward movement of the suction pipe in said second bag supplying unit.

4. A bag supplying device as defined in claim 3 wherein said lever is moved upwardly with the movement of the second bag supplying unit and is moved downwardly by the weight thereof, whereby the bags in the second hopper are pressed lightly.

5. A bag supplying device as defined in claim 1 wherein said bag receiving bracket is located on a conveyer and the bag supplying units are moved at the same speed as that of the conveyer in the same direction.

6. A bag supplying device as defined in claim 5 wherein said bag supplying units are reciprocated in the same direction as the feeding direction of the conveyer, whereby the bags are continuously supplied to the bracket.

7. A bag supplying device as defined in claim 1 wherein the movement of said suction pipes is stopped at the time when the pipes are brought in contact with the bags stored in the hopper.

8. A bag supplying device as defined in claim 1 wherein said first and second bag supplying units are provided with an auxiliary suction pipe for taking the bags out of the hopper so that the suction pipe may firmly pick up the bags.

9. A bag supplying device as defined in claim 8 wherein said auxiliary pipe is moved downwardly when the suction pipe is moved upwardly to pick up the bag.

10. A bag supplying device as defined in claim 1 wherein said bag receiving bracket comprises a base plate, a bag receiving plate, and a pair of guide plates to open the mouth of the bag when the bag is received by the receiving plate.

11. A bag supplying device as defined in claim 10 wherein said guide plates are provided with spring means which normally maintain them in the closed position, and said guide plates are opened when an article is inserted into the bag received by the bracket.

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