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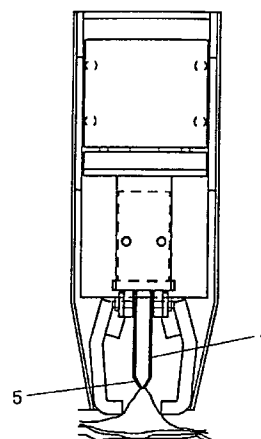
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(54) CLOTH PIECE GRASPING DEVICE

(57) Provided is a cloth gripping device for grasping a single piece of cloth in a pile of pieces of cloth.

According to the cloth gripping device of the present invention, small gripping members are so provided inside large gripping members that they can slide between them and can grasp a small portion of a piece of cloth in a pile of pieces of cloth. Following which, while the piece of cloth is held by the small gripping members, a large portion of the cloth is grasped by the large gripping members, and the piece of cloth is held suspended therefrom.

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Description**FIELD OF THE INVENTION**

The present invention relates to a cloth gripping device that is used in industrial plants, such as laundries, that process pieces of cloth, and that can grasp a single piece of cloth from among a plurality of pieces of cloth in a pile.

BACKGROUND OF THE INVENTION

Conventionally, while performing the processing in laundries when washing many pieces of cloth at the same time, it is difficult to grasp individual pieces of cloth in a pile during or between the various procedures employed for washing, extracting water, drying, ironing and finishing, and presently there is no device available that can do this satisfactorily.

Since a conventional device grasps a large segment of a piece of cloth in a pile of pieces of cloth in order to hold it securely, frequently it seizes hold of two or three pieces, or more, at a time. As a result, problems have arisen in that the process has to be repeated and in that human labor is required to slightly adjust the gripping device so that it grasps only one piece of cloth.

To resolve the above problems, it is one object of the present invention to provide a device for securely grasping a single piece of cloth in a pile of pieces of cloth.

DISCLOSURE OF THE INVENTION

To achieve the above object, the structure of the present invention will now be described.

Provided are gripping members, for grasping a large segment of a piece of cloth when distal ends of levers are opened and closed; and either small levers for sliding up and down between said gripping members and grasping a small segment of a piece of cloth when distal ends are opened and closed, or a suction tube for lifting a piece of cloth using suction.

In the thus arranged gripping device, while the distal ends of the levers of the gripping members are open, the small levers are moved downward between the gripping members, and when the distal ends of the small levers lightly contact the surface of a piece of cloth, and they close and grasp a small portion of the cloth; or the suction tube is moved downward between the gripping members, and when the distal end of the suction tube lightly contacts the surface of a piece of cloth, suction is employed to lift the cloth. Thereafter, the small levers or the suction tube being moved upward, the single piece of cloth is separated from the other pieces that are piled up and hangs suspended. Then, when the upward movement of the small levers or the suction tube is halted, the levers of the gripping members close and the distal ends grasp a large segment of the piece of cloth and hold it suspended.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic, cross-sectional side view of a cloth gripping device according to one embodiment of the present invention;

Fig. 2 is a schematic, cross-sectional front view of the cloth gripping device;

Fig. 3 is a schematic, explanatory diagram showing the condition when a piece of cloth is grasped by nippers of the gripping device;

Fig. 4 is a schematic, explanatory diagram showing the condition when the piece of cloth that is grasped is lifted by the nippers of the gripping device;

Fig. 5 is a schematic, explanatory diagram showing how a piece of cloth is grasped by the gripping members of the gripping device;

Fig. 6 is a schematic, cross-sectional side view of a gripping device according to another embodiment of the present invention;

Fig. 7 is a schematic, cross-sectional front view of a gripping device according to the embodiment of the present invention;

Fig. 8 is a schematic, explanatory diagram showing the condition when a piece of cloth is held by a suction tube of the gripping device;

Fig. 9 is a schematic, explanatory diagram showing the condition when the piece of cloth that is held is lifted by the suction tube of the gripping device; and

Fig. 10 is a schematic, explanatory diagram showing the condition where the piece of cloth is grasped by the gripping members.

BEST MODES FOR CARRYING OUT THE INVENTION

The best modes for carrying out the present invention will now be described while referring to the drawings.

In one embodiment shown in Figs. 1 and 2, small tweezer-shaped levers 4 are provided between gripping members 2, and are moved up and down by an elevation unit 3, which is constructed using a cylinder, a link and a cam. A small chuck unit 6, which as constructed uses air, a cam and a solenoid, opens and closes nippers 5 at the distal ends of the small levers 4 to grasp a portion of the surface of a piece of cloth 1. The width of the opening of the nippers 5 is more than twice (normally 0.6 to 0.7 mm) the thickness of the piece of cloth 1. The gripping members 2 are so located that they enclose the piece of cloth 1 that is grasped by the nippers 5, as well as the nippers 5, and the distal ends of the levers of the gripping members 2 are opened and closed by a large chuck unit 7, which as constructed uses air, a cam and a solenoid.

As is shown in Fig 3, the gripping members 2 are moved above a pile of pieces of cloth 1, and are halted at a predetermined position above one piece of cloth 1. Then, the distal ends of the gripping members 2 are opened and the small levers 4 descend between the

gripping members 2. The nippers 5 at the distal ends of the small levers 4 are halted at a position where they are in contact with the surface of the topmost piece in the pile of pieces of cloth 1.

As is shown in Fig. 4, the nippers 5 at the distal ends of the small levers 4 are then closed, and grasp the surface of the piece of cloth 1. While holding the piece of cloth 1, the small levers 4 are lifted, the nippers 5 being moved upward through the opening between the distal ends of the gripping members 2.

Following this, as is shown in Fig. 5, the large chuck unit 7 is activated to close the levers of the gripping members 2. The gripping members 2 then grasp a portion of the piece of cloth 1 below the top that is held by and is hanging from the nippers 5, and hold the piece of cloth 1 suspended. After this, the nippers 5 at the distal ends of the small levers 4 are opened to release the piece of cloth 1 therefrom.

That is, since the piece of cloth 1 is not securely held by the nippers 5 that are grasping its surface, and would in time drop from the gripping device, the gripping members 2 are employed to grasp a large portion of the piece of cloth 1.

In another embodiment shown in Figs. 6 and 7, a suction tube 8 that is raised and lowered by an elevation unit 3 is provided inside gripping members 2, the distal ends of levers of which are opened and closed by a large chuck unit 7. The suction tube 8 is connected to a vacuum chamber 10, which is connected to a suction device. A solenoid valve 9 is provided between the suction tube 8 and the vacuum chamber 10. With this arrangement, when the solenoid valve 9 is opened and closed, suction that draws air in through the distal end of suction tube 8 is begun or halted.

As is shown in Fig. 8, the gripping members 2 are halted at an appropriate position above a pile of pieces of cloth 1, and the distal ends of the levers of the gripping members 2 are opened. The suction tube 8 is lowered between the gripping members 2, and contacts the surface of a piece of cloth 1. By using vacuum to produce suction at the suction tube 8, only a topmost piece of cloth 1 is lifted from the pile of pieces of cloth 1 and is attached to the tube 8.

As is shown in Fig. 9, when the suction tube 8 is moved upward, the topmost piece of cloth 1 is separated from the pieces of cloth 1 under it, and is lifted and is held suspended.

Sequentially, as is shown in Fig. 10, the distal ends of the levers of the gripping members 2 are closed and grasp a large portion of the piece of cloth 1, which is hanging from the suction tube 8, and hold it suspended. The solenoid valve 9 is then closed to halt the suction at the suction tube 8, and the piece of cloth 1 is released from the suction tube 8.

EFFECTS OF THE INVENTION

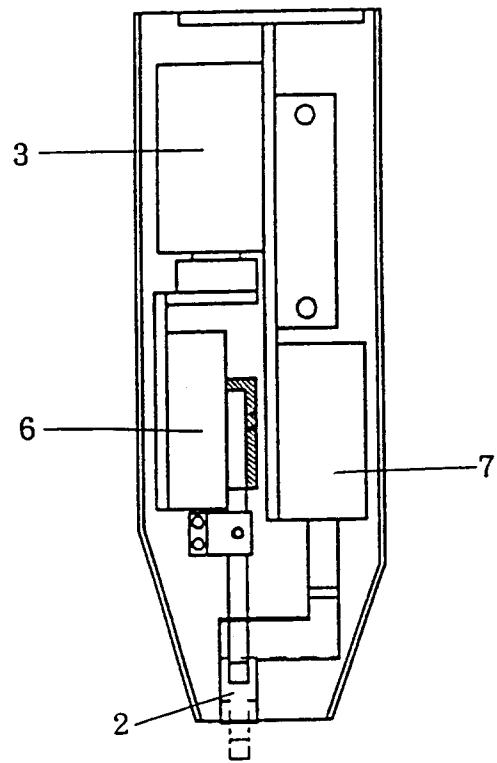
The thus structured present invention provides the following effects.

After the surface of the topmost piece of a pile of pieces of cloth is grasped and the piece of cloth is held suspended, a large portion of the piece is then grasped. As a result, it is possible for a single topmost piece of a pile of pieces of cloth to be grasped, and to be separated from the pieces of cloth below it, so that the grasping and suspension of individual pieces of cloth in a pile of pieces of cloth is ensured.

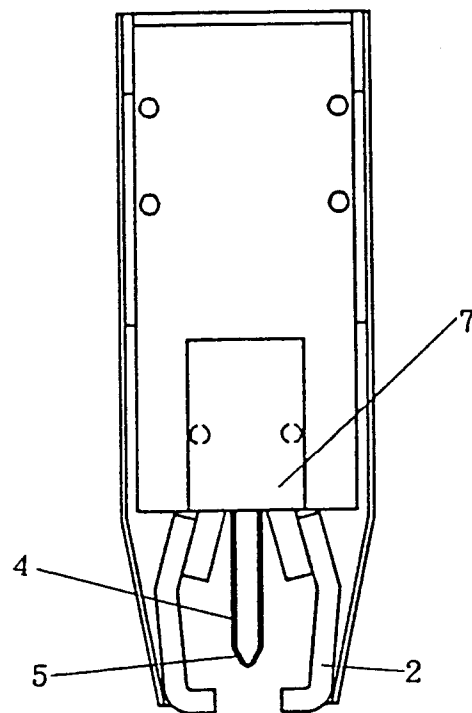
10 Claims

1. A cloth gripping device characterized by providing gripping members (2) for grasping a piece of cloth (1) when distal ends of levers are opened and closed, and small levers (4) for moving between said gripping members (2) and for grasping said piece of cloth (1) when distal ends are opened and closed.
2. A cloth gripping device characterized by providing gripping members (2) for grasping a piece of cloth (1) when distal ends of levers are opened and closed, and small levers (4) for moving between said gripping members (2) and for grasping said piece of cloth (1) when distal ends are opened and closed, and by setting a width for an opening between said distal ends of said small levers (4) that is twice the thickness of said piece of cloth (1).
3. A cloth gripping device characterized by providing gripping members (2) for grasping a piece of cloth (1) when distal ends of levers are opened and closed, and a suction tube (8) for moving between said gripping members (2) to lift and hang said piece of cloth (1) using vacuum.

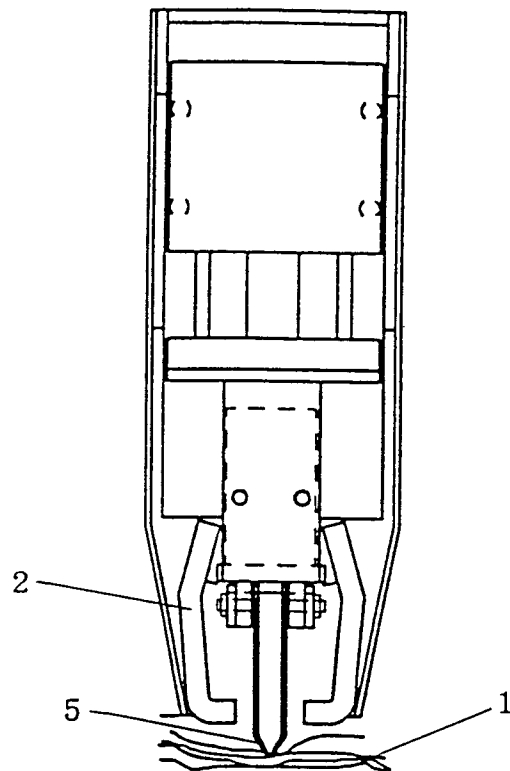
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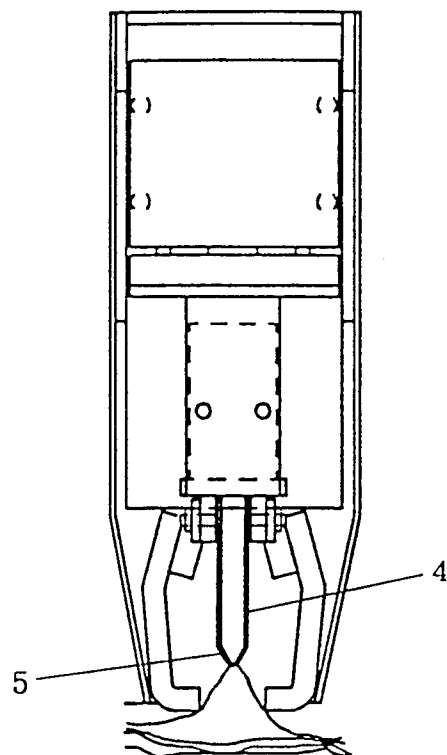
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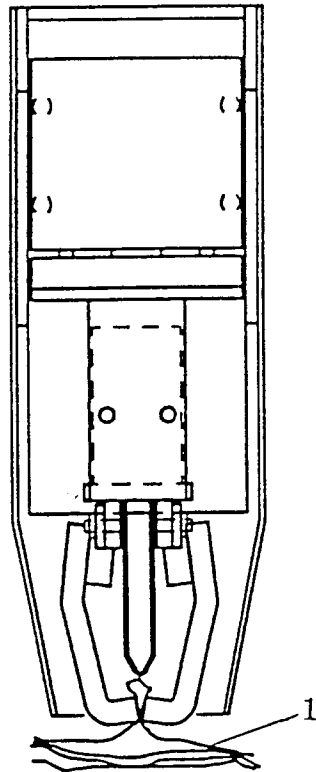
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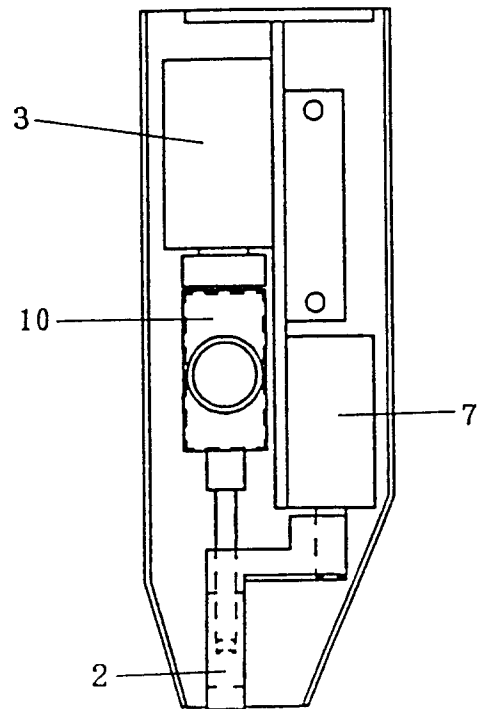
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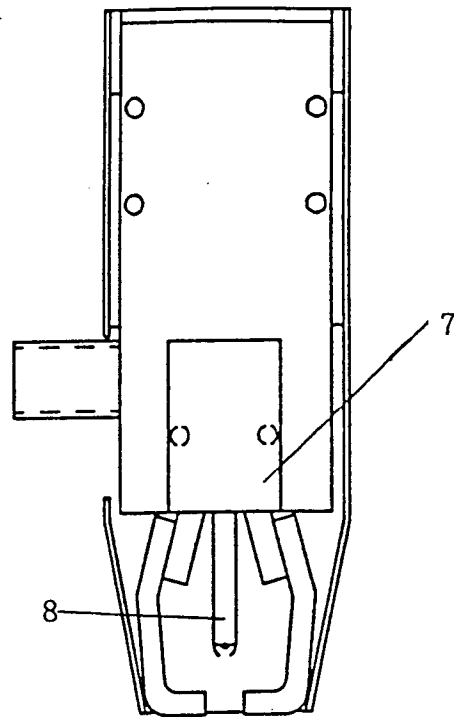
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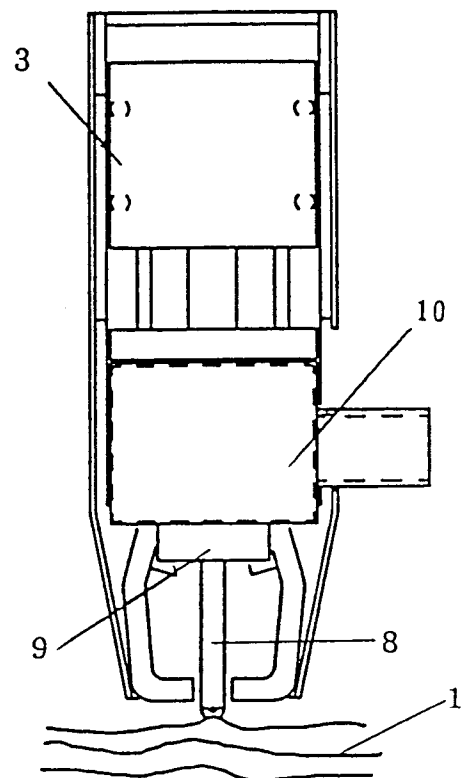
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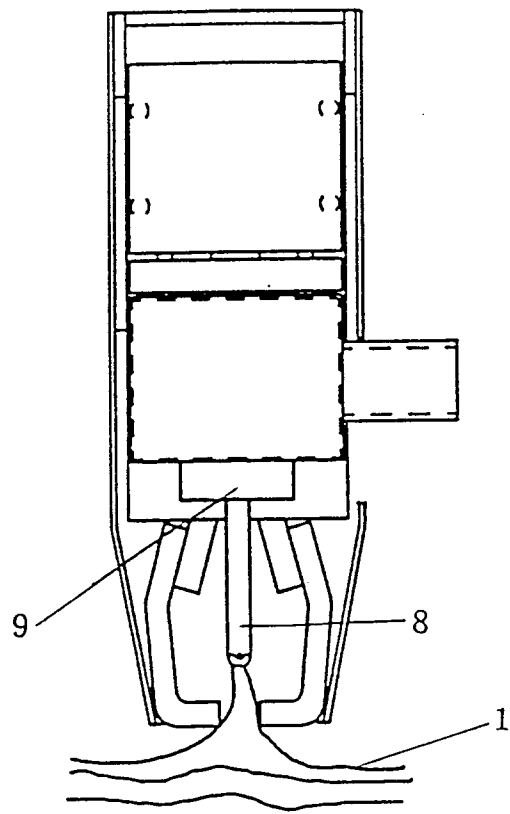
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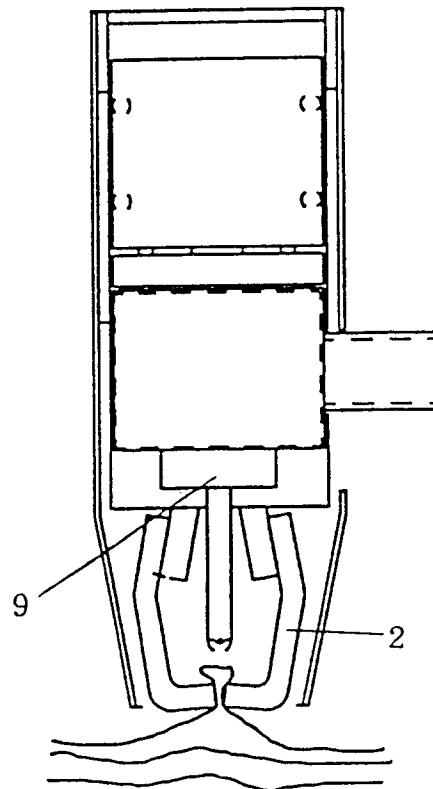
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP96/01122

A. CLASSIFICATION OF SUBJECT MATTER Int. Cl ⁶ B65H3/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) Int. Cl ⁶ B65H3/00, B25J15/08 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926 - 1996 Kokai Jitsuyo Shinan Koho 1971 - 1996 Toroku Jitsuyo Shinan Koho 1994 - 1996 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 6-31672, A (K.K. Nihon Pisco), February 8, 1994 (08. 02. 94) (Family: none)	1, 2
X		3
A	JP, 6-45948, U (Osen Mishin Shokai K.K.), June 24, 1994 (24. 06. 94) (Family: none)	1, 2
A	JP, 59-198236, A (Volkseigener Betrieb Textel & Konfektionsupetoripe Cottbus), November 10, 1984 (10. 11. 84) & US, 4579331, A & DE, 3347547, A1	1, 2
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search July 2, 1996 (02. 07. 96)		Date of mailing of the international search report July 16, 1996 (16. 07. 96)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.		Authorized officer Telephone No.

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