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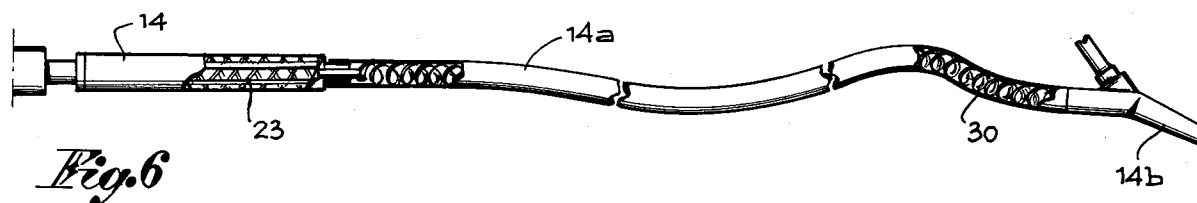
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(54) **Equipment for the preparation, transportation and distribution of mortar, plaster and/or granular aggregate or powdery materials.**

(57) The invention relates to equipment for the transporting, the mixing with water and the distribution of powdery and/or aggregate materials to be used as mortar, plaster or the like having a final mixer-distributor (14) to which dry material feeding canalizations and a nozzle (20) for the supplying of water are

fitted. The mixer incorporates means for mixing the initial materials with water and for spray distributing it or depositing the resulting mixture through a flexible tube (14a) in which there is a rotating helical conveyor (30).



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The present invention generally regards machines for the mixing, conveyance and distribution of pasty, granular aggregate or powdery materials and in particular regards equipment for the preparation, transportation and distribution of mortar, plaster, concrete, pavement foundations and/or each type of aggregate.

According to the method known so far, the conveyance, mixing and distribution of such materials are carried out in sequence at the moment of use, usually with specific equipment which can be connected in series, especially the mixing which is done at an intermediate stage and the mixture is then pressure delivered to the destination of use through canalizations, resulting in conveyance problems for the distribution through spraying means or the like.

The present invention aims to solve the problems of the preparation and distribution of pasty, damp or dry materials which are used in building and also to eliminate powders at the time of distribution, to allow for a more even mixing of the material where needed, to allow for the distribution of any type of aggregate with the possibility of increasing conveyance distances and to create favourable operating conditions with less energy consumption for each batch of material treated.

Another aim of the invention is to propose equipment which can mix the initial components even at the end of all the stages, up to the moment of use, with the same means designed for the distribution of the final material. The advantage in this case is in being able to draw from a silo and pneumatically convey the powdery and/or aggregate components, which can be premixed, always at the dry stage up till the application of the mixture resulting in fewer transporting problems and in the possibility that the mixing means are portable and handy.

Yet another aim of the invention is to supply equipment with which the conveyance and distribution of the materials can be done either pneumatically, mechanically or with a pneumatic-mechanical system.

To this end the equipment for the conveyance, mixing and distribution of powdery and/or aggregate materials for building has: at least one silo for the initial dry materials; at least one pneumatic batching plant for drawing the dry materials from said silo and to convey them along at least one canalization to a mixer; fluid supply means, usually water, in said mixer for the mixing of the initial materials used; and a distributor for the dispersal of the produced mixture, the distributor being formed from the mixture means.

Further, details of the invention will however appear clearer following the description with references being made to the attached drawings in

which:

- Fig. 1 is a sketch of the transporting, mixing and distributing equipment in accordance with the invention;
- Fig. 2 is a section view of an intermediate batching plant-accumulator for dry materials;
- Fig. 3 is a section view of a mixer-distributor;
- Fig. 4 is a section view of a variant of the mixer-distributor;
- Fig. 5 is a section view of a final batching plant attached to the mixer distributor;
- Fig. 6 is a partial section view of the perfected distribution means in accordance with the invention;
- Fig. 7 is part of an embodiment as in Fig. 6 but complete with an auxiliary motor for driving the helical conveyor; and
- Fig. 8 shows a variant in which the mixer is part of a hopper designed to hold the initial materials.

Fig. 1 shows equipment in accordance with the invention having at least one silo (11) for powdery or aggregate materials which are dry and can be premixed. The silo (11) can be of the pressure-closed type and has a distributor-batching plant (12) able to draw the dry material from the bottom of the silo and convey it along a canalization (13,13') to the place of use. By using dry materials, the distributor-batching plant (12) can be pneumatic of any type.

The canalization (13,13') for dry material coming from the silo (11) connects to a final mixer (14) which also carries out the function of distributor of plasterer and will now be defined as mixer-distributor. Said mixer-distributor (14) can be a portable version and used as a nozzle or a fixed version having an extension tube (14a) which is usually flexible so as to be more handy.

If the canalization (13,13') is particularly long, it can be fitted with one or more intermediate hatching plant-accumulators (15) in order to accumulate the dry material coming from the silo and discharge it in new batches to then be entrained by the pneumatic flow of conveyance towards the final mixer-distributor (14).

Fig. 2 shows an example of an intermediate batch plant-accumulator (15) having a closed container (16) with an upper inlet (17) for the material brought by the canalization (13'), a lower control valve (18) for the discharge of the material from the pipe (13') towards the mixer-distributor (14) and with a tube (19) for the drawing of air which connects to the pipe (13'). In practice the material accumulates in the container (16), the air for its transportation separates and coming out of the upper tube (19) passes through the pipe transporting the material (13') towards the mixer-distributor

(14) which is discharged in batches through the control valve (18). Such a batching plant-accumulator (15) thus permits the flow of material, which can undergo variations along the canalization, to be reset and rebalanced without leading to air leakages seeing that the system is closed and remains pressurized.

The mixer-distributor (14) is fitted with a nozzle (20) for the supplying of pressurized water and with a final batching plant (21) for the material. The mixer-distributor (14) is essentially made up from a tubular body (22) in which the mixer (23), in the shape of auger with two crossed propellers, rotates with the help of a power plant (24), (Figs. 3 and 4). Said plant (24) can be powered electrically by internal combustion, hydraulically or by air or with a coil-pipe mechanic transformer. The crossed propellers of the auger can be open in the middle (Fig. 3) and longitudinally connected by peripheral stems or closed and wrapped round a central shaft (Fig. 4). Such a system allows for the material to be mixed and to be progressively moved towards an outlet of the tubular body for the spray delivery or by deposits through an extension tube (14a). The mixing of the material is therefore carried out directly at the place of use of the mixture and in the same distribution or plastering means.

The water which is supplied by the nozzle (20) is used for making a mixture with the material which arrives in the mixer-distributor (14) through the final batching plant (21); the pressurized water, preferably atomized, is spouted directly in the material which enters the mixer through the final batching plant (21) at the beginning of the crossed propeller rotating mixer (23).

The embodiment shown in Fig. 5 of a final batch plant (21) has a hopper body (25) with an inlet, which can be tangential, for the dry material brought by the pipe (13') incorporating a rotating blade agitator (26) which is opportunely operated and has a fixed grate (27) or a rotating plate on the bottom one of which is designed to adjust the passage of dry materials to the mixer. The rotating plate can be fixed and operated by the same shaft of the agitator (26) and is positionable in height so as to vary the span of the passage for the material which is perifically defined with the sloped bottom of the hopper container (25).

A rotating scraper (28) can be fitted between the batching plant (21) and the body of the mixer-distributor (Fig.5) in order to keep the inlet of said mixer-distributor (14) clean and therefore preventing clogging, the spurt of water generated by the nozzle (20) hitting at least part of such a scraper.

In accordance with another characteristic of the invention, said tube (14a), (Fig.6), has a helical conveyor (30) axially hollow and rotating in the tube itself as an auger. The helical conveyor (30) can be

made from the materials in an appropriate way and rotates in the tube (14a) for a progressive advancement, accompanied with a mixing, of the material towards the end distributor (14b).

The helical conveyor (30) is splined to the shaft of the rotating organ (23) of the mixer on one side and has friction bearings on the other side which are mounted onto the free end of the tube (14a).

The helical conveyor (30) is then operated in rotation by the mixer (14) itself and forces the material to advance along the tube (14a) towards the end distributor. This is so even without the help of an air flow which thus allows the compressor and relative canalizations to be eliminated.

Furthermore, the helical conveyor (30) can be operated by an auxillary motor (33), (Fig.7) placed on the free end of the tube (14a) and designed to control the pin (31) in said conveyor.

In each case, the helical conveyor permits all the material to be distributed and to keep the inside of the tube clean; therefore resulting in being self-cleaning and eliminates the necessity for a systematic washing of the tube at the end of each material distribution.

Whatsmore, a rotator blade (31) can be fitted to the end distributor (14b) and be operated through the helical conveyor (30) or a possible auxillary motor (33) for as better distribution of the material. The rotator can be either centrifugally or axially operated.

In a constructive variation, the mixer (14) is part of a hopper (34) fitted onto a carrier structure (35) and designed to receive the dry materials as shown in Fig. 8. To be more precise, the mixer (14) which then essentially works as an auger transporter, is placed on the bottom of the hopper (34) and its outlet is always connected to tube (14a) with a conveyor (30) for the distribution of the material at a distance. The hopper (34) can then receive premixed initial materials which are loaded through a transporter (36) and come from a preferably continuous-type mixer (37) placed at the top for the continual production of the material to be distributed, but which can even be of the intermittent type. The initial materials can come from a silo or prepacked bags or can be put in said hopper manually or with appropriate lifting means.

An agitator (38) can be mounted with a hopper (34) in order to help the falling of the materials towards the bottom, in other words towards the transporter for their mixing with water or for a final mixing before being conveyed along the tube to the place of use.

The simpleness of the equipment and the possibility of using it for the preparation and distribution of any material, from mortar to pavement foundations, from plaster to concrete and even to aggregates therefore result in being evident. All this is

possible without producing powder and with the advantage of correctly placing the material wherever necessary, even directly on the wall under construction.

Finally, the conveyor (30) can be advantageously used as a propeller shaft for various tools, such as trowels, brushes, vibrators to be fitted to its end, if necessary with the interpositioning of a cyclo-converter which avoids the necessity of bringing electric tension cables and/or fluid tubes to the place of use.

Claims

1. Equipment for the transporting, the mixing with water and the distribution of powdery and/or aggregate materials to be used as mortar, plaster, pavement foundations and varnishes having at least one silo or container (11) for the initial dry materials and at least one pneumatic distributor-batching plant (12) for drawing the dry materials from said silo and to convey it along at least one canalization (13, 13') characterized in that it has a final mixer-distributor (14) to which said canalization for the dry material is connected and a nozzle (20) for the supplying of pressured fluids, usually water, and in that said mixer incorporates mixing means for the initial materials with the water and in order to spray distribute or deposit the resulting mixture, said mixer-distributor (14) being portable in the shape of a nozzle or being fixed and directly connected to the place of use of the mixture.
2. Equipment in accordance with claim 1 in which a flexible tube (14a) for the transporting of the mixed material at a distance and having an end distributor (14b) is connected to the outlet of the mixer-distributor, characterized in that said tube (14a) has a rotating helical conveyor (30) for the transporting and mixing of the material by said mixer-distributor (14) up to the end distributor, and in that at least one rotating element (23) of the mixer-distributor (14) is splined to the helical conveyor (30) for its rotation.
3. Equipment in accordance with claim 2, characterized in that said helical conveyor (30) is axially hollow and extends along the whole length of said tube.
4. Equipment in accordance with claims 2 and 3, characterized in that said helical conveyor (30) is operated by an auxillary motor (33) connected to the end of said tube (14).
5. Equipment in accordance with the preceding claims, characterized in that the end distributor (14b) has a rotating blade operated by the helical conveyor (30) or by the auxillary motor.
6. Equipment in accordance with claim 1, characterized in that said mixer-distributor (14) has a tubular body, a mixer (23) rotating in said tubular body and operated by a power plant, a final distributor (21) for sending the dry material to said mixer and at least one nozzle (20) for supplying the water to said mixer at the height of the inlet of the dry material and an outlet for the mixed material.
7. Equipment in accordance with claim 1, characterized in that said mixer-distributor (14) is fixed to the bottom of a hopper (34) for the loading of possibly premixed initial materials which can be fed in a continuous way.
8. Equipment in accordance with one of the preceding claims, characterized in that said final batching plant (21) has a hopper body to which a canalization (13') for the transporting of the dry material is tangentially or radially connected as well as a rotating agitator in said body, a bottom grate or disk in order to adjust the delivery of material towards the mixer and a rotating scraper for cleaning the inlet of the material into the mixer-distributor, the nozzle for the water being at the height of said scraper.
9. Equipment in accordance with claim 6, characterized in that the rotating mixer (23) is in the shape of an auger with two crossed propellers, the propellers being either open in the centre and joined peripherally or wrapped round a central shaft.
10. Equipment in accordance with claim 1, characterized in that at least one intermediate accumulator-batching plant (15) is placed along the canalization (13, 13'), said accumulator-batching plant being able to receive the dry material and send it along the canalization in new batches without loss of air seeing that it has a closed body with one inlet for the material and separate outlets for the newly batched material and for the air separated from the material in said body.

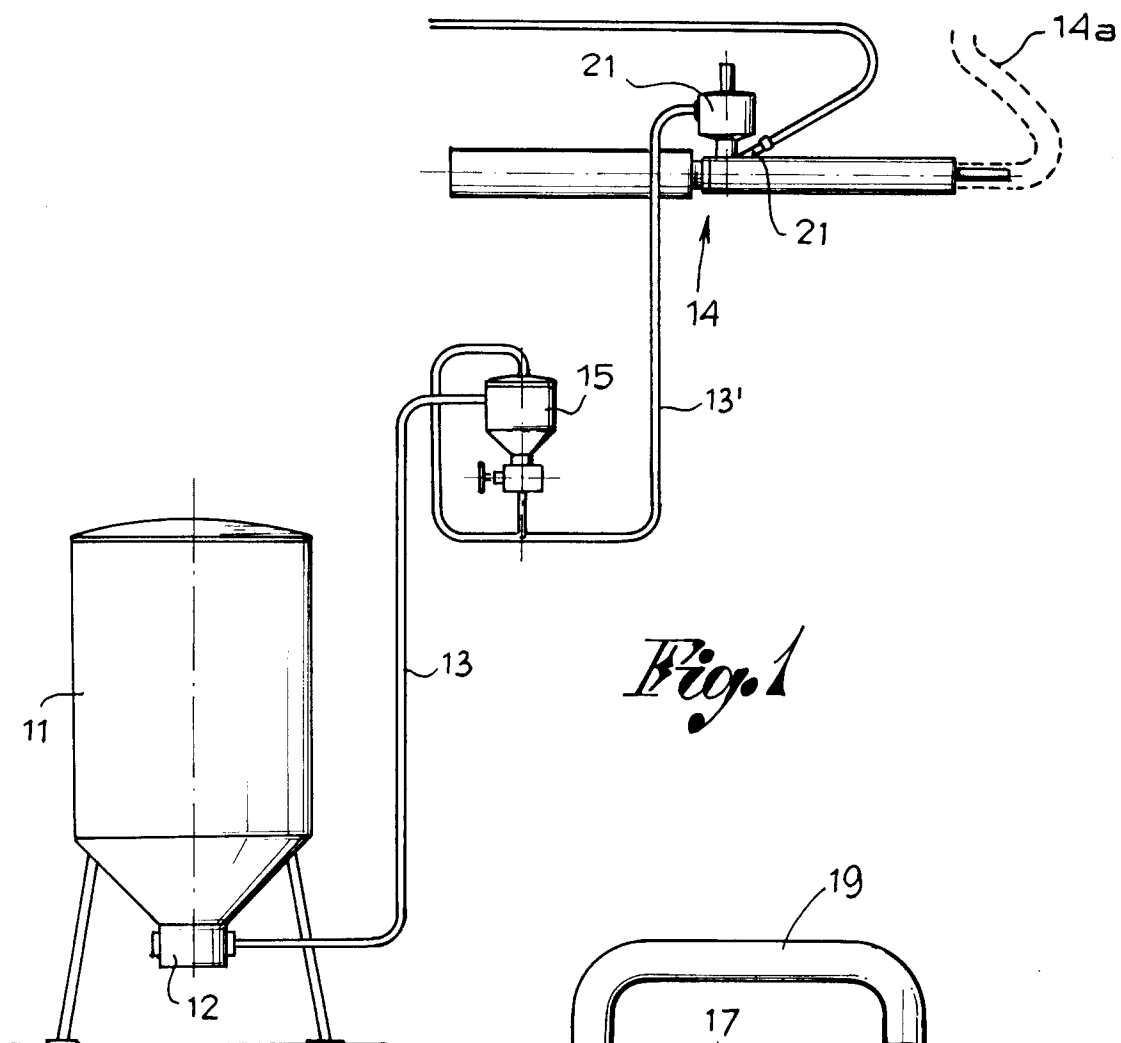
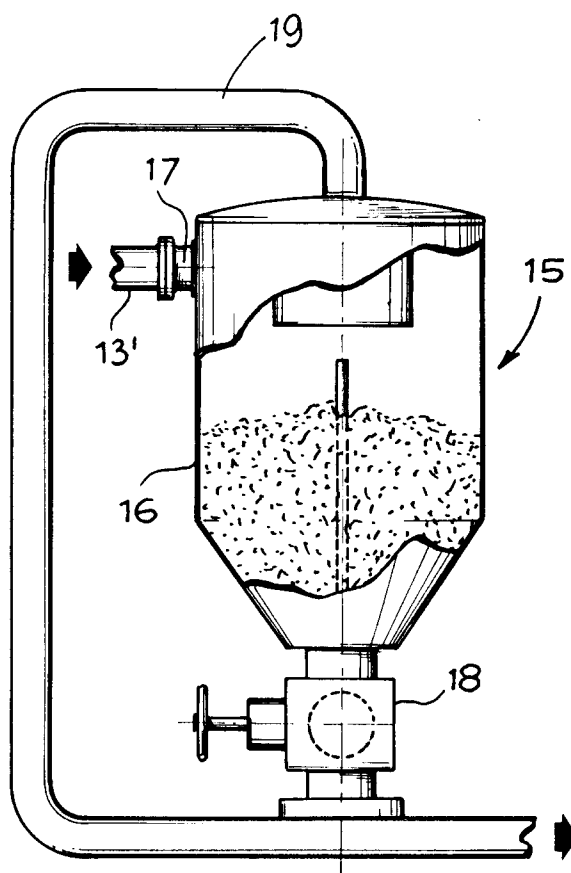


Fig. 2



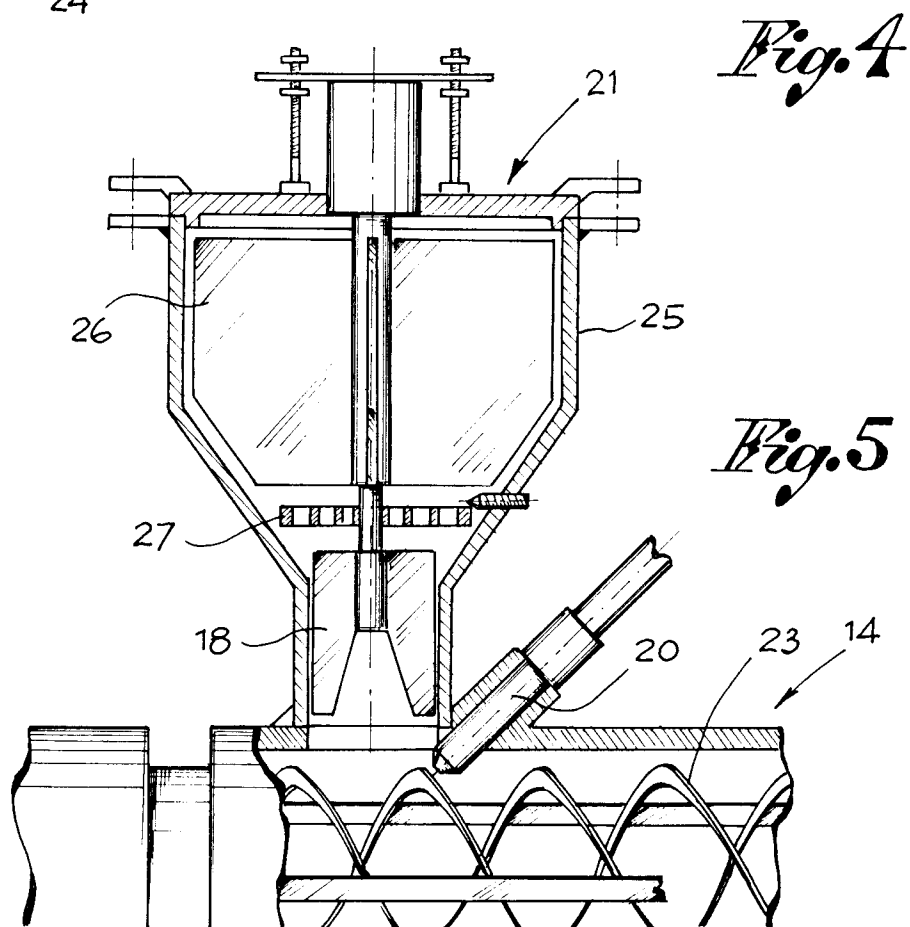
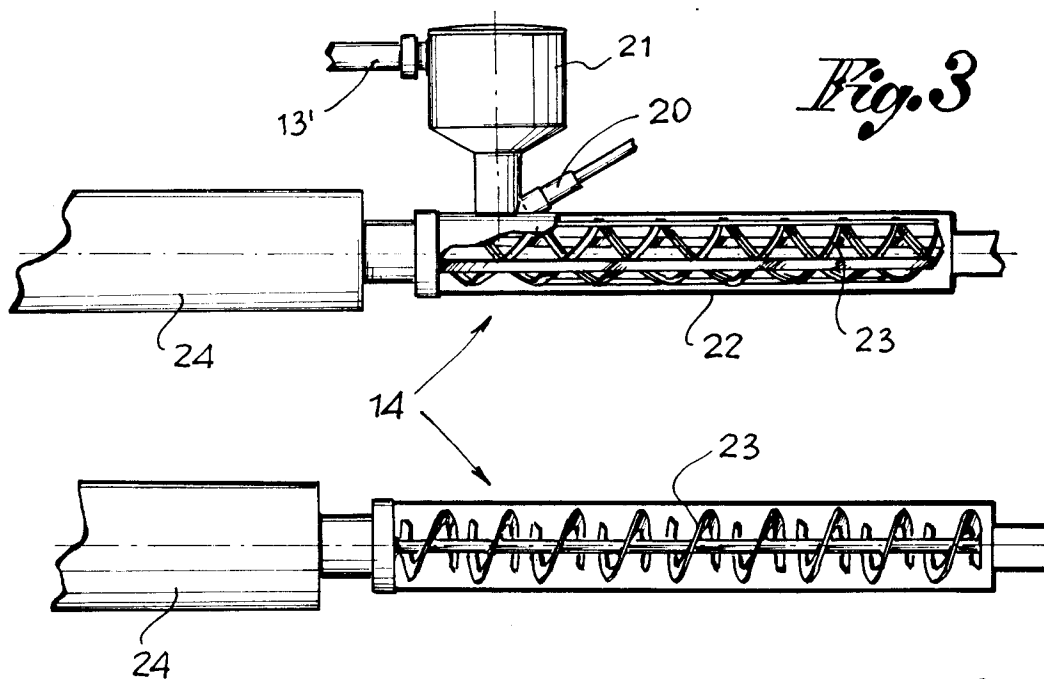
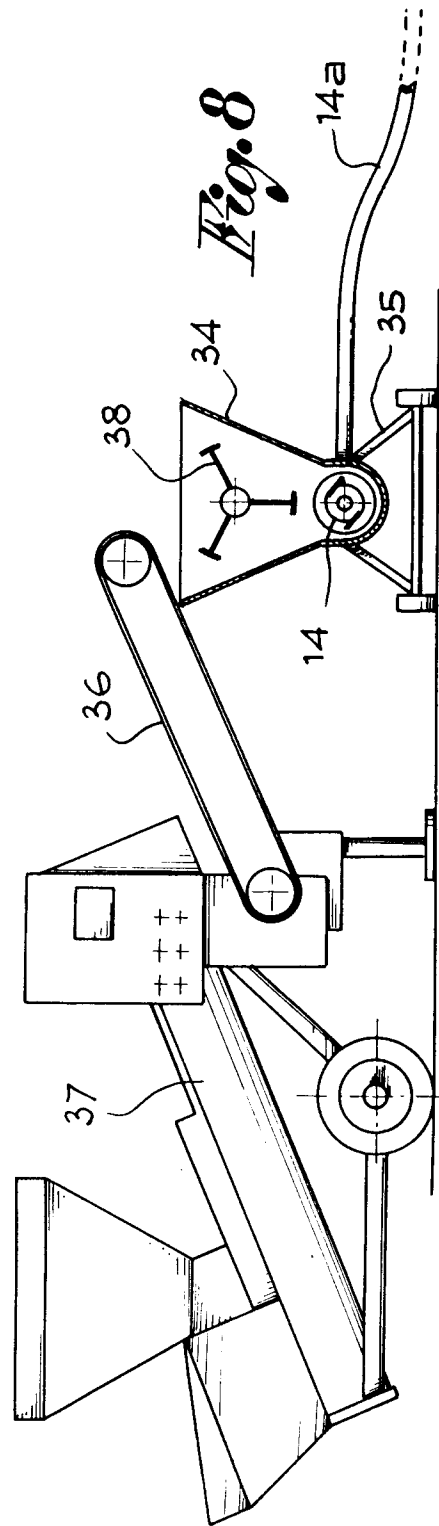
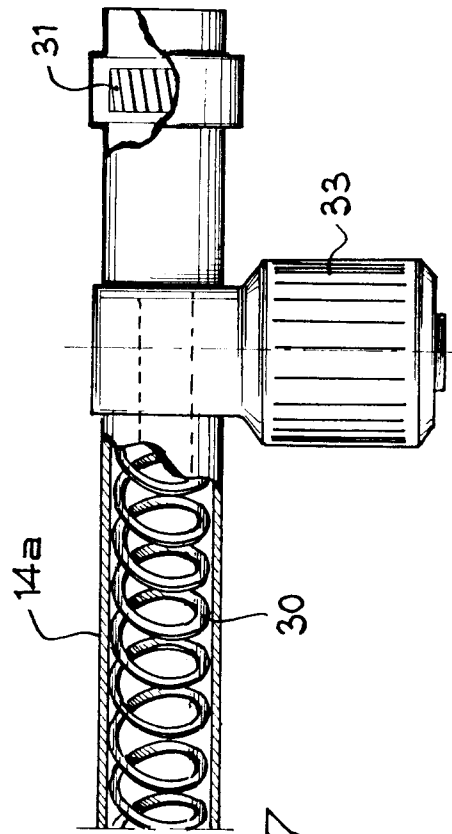
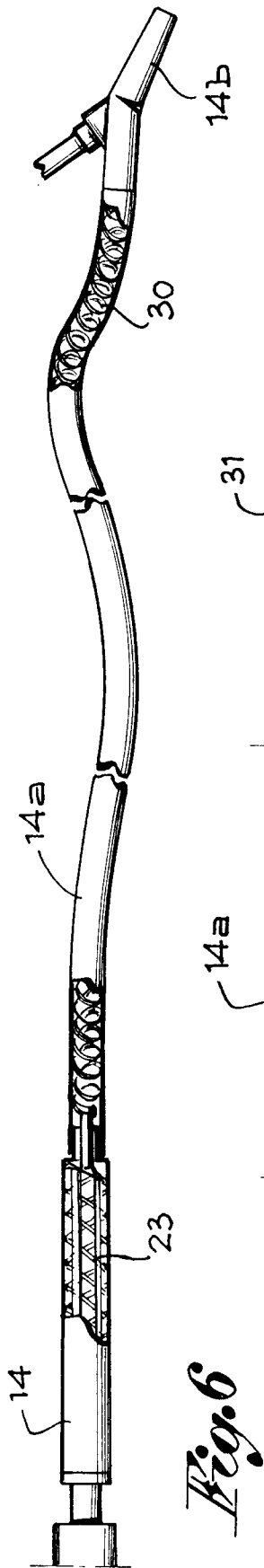


Fig. 5





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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0164

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	PATENT ABSTRACTS OF JAPAN vol. 14, no. 235 (M-975)(4178) 18 May 1990 & JP-A-2 062 205 (OHBAYASHI) * abstract *	1,6	B28C5/14 B28C7/16
X	PATENT ABSTRACTS OF JAPAN vol. 14, no. 209 (M-968)(4152) 27 April 1990 & JP-A-2 047 006 (FUJITA) * abstract *	1,6	
A	US-A-1 689 963 (PELTON) ---	2,7	
A	US-A-2 888 128 (ALLEN) ---	2,6	
A	SU-A-1 162 597 (DNEPR ENG CONS) * abstract *	3,9	
A	DE-A-3 135 657 (HELD) ---	7,8	
A	DE-C-354 618 (LEIPZIGER TANGIER-MANIER) ---	4	
A	US-A-3 459 409 (GOLDBERGER) ---		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-3 580 384 (PINGREE) ---		B28C
A	AU-A-83 030 (TROTT) LODGED 1975 -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 JULY 1992	Examiner PEETERS S.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			