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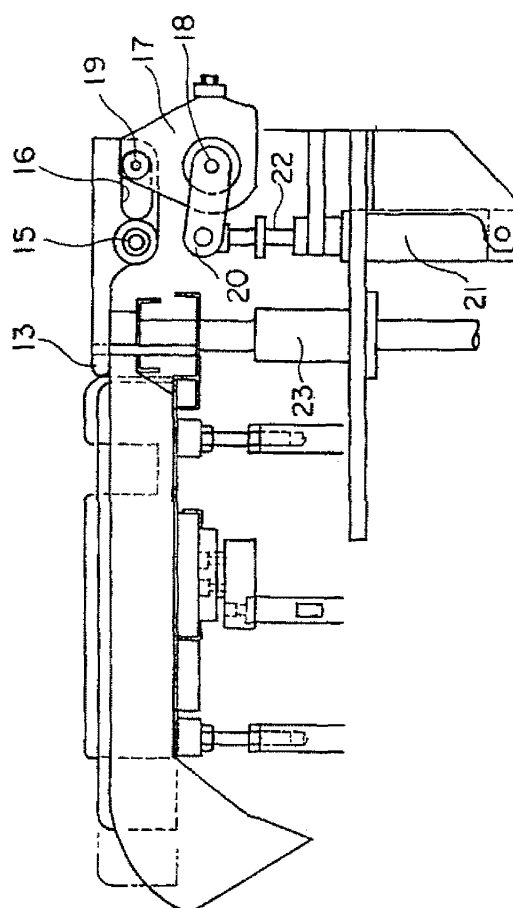
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Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) **Bag opening apparatus**

(57) A bag opening apparatus is provided by which bags stacked with pins being inserted into pin holes are smoothly opened and delivered one by one from the uppermost one of the bags. The apparatus comprises a center holding member (13) pressing elongations (2) of bags (1) between two pin holes (3) and side holding members (14) pressing the elongations (2) on both outer sides of the pin holes (3). Pressing of the elongations (2) by the holding members (13), (14) is released by rotation of a rotating member (17), (37) around a rotating shaft (18), (38). When the elongations (2) are to be pressed, the rotating member (17), (37) is vertically positioned so that a pushing-up force acting on the elongations (2) is received by the rotating member (17), (37) in a dead point state in the vertical direction. A control device controls such that when the bag 1 is to be opened by being blown with air, the pressing by the side holding members (14) is released and when the bag 1 so opened is to be discharged, the side holding members (14) press the remainder of the stacked bags 1 and the pressing by the center holding member (13) is released.

Fig. 4



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention generally relates to a bag opening apparatus and more particularly to an apparatus for opening bags in a stack, one by one, where each of the bags has one edge of its opening portion elongated, the edge so elongated is provided with two pin holes and a multiplicity of the bags are held together with pins, having upper ends free, being inserted into the pin holes.

Description of the Prior Art

[0002] In a packaging apparatus for making packages by filling articles in plastic bags for packaging purpose, it is necessary to open the bags, one by one, out of a multiplicity of the bags held together in a stack. In order to facilitate operation to open the bags, one by one, out of the stacked bags for packaging purpose, conventionally, it is so carried out that, as shown in Fig. 8, a plastic bag 1 is formed having one edge of its opening portion 0 elongated to form an elongation 2, the elongation 2 is provided with two pin holes 3, as shown in Fig. 9, and pins 04 are inserted into the pin holes 3 so that a multiplicity of the bags 1 are held together in a stack and the bags 1 in this state are opened, one by one, to be filled with articles.

[0003] When the bags held with the pins 04 being inserted into the pin holes 3, as shown in Fig. 9, are opened, one by one, to be used for packaging, each of the plastic bags 1 so opened must be released from the pins 04. Conventionally, it is so carried out that while the pins 04 are held inserted in the pin holes 3, articles are filled in the plastic bag 1 and by action of force acting following the packaging work or the like, the plastic bag 1 is torn off at the portion of the pin holes 3 for release from the pins 04. Numeral 05 designates a perforated line provided so that the plastic bag 1 can be easily torn off at the portion of the pin holes 3.

[0004] Nevertheless, at the portion of the pin holes 3 of the plastic bag 1 so torn off, there remain broken fractions and the exterior appearance of packaged articles is damaged. Hence, in order to improve this problem, the applicant here has heretofore proposed plastic bag opening methods by the Japanese laid-open patent applications 2000-255514 and 2003-11920. In these methods, as shown in Fig. 10, pins 4 having upper ends free are inserted into pin holes of a plastic bag 1 to hold together the plastic bags 1 in a stack, air is blown obliquely from above to partially open the plastic bag 1 and then an opening member is inserted into the bag to enlarge the opening of the bag. At the time of so enlarging the opening, the plastic bag 1 is drawn out of the pins 4 without being torn or broken.

[0005] In these new methods, it is necessary to always

hold in a stable state an upper surface of the plastic bags 1 stacked with the pins 04 being inserted into the pin holes 3. Especially, when the uppermost bag fully opened is to be drawn out of the pins 04, the stack of the remaining plastic bags 1 is often deformed to thereby irregularly move the bags 1 so that the bag opening operation is obstructed. In order to avoid the obstruction, it is necessary to accurately hold the stack of the bags so that the bags 1 can be smoothly drawn out of the pins 04. For this purpose, there is provided a holding member 5 so that the upper surface of the stacked bags 1 pushed up from below is always held at a predetermined level. That is, even if the stacked bags 1 are consumed one by one and the height of the stack is changed, the remaining bags 1 are pushed up from below and the upper surface of the bags 1 is pressed to be accurately held at the predetermined level by the holding member 5. What is now needed is an apparatus to securely operate the holding member 5 so that the upper surface of the stacked bags 1 pushed up from below is pressed to be held at the predetermined level as well as the pressing is released so that the bags 1 are discharged one by one from the uppermost one.

SUMMARY OF THE INVENTION

[0006] In order to satisfy the above-mentioned necessity, it is an object of the present invention to provide a bag opening apparatus constructed to open bags in a stack, one by one from the uppermost one, by blowing air toward the bags, where each of the bags has one edge of opening portion elongated to form an elongation, the elongation is provided with two pin holes and the bags are held together with pins, having upper ends free, being inserted into the pin holes. In the bag opening apparatus so constructed, in order for the bags to be smoothly opened and stably delivered, a pushing-up force acting on the bags from below is received to thereby always hold an upper surface of the stacked bags at a predetermined level as well as pressing of the stacked bags and release thereof can be quickly and accurately carried out to thereby securely open and deliver the bags one by one.

[0007] That is, as a bag opening apparatus that can achieve the above-mentioned object, the present invention provides a bag opening apparatus constructed to open bags, where each of the bags has one edge of its opening portion elongated to form an elongation, the elongation is provided with two pin holes and the plastic bags are held together in a stack with pins, having their upper ends free, being inserted into the pin holes and opened one by one from the uppermost one of the bags in the stack by being blown with air, i.e. obliquely from above, characterized in that the bag opening apparatus comprises a center holding member to press the elongations between the two pin holes, side holding members to press the elongations, i.e. on both outer sides of the pin holes, and a control device to control movements of the center holding member and side holding members

such that when the bags are to be opened by the air blowing, the pressing by the side holding members is released and when the bags so opened are to be discharged, the side holding members press the remainder of the bags in the stack and the pressing by the center holding member is released and each of the center holding member and side holding members is constructed such that the pressing of the elongations and release thereof are carried out by rotation of a rotating lever around a rotating shaft and when the elongations are to be pressed, the rotating lever is vertically positioned so that a pushing-up force acting on the elongations is received by the rotating lever in a dead point state in the vertical direction.

[0008] In the bag opening apparatus according to the present invention, the elongation is formed by an edge of a lower sheet out of two sheets forming the bag opening portion being elongated and while the elongations of the bags are held pressed by the center holding member between the two pin holes, air is blown obliquely from above toward the bag opening portion. Thereby, the uppermost one of the bags held together in the stack is partially opened and, at this time, the bag at the portion of the pin holes is drawn out of the pins having their upper ends free.

[0009] Then, an opening member that is vertically and/or horizontally enlargeable is inserted into the bag opening portion so partially opened and the bag opening portion is enlarged to be fully opened. Thereby, the elongation, except the portion pressed by the center holding member between the two pin holes, is lifted up so that the bag at the portion of the pin holes still inserted with the pins can be fully drawn out of the pins.

[0010] In this way, the bag opening portion is enlarged and the bag at the portion of the pin holes is drawn out of the pins without being torn off or broken so that the bag becomes ready for being filled with articles. In the bag so opened, there remains no broken fraction in the vicinity of the pin holes differently from the conventional case and packaged articles having an excellent exterior appearance can be produced. The remainder of the stacked bags after the uppermost bag is so opened are pressed at the portion of the elongations by the side holding members on both outer sides of the pin holes. Hence, even if the pressing by the center holding member is released for discharge of the opened bag, the stacked bags are pressed by the side holding members and the stacked state of the bags can be stably held.

[0011] Also, in the bag opening apparatus according to the present invention, the center holding member and side holding member are respectively constructed such that the pushing-up force acting on the elongations from below is received by the rotating lever vertically positioned so as to be in the dead point state in the vertical direction. That is, the pushing-up force to push up the stacked bags from below is securely received by the center holding member and side holding members and the upper surface of the stacked bags can be always held at

the predetermined level. When the pressing of the stacked bags is to be released, the rotating lever is only rotated around the rotating shaft and thereby the bag opening operation can be smoothly carried out. Also, when the stacked bags are to be pressed, it is carried out by a simple structure that the rotating lever vertically positioned becomes the dead point state in the vertical direction to thereby securely receive the pushing-up force acting from below. Thus, even if the height of the stacked bags changes or the pushing-up force from below changes, the stacked bags are securely held and the upper surface of the bags can be always held at the predetermined level.

[0012] In this way, by the construction that at least one of the center holding member and side holding member always abuts on the upper surface of the stacked bags, the stacked bags pushed up from below are securely held so that the upper surface thereof is maintained at the predetermined level. Thus, according to the bag opening apparatus of the present invention, the bags in the stack can be stably opened one by one from the uppermost one of the bags.

[0013] In the bag opening apparatus of the present invention as mentioned above, if the rotating shaft to rotate the rotating lever for moving the center holding member and side holding member is constructed to be rotated by elongation and contraction of an air cylinder, there is obtained a bag opening apparatus in which a change-over between a state where the rotating lever vertically positioned to be in the dead point state receives the pushing-up force acting from below and a state where the rotating lever rotated around the rotating shaft releases the pressing of the elongations of the bag opening portion can be easily, quickly and securely carried out.

[0014] Also, in the bag opening apparatus of the present invention as mentioned above, if the pressing by the center holding member and side holding member and release thereof are carried out by a construction such that the rotating lever has its one end fitted with an engaging roller and a member having a slot with which the engaging roller engages is moved by rotation of the rotating lever around the rotating shaft, there is obtained a bag opening apparatus in which the center holding member and side holding members are easily moved by rotation of the rotating lever so that the bag opening operation can be smoothly carried out.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a plan view showing plastic bags set in a stack to be opened in a plastic bag opening apparatus according to the present invention.

Fig. 2 is an explanatory view showing a state that a bag opening operation of the plastic bags shown in Fig. 1 is being carried out by the plastic bag opening apparatus according to the present invention.

Fig. 3 is a view seen in the direction of arrow A of Fig. 2.

Fig. 4 is a side view showing a structure of a center holding member used in the plastic bag opening apparatus according to the present invention, wherein the stacked plastic bags are pressed by the center holding member.

Fig. 5 is the same side view of the center holding member of Fig. 4, wherein the pressing of the stacked plastic bags by the center holding member is released.

Fig. 6 is a side view showing a structure of a side holding member used in the plastic bag opening apparatus according to the present invention, wherein the stacked plastic bags are pressed by the side holding member.

Fig. 7 is the same side view of the side holding member of Fig. 6, wherein the pressing of the stacked plastic bags by the side holding member is released.

Fig. 8 is a cross sectional side view of the plastic bag shown in Fig. 1.

Fig. 9 is an explanatory perspective view showing a state that stacked plastic bags are held together by pins in a plastic bag opening apparatus in the prior art.

Fig. 10 is an explanatory side view showing a state that stacked plastic bags held together by pins having upper ends free are being opened in a plastic bag opening apparatus in the prior art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Herebelow, the present invention will be concretely described based on an embodiment of a plastic bag opening apparatus according to the present invention with reference to Figs. 1 to 3. In Figs. 1 to 3, numeral 1 designates a plastic bag for packaging purpose that has its three sides except an opening portion 0 closed. One edge of a plastic sheet out of two plastic sheets forming the opening portion 0, that is, a lower side sheet in the figures, is elongated to form an elongation 2 and the elongation 2 is provided with two pin holes 3 arranged with an interval maintained between them.

[0017] A multiplicity of the plastic bags 1 so formed are held together in a stack with two pins 4, having their upper ends free, being inserted into the pin holes 3. The stacked plastic bags 1 are pressed by a center holding member 13 at the portion of the elongations 2 between the two pin holes 3. Also, the elongations 2 of the stacked plastic bags 1 are pressed by side holding members 14 at peripheral portions of the elongations 2 on both outer sides of the two pin holes 3.

[0018] The stacked plastic bags 1 are pushed up from below with a predetermined pressure by an air cylinder or the like and the construction is so made that this pushing-up force is received by the center holding member 13 and side holding members 14 to thereby always hold an upper surface of the stacked plastic bags 1 at the

same level. In order for the stacked plastic bags 1 to be pushed up from below with the predetermined pressure by an air cylinder or the like so that the same horizontal state is always maintained regardless of the height of the stacked bags, an appropriate device of known constructions may be employed and one example thereof is shown in the Japanese laid-open patent application 2002-20510.

[0019] After the plastic bags are held together in the stack, as mentioned above, pressing by the side holding members 14 is released and air 7 is blown obliquely from above toward the opening portion 0 of the plastic bags from an air nozzle 6 so that the opening portion 0 of the uppermost bag is opened, as shown by solid lines 8 in Fig. 2.

[0020] The air 7 blown from the air nozzle 6 is a hot air of temperature of 50 to 80°C so that temperature of the bag 1 that is being opened is increased and flexibility thereof is enhanced. Thereby, when articles are to be filled in the bag 1, the bag is prevented from being broken by corner portions or the like of the articles, which is preferable, although not essential. The concrete temperature of the air 7 can be appropriately selected in consideration of a material and thickness of the bag to be used, shape and stiffness of the articles to be filled, etc.

[0021] Then, an opening member 9 is inserted into the opening so formed by the air 7 from the air nozzle 6. The opening member 9 comprises four bars, that is, two lower bars 10 and two upper bars 11. Intervals between the lower bars 10 and upper bars 11, between the two lower bars 10 and between the two upper bars 11 are changeable by vertical and horizontal movements of the bars.

[0022] After the opening member 9 is inserted into the opening of the bag 1, the upper bars 11 are moved upward so that the opening of the bag 1 is enlarged, as shown by two dotted chain lines 12. As the result of the bag partial opening action by the air 7 and/or the opening enlarging action by the opening member 9, the bag 1 at the portion of the pin holes 3 is drawn out of the pins 4, having their upper ends free, that have been inserted into the pin holes 3. At this time, the elongation 2 is by no means broken or torn at the portion of the pin holes 3.

[0023] In this way, even if the pressing by the side holding members 14 is released, the pushing-up force of the stacked plastic bags 1 acting from below is received by the center holding member 13 so that the upper surface of the plastic bags 1 can be always maintained at the same level.

[0024] After the uppermost bag 1 is drawn out of the pins 4 at the portion of the pin holes 3, the remaining stacked plastic bags 1 are held together by the side holding members 14, as shown in Fig. 3.

[0025] Next, construction of the center holding member 13 and side holding members 14 will be described with reference to Figs. 4 to 7.

[0026] As shown in Figs. 4 and 5, the center holding member 13 is pivotably fitted around a pivotal shaft 15 and is provided with a slot 16. Numeral 17 designates a

rotating member, constituting a rotating lever of the present invention, that is rotatably fitted around a rotating shaft 18. An engaging roller 19 is rotatably fitted to the rotating member 17 and is fitted in the slot 16 of the center holding member 13 to be rollably moved along the slot 16.

[0027] The rotating shaft 18 to which the rotating member 17 is rotatably fitted is provided with a lever 20 and the lever 20 is pivotably fitted to an upper end of a piston rod 22 of an air cylinder 21.

[0028] By this construction, when a piston of the air cylinder 21 is retracted, the rotating shaft 18 is rotated via the lever 20, the rotating member 17 is rotated around an axis of the rotating shaft 18, the engaging roller 19 is moved along the slot 16 and the center holding member 13 is pivotally rotated around the pivotal shaft 15 in the clockwise direction in Figs. 4 and 5. That is, a press state shown in Fig. 4 where the center holding member 13 presses the plastic bags 1 stacked with the pins 4 being inserted in the pin holes 3 is changed to a release state shown in Fig. 5 where the pressing by the center holding member 13 is released by the center holding member 13 being so clockwise rotated.

[0029] On the other hand, while the center holding member 13 is in the state pressing the stacked plastic bags 1, as shown in Fig. 4, a line connecting axes of the engaging roller 19 and rotating shaft 18 of the rotating member 17 is maintained vertical. Hence, even if a downward pressing force acts on the engaging roller 19 from the center holding member 13, this force only acts on the rotating shaft 18 right below thereof via the vertical rotating member 17 and by no means becomes a force to rotate the rotating member 17. That is, the rotating member 17 is in a dead point state. It is to be noted that in Figs. 4 and 5, numeral 23 designates an air cylinder that always pushes up the stacked plastic bags 1. The pushing-up force of the air cylinder 23 is received by the center holding member 13 so that the upper surface of the stacked plastic bags 1 can be held at the same level.

[0030] Next, construction of the side holding member 14 will be described with reference to Figs. 6 and 7. In Figs. 6 and 7, the side holding member 14 is fitted with a lever 31 that downwardly elongates and the lever 31 is fitted with a sliding member 32 via a bolt 33. The sliding member 32 is supported being fitted movably up and down in a groove 34 of a strut 30.

[0031] The lever 31 has its lower end fitted with a receiving member 35 and the receiving member 35 is provided with a slot 36 that horizontally elongates. Numeral 37 designates a rotating member constituting a rotating lever of the present invention. The rotating member 37 has its upper end side fitted with a rotating shaft 38 that is connected to an air cylinder and its lever end side fitted rotatably with an engaging roller 39.

[0032] The engaging roller 39 fitted to the lower end of the rotating member 37 is fitted in the slot 36 of the receiving member 35 and the construction is so made that when the rotating member 37 is rotated around an axis of the rotating shaft 38, the receiving member 35 is

moved up and down via the engaging roller 39.

[0033] In a state shown in Fig. 6 where the side holding member 14 is in the state pressing the stacked plastic bags 1, a line connecting axes of the engaging roller 39 and rotating shaft 38 of the rotating member 37 is maintained vertical. Hence, even if an upward pressing force acts on the engaging roller 39 from the side holding member 14 via the receiving member 35, this force only acts on the rotating shaft 38 right above thereof via the vertical rotating member 37 and by no means becomes a force to rotate the rotating member 37 that is in a dead point state. It is to be noted that in Figs. 6 and 7, numeral 40 designates an air cylinder that always pushes up the stacked plastic bags 1. The pushing-up force of the air cylinder 40 is received by the center holding member 13 and side holding member 14 so that the upper surface of the stacked plastic bags 1 can be held at the same level.

[0034] In Fig. 6, when the rotating member 37 is rotated in the clockwise direction around the axis of the rotating shaft 38, the receiving member 35 is upwardly moved and the side holding member 14 is also upwardly moved so that the pressing force acting on the stacked plastic bags 1 from the side holding member 14 is released, as shown in Fig. 7.

[0035] It is to be noted that as in the case of the rotating member 17 with respect to the center holding member 13, the rotating member 37 is rotated around the axis of the rotating shaft 38 by the rotating shaft 38 being rotated by an appropriate air cylinder (not shown).

[0036] Now returning to Fig. 3, when the bag 1 is opened to the maximum size by the interval between the lower bars 10 and upper bars 11 being enlarged, as mentioned above, articles to be packaged are inserted into the bag 1 to be filled therein. It is to be noted that at an appropriate time before filling the articles in the bag 1, during the filling time thereof or after the filling thereof, the bag pressing force by the center holding member 13 may be weakened so that the uppermost bag 1 so opened is released from the stacked state of the bags.

[0037] When the bag 1 filled with the articles is to be discharged, the edge portion of the bag 1 is released from the center holding member 13. Even if the bag pressing force by the center holding member 13 is released, the elongations 2 of the bags 1 stacked thereunder are pressed by the side holding members 14 on both outer sides of the pins 4 so that the stacked state of the bags 1 can be maintained in order. Also, the pushing-up force from below of the plastic bags 1 in the stacked state is received by the side holding members 14 in the dead point state, as mentioned above, so that the upper surface of the plastic bags 1 can be maintained at the predetermined level.

[0038] As for the opening member 9, the construction is made such that when the opening member 9 is inserted into the opening of the bag 1, it can enlarge the opening in the vertical direction, in the horizontal direction or both in the vertical and horizontal directions and the size there-

of may be appropriately selected corresponding to the size, shape or the like of the bag to be opened.

[0039] In the foregoing, while the present invention has been concretely described based on the embodiment, as illustrated, the present invention is not limited to the embodiment but, as a matter of course, may be added with various modifications in the concrete structure and construction without departing from the scope of the claims of the present invention as appended herein.

[0040] For example, in the embodiment, while the construction of the opening member 9 has been described to enlarge the opening of the bag 1 by the upper bars 11 being moved straightly upwardly, as shown in Fig. 3, in place thereof, such a construction may be employed that four bars are moved obliquely upwardly and obliquely downwardly with an oblique angle of 45°, respectively, so as to enlarge the opening of the bag 1. That is, an appropriate one of known constructions as the opening member of this kind can be employed.

[0041] Also, in the embodiment, the construction of the rotating members 17, 37 as the rotating lever has been described such that the engaging rollers 19, 39, fitted to the rotating members 17, 37, are fitted in the slots 16, 36 so that when the rotating members 17, 37 are rotated, the center holding member 13 and side holding members 14 are caused to press the stacked bags 1 or to release the pressing and when the line connecting the rotating shafts 18, 38 and engaging rollers 19, 39 becomes vertical, the dead point state of the rotating members 17, 37 is formed. But, not being limited thereto, an appropriate construction, except the illustrated one, of the center holding member and side holding member may be employed, if they are constructed such that when the rotating member is rotated around the rotating axis, the pressing of the elongations 2 of the bags 1 is released and when the elongations 2 of the bags 1 are to be pressed, the rotating member becomes vertical to form the dead point state so that the pushing-up force from below of the elongations 2 is received by the rotating member.

[0042] Although the description of the invention has been made in connection with a bag opening apparatus for opening plastic bags in a stack, the bag opening apparatus of the invention is of course applicable to other types of bags that can be stored in a stack and opened by an air stream blown towards an opening of the uppermost bag in such a stack, i.e. paper bags or textile bags. It is also feasible to use other means for pre-opening the opening of the bags in lieu of the air stream, i.e. a mechanical device.

Claims

1. A bag opening apparatus constructed to open bags (1), which bags (1) each have one edge of an opening portion (O) elongated to form an elongation (2) provided with two pin holes (3), wherein said bags (1) are held together in a stack with pins (4) inserted

into said pin holes (3), and wherein said bags (1) are to be opened one by one from an uppermost one of said bags (1) in the stack by being blown with air; **characterized in that** said bag opening apparatus comprises

a center holding member (13) to press said elongations (2) between said two pin holes (3); side holding members (14) to press said elongations (2) on outer sides of said center holding member (13); and

a control device to control movements of said center holding member (13) and side holding members (14) such that, when said respective uppermost bag (1) is to be opened by the air blowing, the pressing by said side holding members (14) is released, and such that, when said respective bag (1) so opened is to be discharged, said side holding members (14) press the remainder of said bags (1) in the stack and the pressing by said center holding member (13) is released; and

wherein each of said center holding member (13) and side holding members (14) are constructed so as to be movable between the pressing and release positions by rotation of a rotating lever (17;37) around a rotating shaft (18;38), wherein, when said center holding member (13) and side holding members (14) are in the pressing position, said rotating lever (17;37) is vertically positioned so that a pushing-up force acting on said stack of bags (1) is received by said rotating lever (17;37) in a dead point state in the vertical direction.

2. The bag opening apparatus as claimed in claim 1, **characterized in that** said rotating shaft (18;38) for rotating said rotating lever (17;37) for moving said center holding member (13) and side holding members (14) is constructed to be rotated by elongation and contraction of an air cylinder (21).
3. The bag opening apparatus as claimed in claim 2, **characterized in that** said rotating lever (17;37) has its one end fitted with an engaging roller (19;39) and a member (13;35) having a slot (16;36) with which said engaging roller (19;39) engages is arranged to be moved by rotation of said rotating lever (17;37) around said rotating shaft (18;38) to move said center holding member (13) and side holding members (14) between the pressing and release positions.
4. The bag opening apparatus as claimed in claim 1, 2 or 3, **characterized by** further comprising an air cylinder (40) for applying the pushing-up force on said stack of bags (1).

Amended claims in accordance with Rule 86(2) EPC.

1. A bag opening apparatus constructed to open

bags (1), which bags (1) each have one edge of an opening portion (0) elongated to form an elongation (2) provided with two pin holes (3), wherein said bags (1) are held together in a stack with pins (4) inserted into said pin holes (3), and wherein said bags (1) are to be opened one by one from an uppermost one of said bags (1) in the stack by being blown with air; wherein said bag opening apparatus comprises a center holding member (13) to press said elongations (2) between said two pin holes (3); side holding members (14) to press said elongations (2) on outer sides of said center holding member (13); and a control device to control movements of said center holding member (13) and side holding members (14) such that, when said respective uppermost bag (1) is to be opened by the air blowing, the pressing by said side holding members (14) is released, and such that, when said respective bag (1) so opened is to be discharged, said side holding members (14) press the remainder of said bags (1) in the stack and the pressing by said center holding member (13) is released;

characterized in that

said bag opening apparatus comprises a device for pushing up the stacked bags (1) from below with a predetermined pushing-up force, wherein the pushing-up force can be received by said center holding member (13) and said side holding members (14) to hold an upper surface of the stack of bags (1) at the same level, and wherein each of said center holding member (13) and side holding members (14) are constructed so as to be movable between the pressing and release positions by rotation of a rotating lever (17;37) around a rotating shaft (18;38), wherein, when said center holding member (13) and side holding members (14) are in the pressing position, said rotating lever (17;37) is vertically positioned so that the pushing-up force acting on said stack of bags (1) is received by said rotating lever (17;37) in a dead point state in the vertical direction.

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Fig. 1

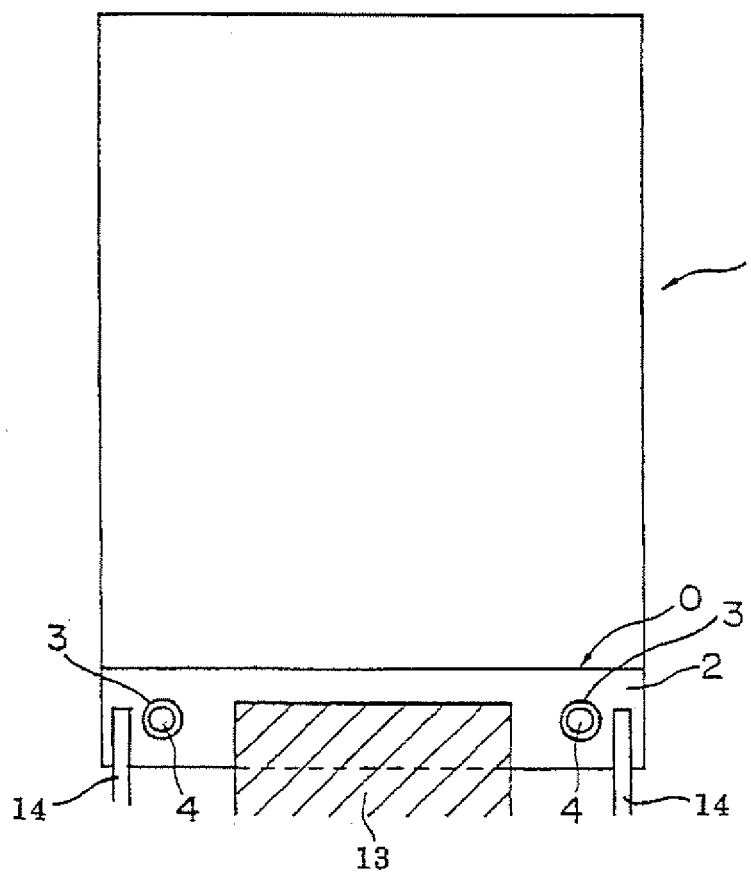


Fig. 2

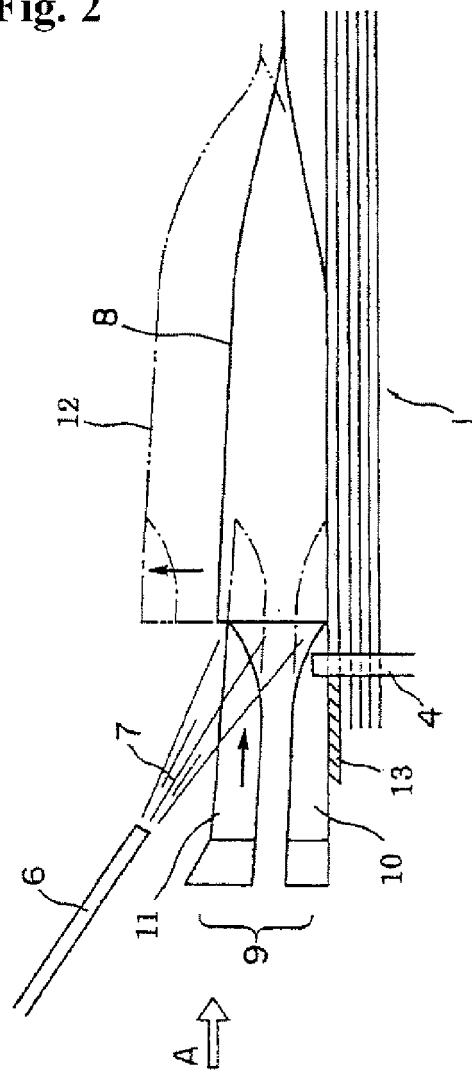


Fig. 3

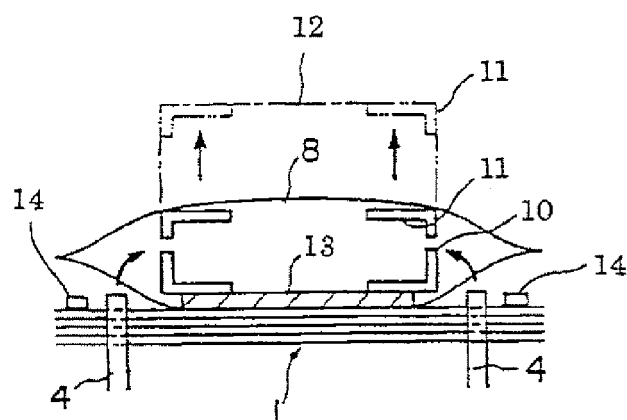


Fig. 4

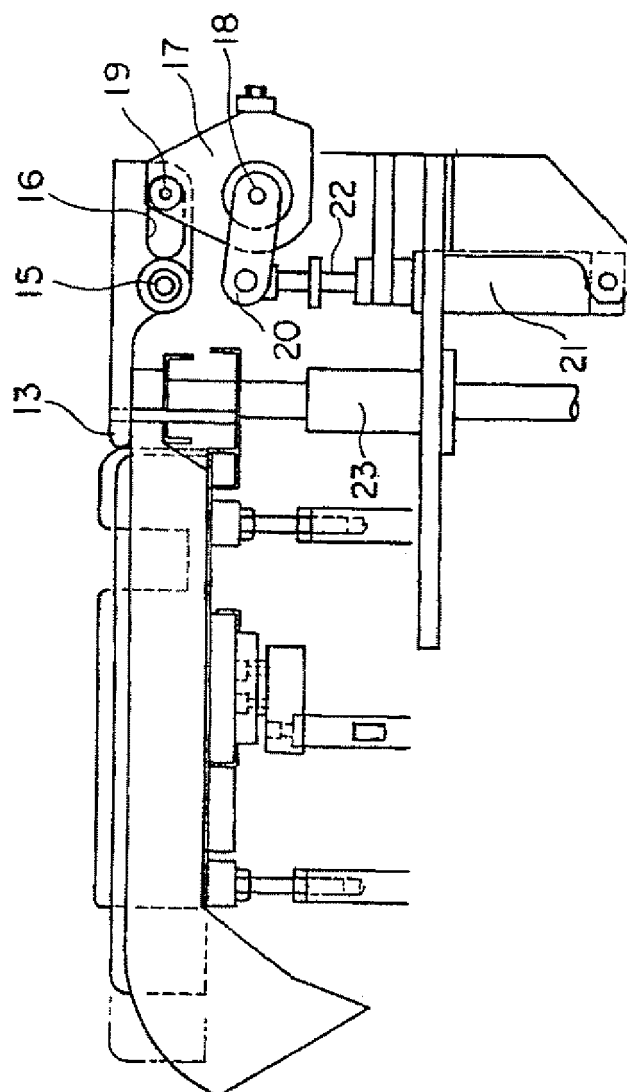


Fig. 5

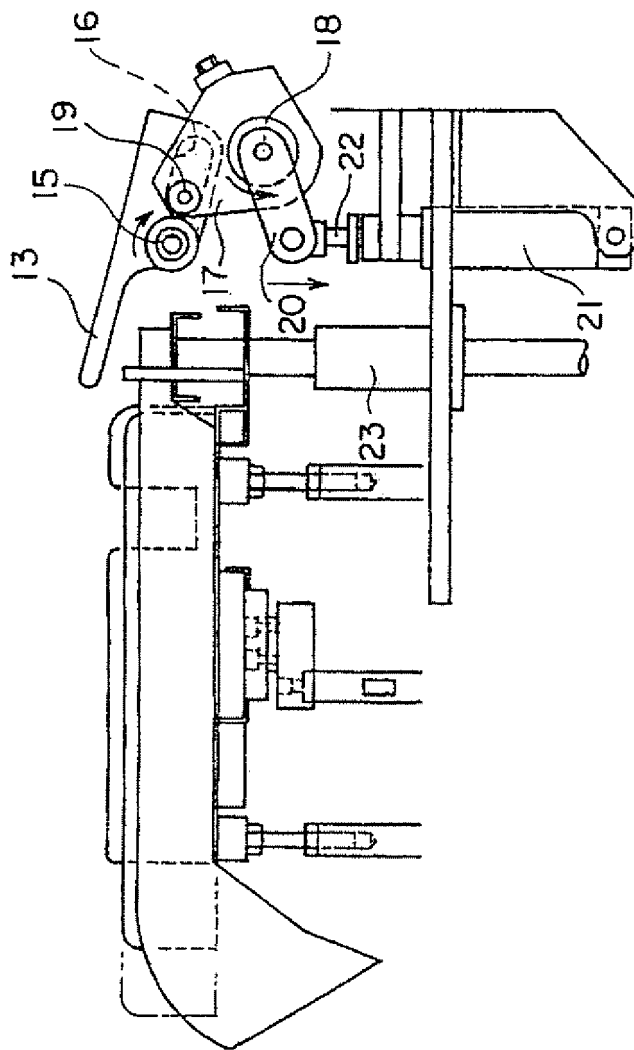


Fig. 6

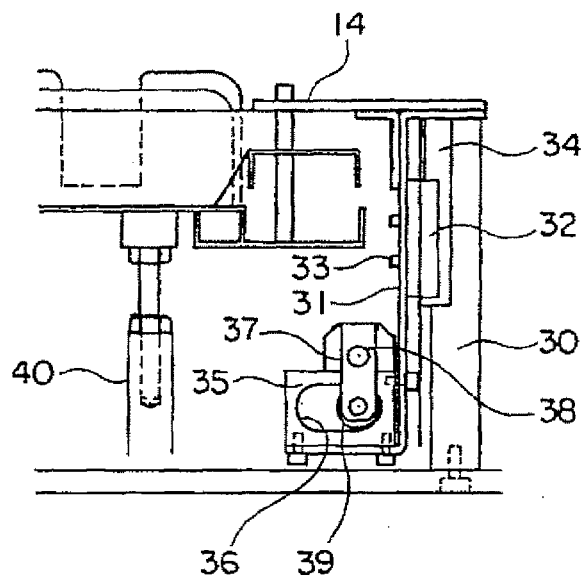


Fig. 7

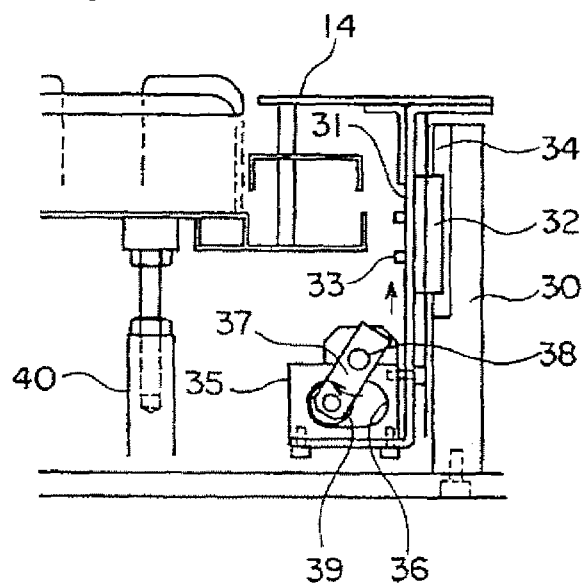


Fig. 8



Fig. 9

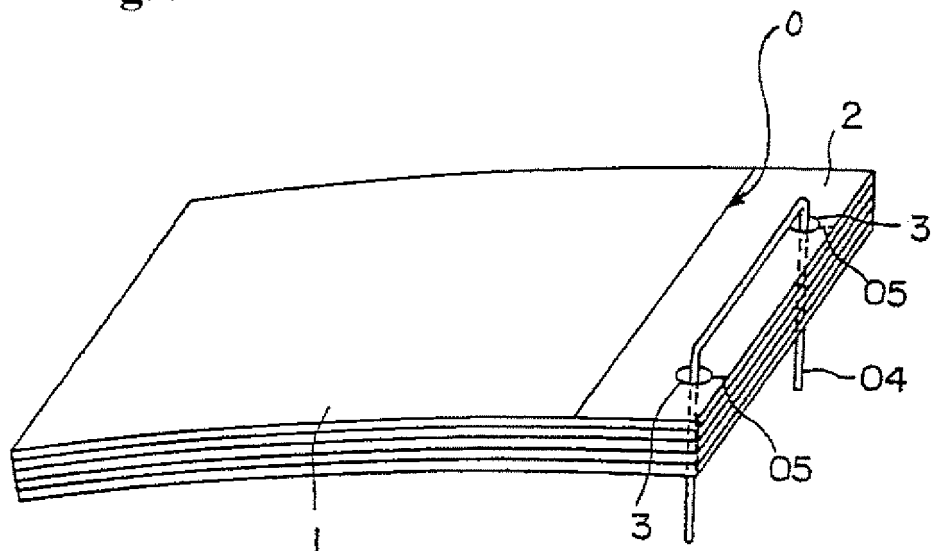
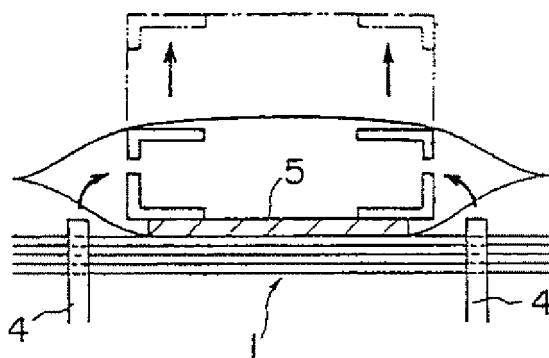


Fig. 10





European Patent
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Application Number
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