



(19)

Europäisches Patentamt
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(11)

EP 0 640 711 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
06.08.1997 Bulletin 1997/32

(51) Int Cl. 6: **D06B 5/22, D06B 17/06**

(21) Application number: **93116816.5**

(22) Date of filing: **18.10.1993**

(54) Method and device for degumming silk fabric

Verfahren und Vorrichtung zum Entbasten von Seidengewebe

Procédé et installation pour le dégommage de tissus en soie

(84) Designated Contracting States:
DE FR GB IT

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(30) Priority: **31.08.1993 JP 216422/93**

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(43) Date of publication of application:
01.03.1995 Bulletin 1995/09

(56) References cited:
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Description

This invention relates to a method and a device for degumming a silk fabric.

In order to give a silk fabric a gracious luster and a soft touch inherent to silk, and also for good dying and printing, its sericin content has to be removed by degumming. A method and device for degumming a fabric in a degumming kier as described in the first part of claims 1 and 3 is known from US-A-3753358 in which the silk fabric is hung in a spiral pattern as viewed from top so that its width extends vertically. For that purpose use is made of a device comprising a degumming kier, a supporting rod arranged vertically along the central axis of said degumming kier and a plurality of arms extending radially from said supporting rod at a predetermined height, each of said arms being provided with hooks arranged in a longitudinal direction. GB-A-1081479 and FR-A-2228020 disclose similar fabric treatments.

Fig. 10 illustrates another conventional method of degumming silk in which silk fabrics a folded in a longitudinal direction are hung in a rectangular degumming kier 1. A degumming solution b is fed into the degumming kier 1 from its top, discharged from its bottom and resupplied into the kier from its top, so that the solution is circulated through the degumming kier 1.

The degumming solution b flows downwards in the degumming kier, whereas the silk fabrics a are folded in a longitudinal direction. Thus, the degumming solution does not flow uniformly into the inner layers of the folded silk fabrics, so that they cannot be degummed uniformly over the entire length thereof.

An object of the present invention is to provide a degumming method and device which permits a uniform circulation of the degumming solution throughout the degumming kier, while facilitating the work for fixing the fabric in the kier.

Another object is to provide a degumming method and device which improves the workability.

The structure employed in this invention to solve these problems is disclosed in claim 3. The method related thereto is disclosed in claim 1.

The top edge of the silk fabric are fixed at a plurality of points arranged in a spiral pattern as viewed from top so as to rise gradually outwardly from the center of the spiral pattern.

While degumming the silk fabric hung in the degumming kier, the spiral shape of the silk fabric should be such that the inclination of the plane extending from the center of spiral pattern to its outer periphery increases gradually.

The device for degumming a silk fabric may comprise a degumming kier, a supporting rod arranged vertically along the central axis of the degumming kier, and a plurality of arms extending radially from the supporting rod at a predetermined height, each of the arms being provided with hooks arranged in a row in its longitudinal direction.

The arms should be inclined upwardly outwards. Further, such a device should further comprise a vertically movable sleeve concentrically threaded around the supporting rod, the arms extending from the sleeve.

- 5 The arms should be designed so as to be pivotable up and down about their inner ends. Also, the device should be further provided with a sleeve vertically movably mounted on the upper part of the supporting rod so as to be driven from outside, and coupling levers connecting the sleeve to the arms so that the arms can be pivoted by the vertical movement of the sleeve through the coupling levers.

The degumming kier should preferably be shaped cylindrically.

- 15 Gaps between the adjacent layers of the spirally wound silk fabric extend through the entire height of the fabric. Thus, the degumming solution can flow freely through these gaps. Since such gaps are present over the entire area in the degumming kier, the degumming solution is circulated uniformly over the entire area in the degumming kier.

Since the hooks for hanging the silk fabric are arranged so that outer ones are located higher than inner ones, an operator can hang the fabric on inner hooks without being hindered by outer ones. Even though the hooks are arranged upwardly outwards, the fabric can be fixed at the same level by gradually lowering the entire arms.

- 25 Further, the silk fabric may shrink while degumming.
- 30 But since it is fixed to the hooks along the top edge, only the portion near the bottom edge shrinks markedly while its top portion scarcely shrinks, so that the fabric might be distorted in the longitudinal direction. In order to prevent this problem as the degumming proceeds, the top edge of the fabric should be moved in such a way that the inclination of the plane defined by the top edge of the fabric increases gradually from its center to outer periphery. With this arrangement, the distances between the circumferentially adjacent fixing points can be
- 35 reduced gradually. This can compensate for any shrinkage of the fabric. Thus, the fabric is kept free from distortion.

- 40 The spirally wound silk fabric has a cylindrical outer configuration. Thus, the degumming kier should also have a cylindrical shape because by doing so, a degumming solution can be circulated smoothly while keeping its amount to a minimum.

- 45 With this arrangement, the degumming solution can be distributed uniformly throughout the degumming kier, so that the silk fabric can be degummed uniformly. Also, the silk fabric can be hung easily.

- 50 Other features and objects of the present invention will become apparent from the following description made with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of one embodiment;
Fig. 2 is a sectional view of a portion of the same;

Fig. 3 is a perspective view of a portion of the same;
 Fig. 4 is a perspective view of another portion of the same;
 Fig. 5 is a plan view of the portion of the same;
 Fig. 6 is a partially cutaway front view of a portion of Fig. 4;
 Fig. 7 is a sectional view taken along line X-X of Fig. 6;
 Fig. 8 is a partially cutaway front view of another embodiment;
 Fig. 9 is a view showing how the silk fabric is hung; and
 Fig. 10 is a view showing a conventional way of hanging a silk fabric.

As shown in Fig. 1, a supporting rod 12 extends vertically along the axis of a cylindrical degumming kier 11. The kier has a lid 13 driven by a cylinder 14 between open and closed positions and is filled with a degumming solution b. The solution is discharged from the bottom of the kier 11 and sucked up by a pump P through a strainer 15, fed through a supply pipe 16 and sprayed back into the kier 11 through a perforated tray 17. The solution is thus circulated.

A rotary sleeve 18 is rotatably mounted on the supporting rod 12 through a thrust bearing 19 and metals 20 (Fig. 2). A guide cylinder 21 is secured by screws to the top end of the rotary sleeve 18. A square-threaded hollow shaft 22 is inserted in the top end of the supporting rod 12 and coupled thereto by a key 23 (Fig. 3).

A vertically movable hollow shaft (referred to as "sleeve" in the claims) 24 is coaxially threaded into the square-threaded shaft 22. The hollow shaft 24 can be moved up and down along the square-threaded hollow shaft 22 (supporting rod 12) by rotating it about its own axis. Its movement is guided by a guide lever 25 provided at the bottom end of the hollow shaft 24 and slidably fitted in a vertical guide groove 21a formed in the guide cylinder 21 (Fig. 4). The vertically movable hollow shaft 24 and the rotary sleeve 18 are not rotatable relative to each other.

Arms 26 extend radially outwardly from the mid-portion of the hollow shaft 24 so as to be arranged at equal intervals (Fig. 4). The arms 26 are pivotable about their inner ends. The number of arms 26 is determined according to how a silk fabric a is suspended. Hooks 27 are provided on each arm 26 at equal intervals in its longitudinal direction.

A guide cylinder 28 is secured to the vertically movable hollow shaft 24 through a boss 28' (Fig. 2). A sleeve 29 is vertically movably threaded on the hollow shaft 24 at its portion surrounded by the guide cylinder 28. A ring 30 is rotatably fitted on the sleeve 29. Support plates 31 protrude from the ring 30 outwardly through grooves 28a formed in the guide cylinder 28. An annular frame 32 is secured to the free ends of the support plates 31 (Fig. 4).

As shown in Figs. 4 - 7, the annular frame 32 carries rollers 33 on its underside at portions opposite the arms

26. The rollers 33 are received in respective guide frames 34 of the arms 26 (Fig. 6). Thus, as shown in Figs. 1 and 2, as the sleeve 29 moves up and down, the rollers move in the guide frames 34, so that the arms 26 5 pivot up and down.

The lid 13 has in the center an opening in which is fitted a packing 37 (see Fig. 1). By inserting a handle shaft 35, the opening can be liquid-tightly sealed. The handle shaft 35 has a square tip which is inserted in a 10 square hole formed in the top end face of the sleeve 29. By turning the handle shaft 35 in this state, the sleeve 29 can be moved up and down with respect to the vertically movable hollow shaft 24.

In operation, as shown in Fig. 2, a suspension 15 mechanism including the supporting rod 12 is taken out of the degumming kier 11 and placed on the ground by means of a crane. In this state, as shown by chain line in this figure, the vertically movable hollow shaft 24 is raised until the arms 26 reach their highest position. In 20 this state, silk fabric a is hitched, from inside to outside, to the hooks 27 on the arms 26 so that it is hung from the hooks in a spiral pattern as shown in Fig. 9.

In this state, since the arms 26 extend upwardly outwards, the silk fabric can be attached to the inner hooks 25 of each arm without being hindered by the outer ones of the same arm. When attaching the silk fabric a to the respective hooks, the hollow shaft 24 can be rotated to lower it. By doing so, one can attach the fabric at the same height. Thus, the operator can do his work easily.

30 When all the silk fabric has been attached to the hooks as shown in Fig. 9, the suspension mechanism is brought back into the degumming kier 11 so that the supporting rod 12 is disposed on the center axis as shown in Fig. 1. The lid 13 is then closed. When closing 35 the lid, the handle shaft 35 is pulled out as shown by chain line in Fig. 1 to prevent its tip from abutting the sleeve 29. After closing the lid 13, the handle shaft 35 is pushed in until its tip is received in the square hole 29a formed in the sleeve 29.

40 In this state, degumming solution b is supplied into the degumming kier 11 and circulated through the kier to degum the silk fabric. While degumming, the handle shaft 35 is turned gradually to move the sleeve 29 upwards and thus to pivot the arms 26 upwards. As the 45 arms 26 pivot upwards, the plane containing the top edge of the silk fabric becomes gradually steep (Fig. 9).

50 This means that the distances between the circumferentially adjacent hooks decrease gradually. Thus, by properly determining the ascending speed of the sleeve 29, the silk fabric is allowed to shrink at its top edge to the same degree as at its bottom edge. The ascending speed of the sleeve 29 varies according to the kind of silk fabric and may be determined through actual operations or experiments. The handle shaft 35 may be driven by a motor. In this case, the arms 26 can be moved 55 automatically by controlling the motor speed.

Upon completion of the degumming operation, as shown in Fig. 2, the suspension mechanism is taken out

of the kier 11 together with the degummed silk fabric and the silk fabric is detached from the hooks 27. When detaching it, the vertically movable hollow shaft 24 is turned in such a direction that it ascends. By doing so, the fabric can be detached from the hooks at the same height. In the state where the fabric is detached from all the hooks, the arms 26 come to the position shown by chain lines in Fig. 2.

As shown in Fig. 8, the mechanism for pivoting the arms 26 may comprise the sleeve 29 and coupling levers 36 coupled to the sleeve 29 and the respective arms 26 through pins.

A liquid-tight door may be provided on one side of the degumming kier 11. This door allows access to the interior of the kier, so that it is not necessary to take the suspension mechanism out of the kier in order to hang a silk fabric.

Claims

1. A method of degumming a silk fabric (a) in a degumming kier (11) wherein the top edge of the silk fabric (a) is fixed at a plurality of fixing points (27) of a support structure (26) one after another so that the silk fabric (a) is hung in a spiral pattern as viewed from top with its width extending vertically, **characterized** in that

said fixing points (27) of the support structure are on different heights rising gradually outwardly from the center of the spiral pattern, and the silk fabric (a) is fixed at said fixing points (27) one after the other from the center of the spiral pattern outwardly while gradually lowering the support structure (26) such that the fixing operation at each of the fixing points (27) can be done at the same height.

2. A method of degumming a silk fabric (a) as claimed in claim 1,

characterized in that

the angle formed by the top edge of said silk fabric (a) and a vertical axis as viewed from the side is increased gradually as the degumming proceeds.

3. A device for degumming a silk fabric (a) comprising a degumming kier (11), a supporting rod (12) arranged vertically along the central axis of said degumming kier (11), and a plurality of arms (26) extending radially from said supporting rod (12) at a predetermined height, each of said arms (26) being provided with hooks (27) spaced in its longitudinal direction,

characterized in that

said arms (26) are inclined upwardly outwards, and in that

5

said device further comprises a vertically movable sleeve (29) concentrically threaded around said supporting rod (12) and coupling levers (31) connecting said sleeve (29) to said arms (26) so that said arms (26) can be pivoted by the vertical movement of said sleeve (29) through said coupling levers (31).

4. A device for degumming a silk fabric (a) as claimed in claim 3,

characterized in that

said arms (26) are pivotable up and down about their inner ends, and said vertically movable sleeve (29) is mounted on an upper part of said supporting rod (12) so as to be driven from outside.

Patentansprüche

20 1. Verfahren zum Entbasten eines Seidengewebes (a) in einem Entbastungs-Beuchapparat (11), wobei der obere Rand des Seidengewebes (a) an einer Vielzahl von Befestigungspunkten (27) eines Trägeraufbaus (26) nacheinander befestigt wird, so daß das Seidengewebe (a) von oben betrachtet in einem Spiralmuster aufgehängt ist, wobei sich seine Breite vertikal erstreckt, dadurch **gekennzeichnet**, daß

30 die Befestigungspunkte (27) des Trägeraufbaus auf unterschiedlichen Höhen sind, die vom Mittelpunkt des Spiralmusters nach außen hin fortschreitend ansteigen, und

35 das Seidengewebe (a) an den Befestigungspunkten (27) nacheinander vom Mittelpunkt des Spiralmusters nach außen hin befestigt wird, während der Trägeraufbau (26) fortschreitend abgesenkt wird, so daß der Befestigungsvorgang an jedem der Befestigungspunkte (27) auf derselben Höhe durchgeführt werden kann.

40 2. Verfahren zum Entbasten eines Seidengewebes (a) nach Anspruch 1, dadurch **gekennzeichnet**, daß

45 der von der Seite betrachtete, vom oberen Rand des Seidengewebes (a) und einer vertikalen Achse gebildete Winkel mit fortschreitender Entbastung fortschreitend vergrößert wird.

50 3. Vorrichtung zum Entbasten eines Seidengewebes (a), mit einem Entbastungs-Beuchapparat (11); einer Trägerstange (12), die entlang der Mittelachse des Entbastungs-Beuchapparats (11) vertikal angeordnet ist; und einer Vielzahl von Armen (26), die sich von der Trägerstange (12) auf einer vorbestimmten Höhe radial erstrecken; wobei jeder der

FIG. 1

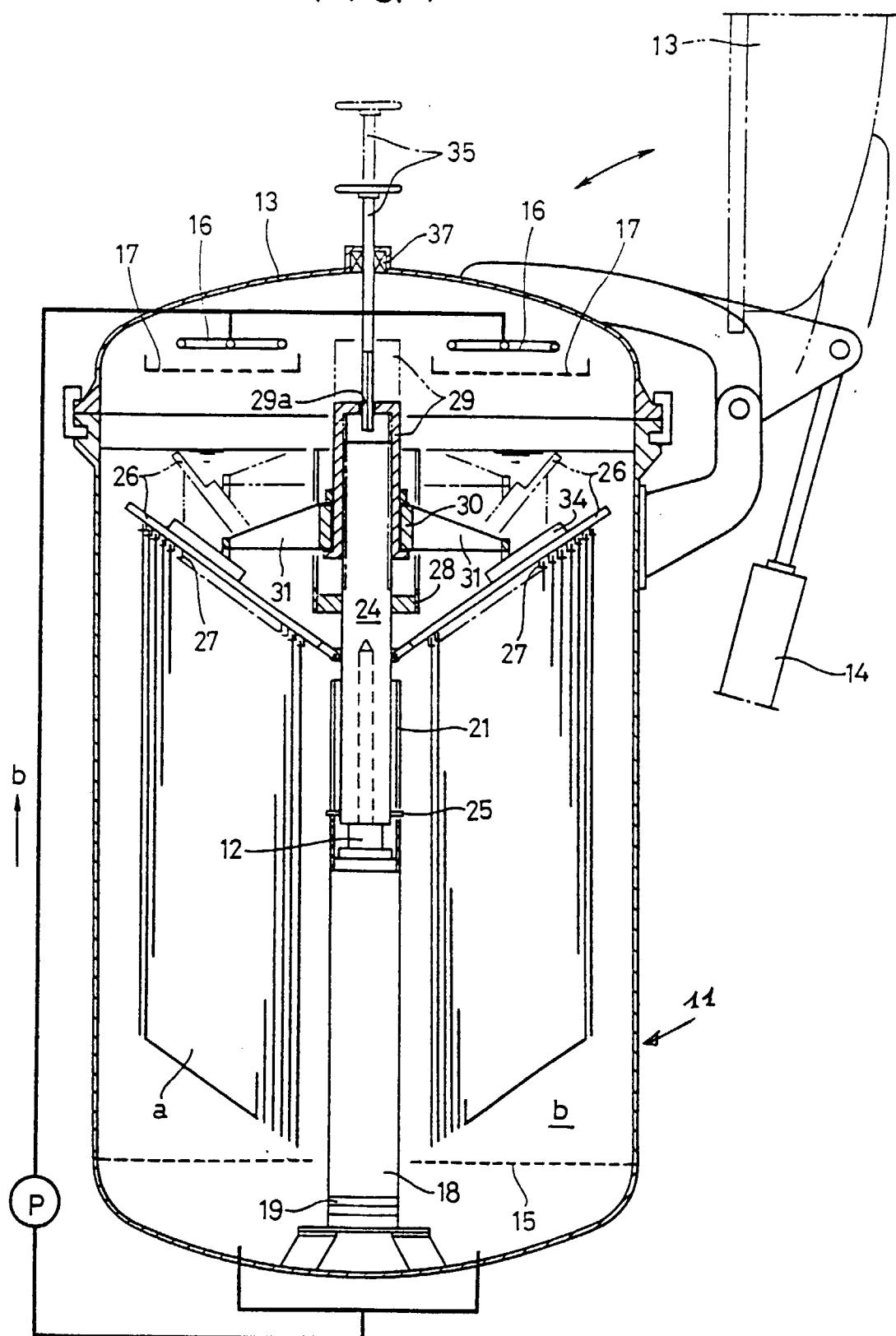


FIG. 2

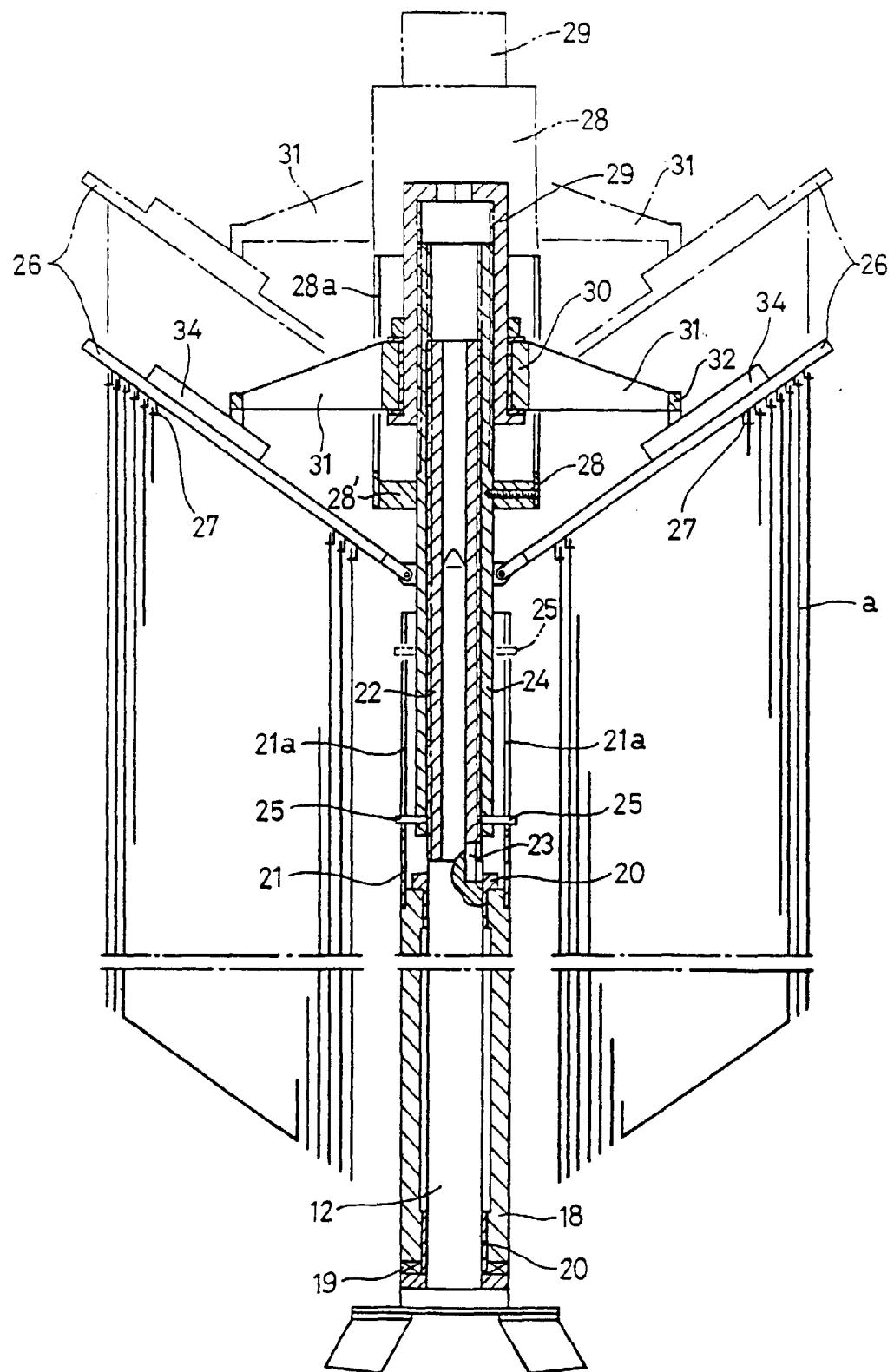


FIG. 3

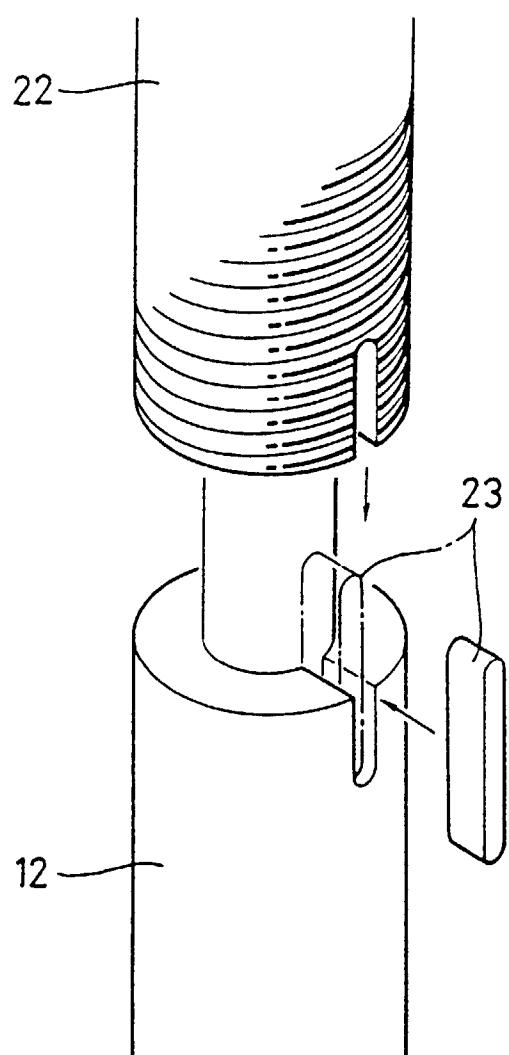


FIG. 4

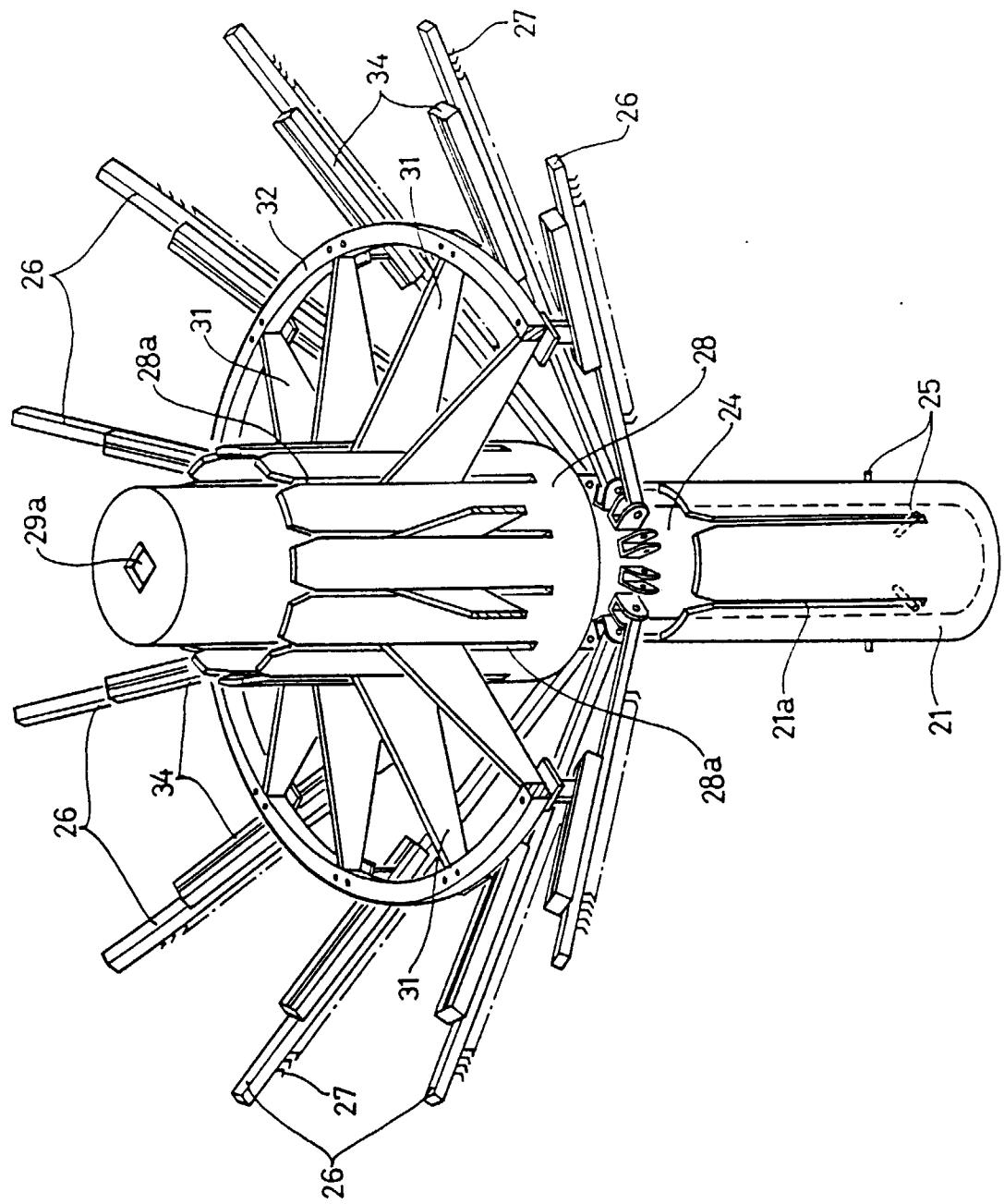


FIG. 5

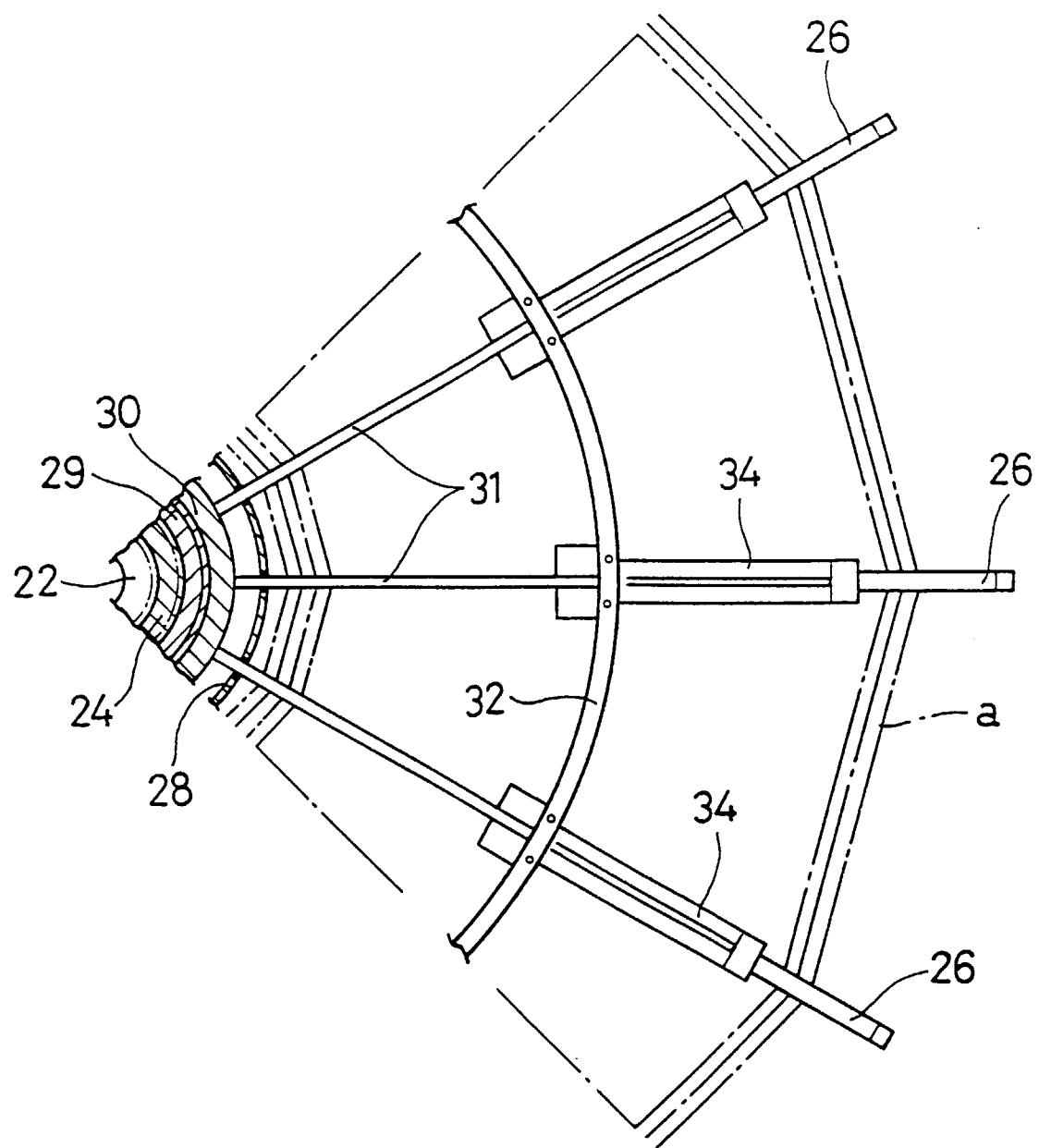


FIG. 6

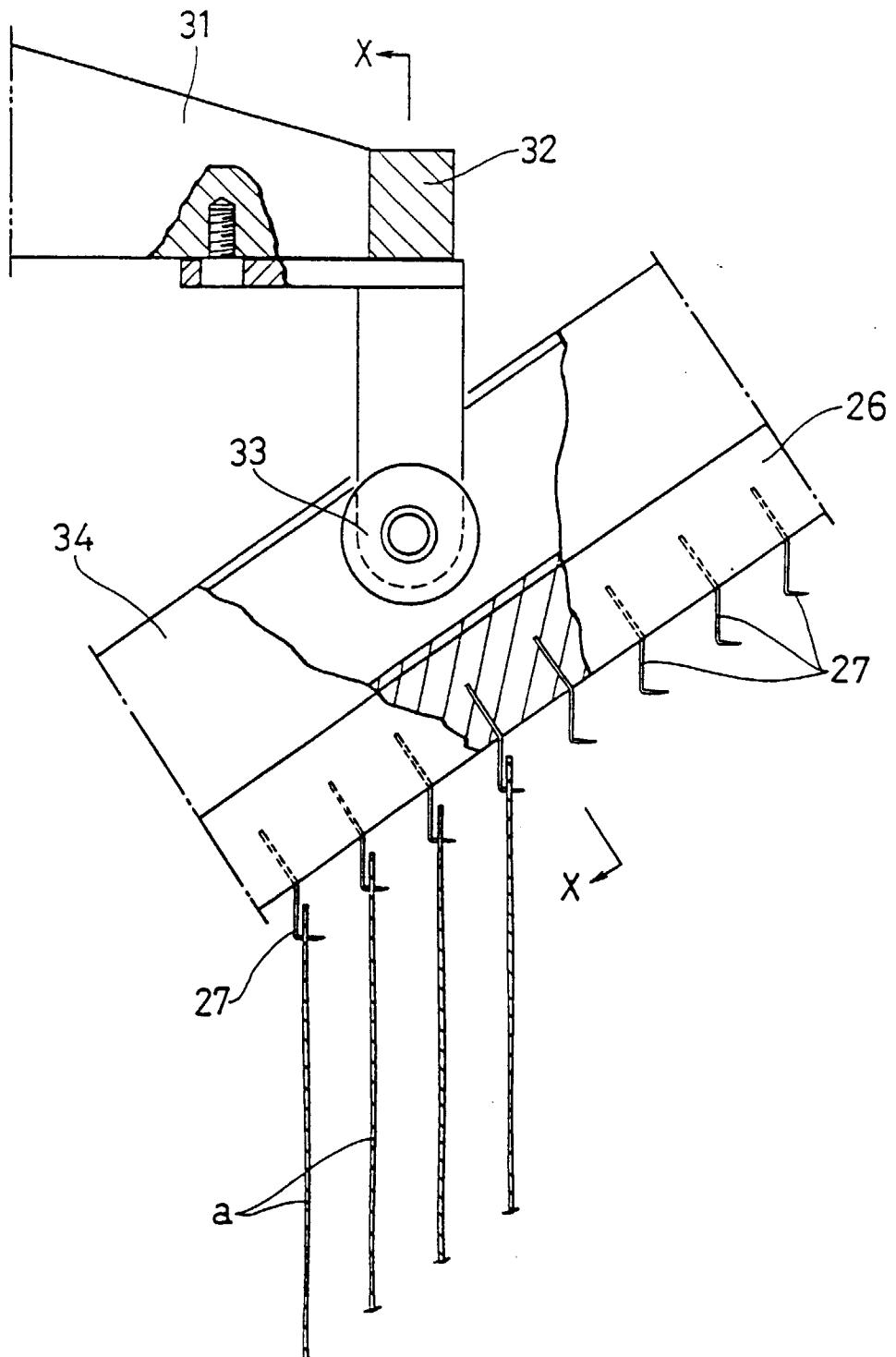


FIG. 7

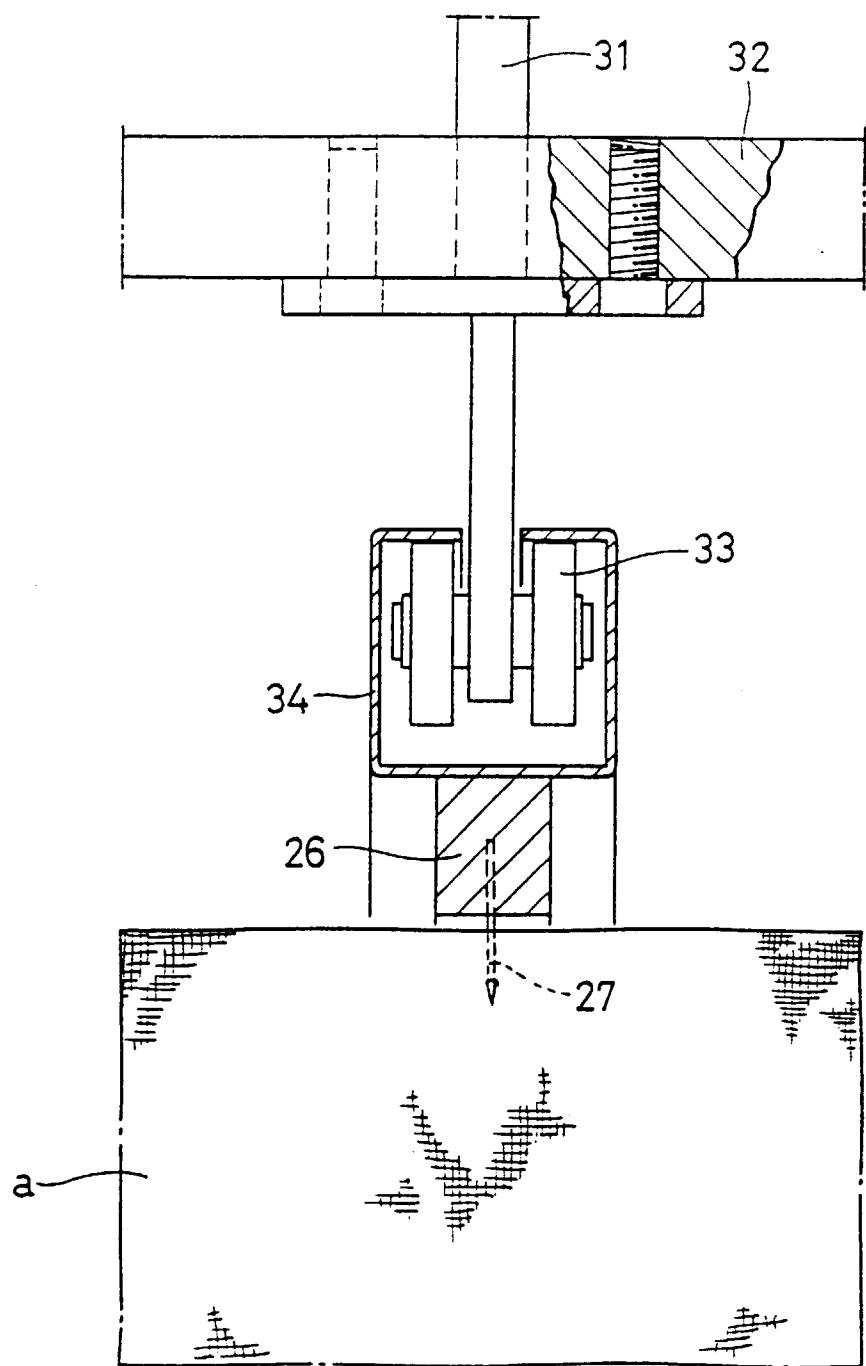


FIG. 8

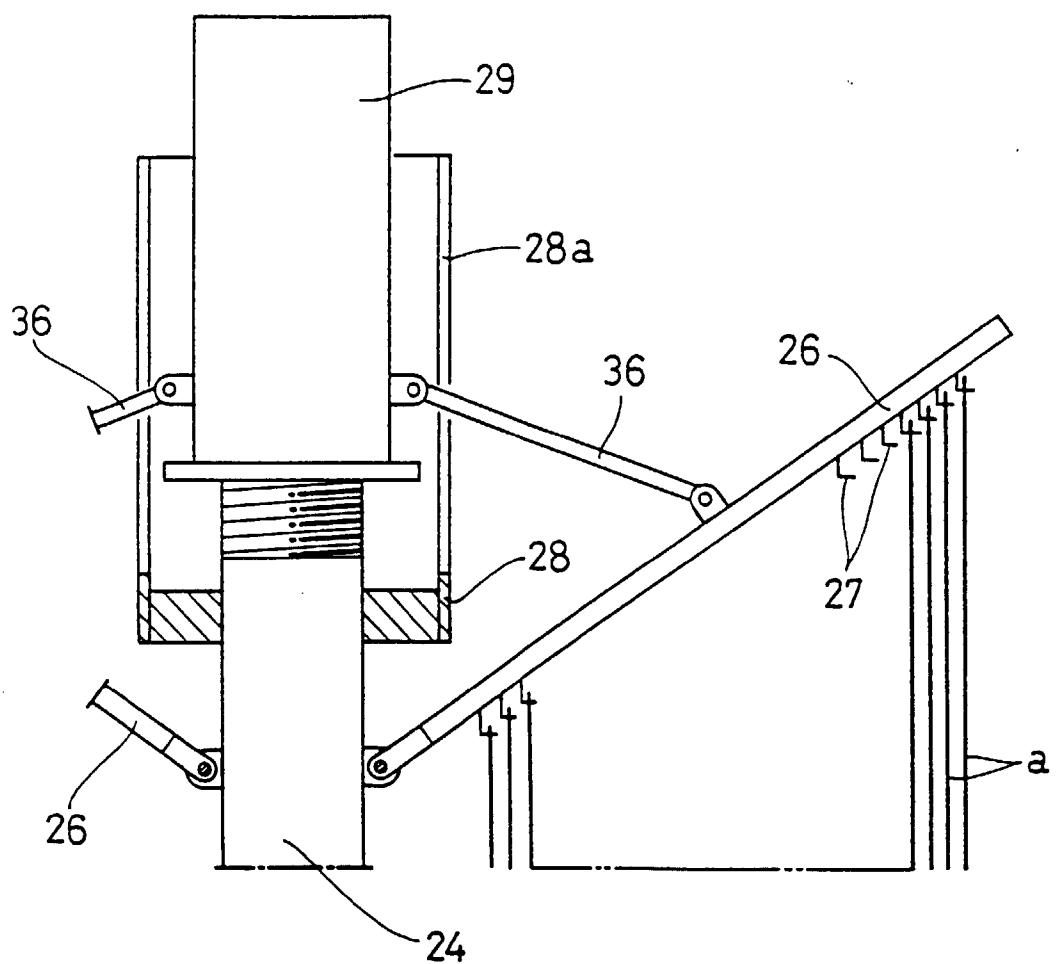


FIG. 9

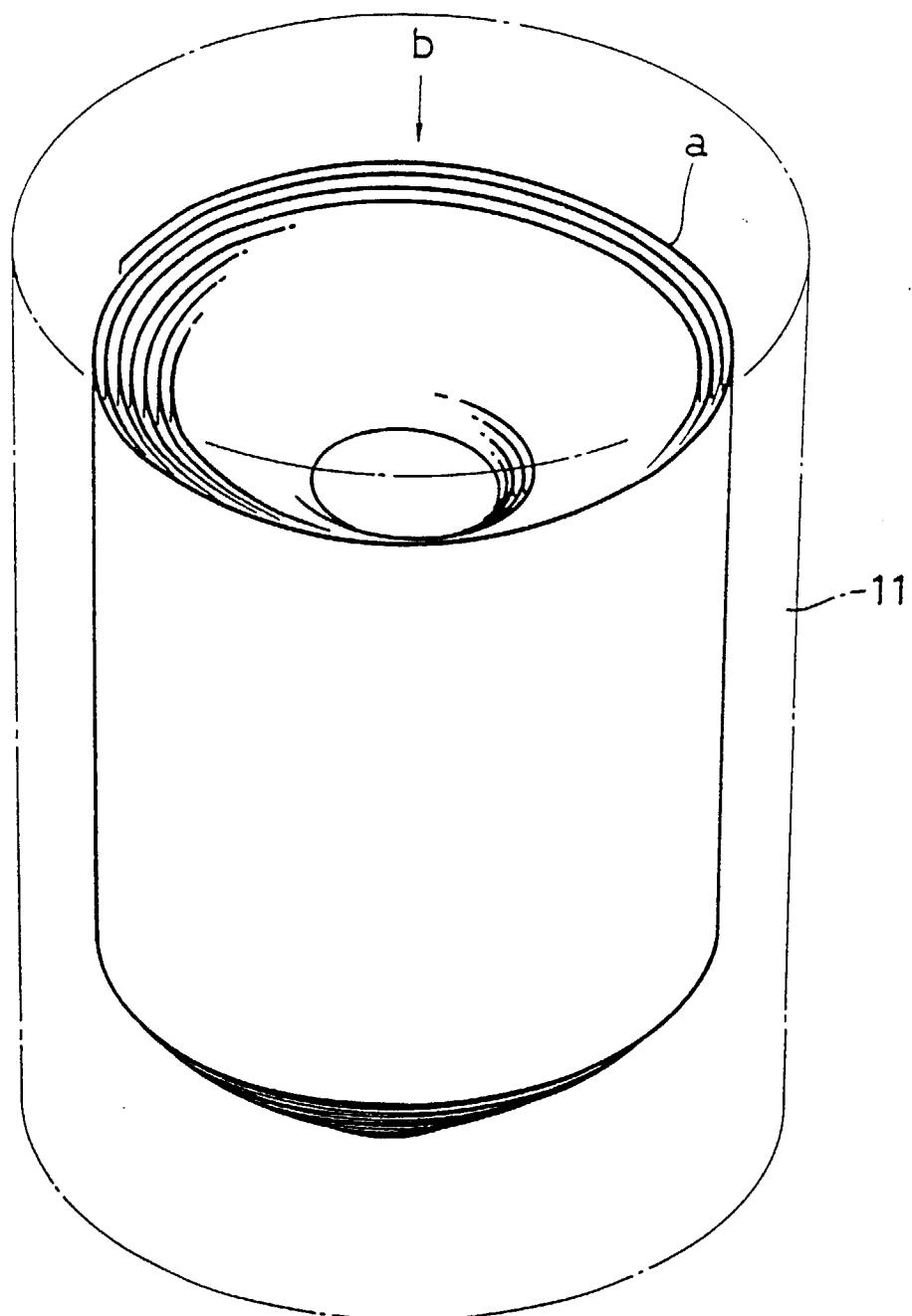


FIG. 10

