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US-A- 3 209 497
US-A- 3 423 884
US-A- 3 624 970

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Description

The present invention relates to a tumbling machine and according to the preamble of claim 1. Such a machine is known from US-A-3624970 is particularly suited to carry out a series of finishing operations, such as degreasing, pickling, fettling or dressing-off,smoothing,washing and protection of mechanical components.

Following the mechanical machining of a piece, and, in particular, in the plant for the production of pieces in lots of more or less equivalent quantity, it is necessary to carry out a series of finishing operations such as those indicated above.

Currently this necessity is met with vibrating machines having a cradle of rectilinear or spiral type or with small tumbler having a vibratory tub fitted upon a stationary suspension system.

Both the rectilinear machines and the spiral machines have considerable overall size, and in both cases the pieces to be processed remain in the machine for a period of time that is proportional to the length of the machine and to the speed at which the piece advances, being, however, sufficient to carry out a single operation, for example, the dressing-off of the piece.

The speed of advancement of the piece, may not, furthermore, be reduced beyond a reasonable limit, since any excessive slowing down thereof causes it to advance irregularly, and an excessive build-up of the pieces may arise, with the possibility of their damaging each other. -

Also, in small tumblers with a vibrating tub only a single operation may be carried out per cycle, following which it is necessary to replace the processing fluid; for tumblers of this type, it is necessary to load and unload the piece manually, operations which may present some difficulty. These operations are, furthermore, as in the preceding cases, very noisy.

US-A-3,624,970 discloses a finishing machine comprising a plurality of finishing chambers joined together in the form of closed circle, but the chambers cannot move. The object of the present invention is to provide a tumbling machine capable of overcoming the disadvantages referred to above and thus capable of ensuring a processing time for the piece or the pieces that is absolutely constant and widely adjustable with, furthermore, the possibility of carrying out, with almost total automation, a tumbling cycle in which the piece undergoes various treatments.

This object is achieved by the tumbling machine according to the invention as described in claim 1.

Further characteristics and advantages of the invention will become more fully apparent from the detailed description of a preferred but not exclusive embodiment of a tumbling machine according to the invention, illustrated by way of non-limiting example in the appended drawings, in which:

Figure 1 is a schematic plan view from above the tumbling machine according to the invention;

Figure 2 is a cross-sectional view along the line II-II of Figure 1;

Figure 4 is a scrap sectional view of a detail of the wear-resistant shell of a vibratory barrel of a tumbling machine according to the invention.

With reference to the drawings and in particular to Figure 1, the machine according to the invention, generally indicated 1, comprises a plurality of tumblers 2a, b, c, d, e, f and g of the vibratory-tub type, a carousel support structure 3 on each tumbler is mounted, a series of processing stations 4, 5, 6, 7, 8, and 9 facing the carousel structure 3 on the perimeter thereof, and intermittent drive means 10 to advance the plurality of tumblers 2a, b, c, d, e, f and g in relative to the processing stations 4, 5, 6, 7, 8 and 9.

The carousel support structure 3 includes an annular base 15 supported upon a pedestal 16 and to which is fixed a guide 17 formed by a pair of circular concentric tracks 17a, 17b supported on the lateral walls 18 of the base 15.

Each tumbler 2a, 2b, 2c, 2d, 2e, 2f, 2g, includes a frame 20 movable along the tracks 17a, 17b by means of supporting wheels 21 and guide wheels 22, all of which are freely rotatably mounted on the frame. Each of the frames 20 is provided with a pair of buffers 25a, 25b at opposite ends, each provided with a buffer pad 26 and disposed in such a way that corresponding buffer pads of adjacent frames are in contact with each other.

On each of the frames 20 a vibratory tub 31 is supported by means of springs 30,the details of the tub being more clearly visible in Figure 3; the vibratory tub 31 comprises an outer casing 32 to which the suspension springs 30 are connected by means of brackets 33. The tub 31 is closed at the bottom by a curved base 34, in which there is a plurality of holes 35, and has an internal wear-resistant lining 36.

The mouth of the tub 31 opposite the base 34 is closed by a removable cover 37 made of or coated with sound-absorbent matrial, and in which there are formed slits 38a, 38b for the introduction of processing liquid.

For tubs 31 of substantial dimensions it is preferable that the cover 37 should be supported directly upon the frame 20, for example, by means of studs, not shown.

The introduction of liquid occurs at one or more of the processing stations 5, 6, 7, 8 and 9, each of which is equipped with a pipe 40 drawing from a reservoir 41 and terminating in a pair of spouts 42a, 42b aligned with the corresponding

slits 38a, 38b of the cover 37.

The spouts 42a, 42b have a longitudinal extension which is smaller in size than the slits, so as not to require a precise positioning of the corresponding tumbler 2 upon the carousel structure 3 for the introduction of liquid into the tub 31.

The processing liquid introduced through the spouts 42a, 42b immediately flows from the tub 31 through the holes 35, draining into a collecting basin 44, formed in the base 15 of the carousel structure so as to be aligned with each of the processing stations equipped with spouts 42a, 42b.

The collecting basins 44 preferably have two inclined walls 45 disposed at opposite circumferential ends on the base so as to form a preferential mouth for recovery of the processing liquid, its filtering and possible return to the corresponding reservoir 41.

The station 4, at which loading and unloading of the piece or pieces to be processed in each tumbler is carried out, is provided with a vertically movable fork element 50 located in the base 15 and formed by a plurality of prongs 51,directed towards the base 34 of the overhead tub 31.

The fork element 50 is movable by a fluid pressure actuator 52 housed in a sump 53 below the pedestal 16.

Through the action of the fluid pressure actuator 52 the prongs 51 are thrust through the holes 35 of the base 34 of the tub 31, and are located in these holes with play in such a way as to lift the piece being processed out of the tub.

Each of the prongs 51 is provided at its upper end with a tip 55 made in a soft material so as to avoid any damage to the piece during lifting of the latter.

On opposite walls of each of the tumbler tubs 31 there are fitted motor vibrators 56a, 56b of standard type, which impart vibratory stresses to granules, not shown, contained n the tub 31.

The intermittent drive means 10 comprise a thrust cylinder 60, pivotally mounted on the base 15 to which it is connected by means of a lug 61, and a training cylinder 62, also pivotally mounted by means of an eyelet on the base 15 and acting upon the thrust-cylinder 60 to effect training movement thereof.

The cylinder 60 has a stem 63 provided with a fork 64 which is removably engaged with a stake 65 carried by a striker 66 fixed to the frame 20 of each tumbler.

The station 4 is further equipped with a movable arm 70 of standard type for loading and unloading the pieces undergoing treatment or for the removal of the cover 27.

With reference to Figure 4, the wear-resistant lining 36 to advantage has a plurality of parallel inwardly projecting ribs 71 which prevent the piece from bearing critically upon the base 34 of the tub 31, thus avoiding any accidental damage 69 the piece.

The tumbling machine according to the invention functions as follows:

at station 4 the piece is loaded/unloaded into or out of the tubs 31 of the tumbler during its temporary transit beneath this station.

In each of the tubs 31, in addition to the pieces to be processed, there are present granules of a conventional type of the size, conformation and in the quantity desired.

Through the action of the actuator 52, the prongs 51 of the fork element 50 penetrate the holes 35 of the tubs 31, so lifting the piece or pieces immersed in the granules through the mouth of the tank 31, the cover 37 having been previously removed.

When penetrating the hole 35, the prongs 51 serve to free these holes of any granules that may possibly have become stuck therein or from any other possible obstruction.

Since the station 4 is the only one to require a precise positioning of the tumber 2a,the intermittent drive means 10 act upn the tumbler immediately preceding this so as to transfer it into a precise position above the fork element.

Because of the abutting contact between each tumbler 2a, b, c, d, e, f, and g, a translation of one of these, causes a simultaneous displacement of the remainder which pass in sequence through all the stations 5, 6, 7, 8, and 9.

More particularly, the thrust cylinder 60 retracts its rod 63 and is then trained by the fluid pressure cylinder 62 which carries this, in a retracted state, into a position opposite the striker 66 on the frame 20 of the tumbler 2g.

The training cylinder 62 is then disposed in a neutral position and follows the displacement caused by the main thrust cylinder 60 in transferring the tumbler 2g from the station 9 to the station 4.

In the stations subsequent to the station 4 various processing liquids are introduced into the tumblers, for example, it is possible to introduce a degreasing liquid at station 5, to carry out a pickling process at station 6, to carry out a neutralising wash at station 7, a rinsing process at station 8, and to introduce a protective liquid at stations 9.

In the meantime, the motor-vibrators carried on the tub 31 serve in a manner known per se to vibrate it to effect mechanical abrasion of the pieces.

At each of the stations the liquid introduced is drained through the holes 35, through which any undersized or worn granules, also pass, and is collected in the basin 44 formed in the base at each of the positions 5, 6, 7, 8 and 9.

By virtue of the ribs 71 of the wear-resistant

lining 36 of the tubs 31, the possibility of any point-contact between one of the granules and the piece undergoing treatment is prevented since, under such conditions, the piece and the granule are brought into a state of unstable equilibrium.

Any localised abrasions or instances or damage to the piece are thus avoided. In one or more stations the motor-vibrators may be inverted, in particular, if it is necessary to treat pieces with oppositely and threaded blind holes, which process permits all such holes to be freed from dirt, burrs and the like.

The exemplary embodiment described is particularly suitable for tumblers with a medium-to-large tub; for smaller dimensions preferably each of the said frames 20 carries two or more barrels up to the point where, for small-capacity tumblers, there is a single frame with a rotatable platform supporting the entire series of vibratory tubs.

Claims

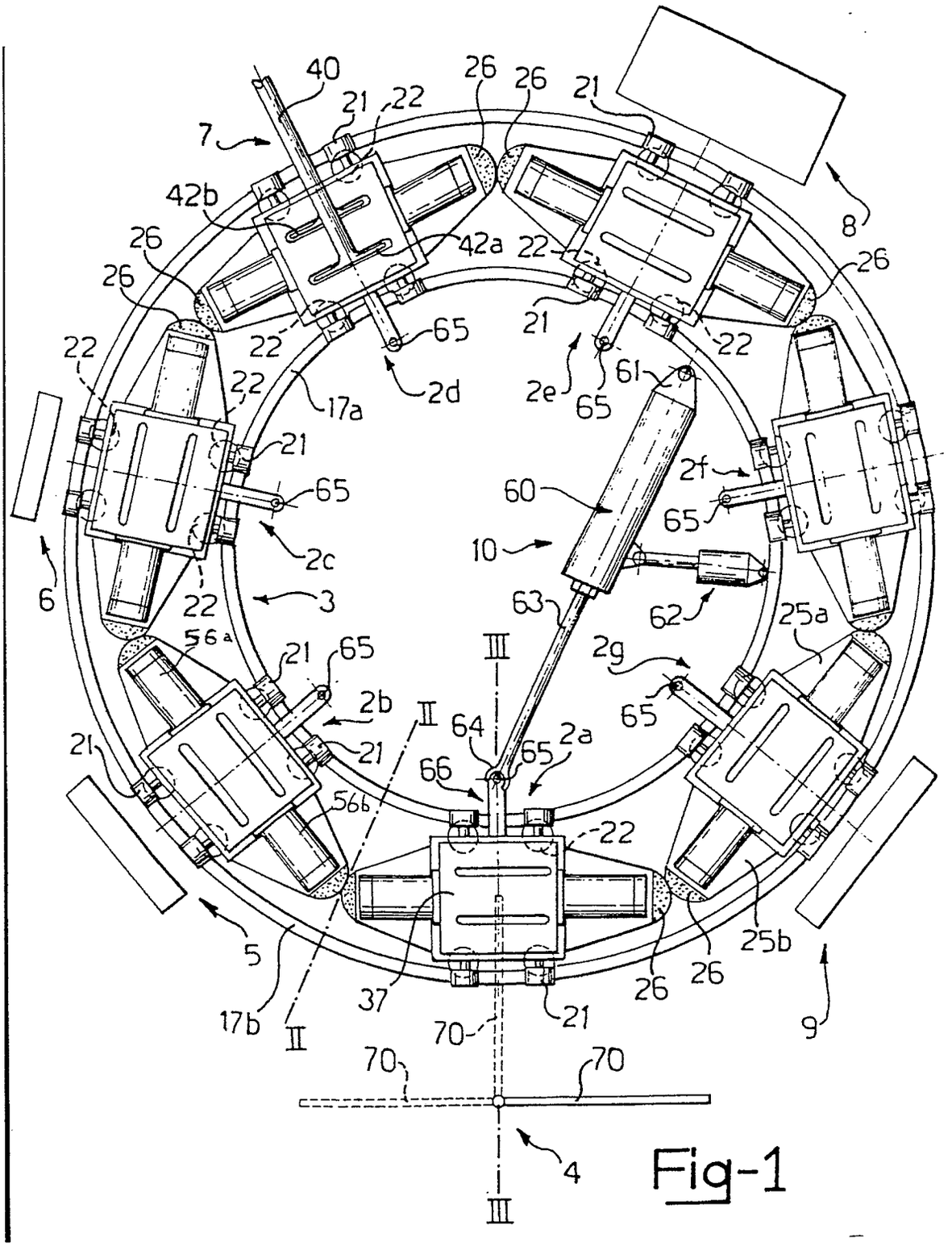
1. A tumbling machine (1) of the type having vibratory tubs (31) in which pieces to be treated are placed, comprising a plurality of vibratory tub tumblers (2), an anular carousel support structure (3) on which the said tumblers (2) are movably supported one or more processing stations (4-9) facing the said carousel structure (3) characterised in that
   the machine (1) comprises intermittent drive means (10) for advancing the plurality of tumblers (2) upon the said support structure (3) relative to the said stations (4-9); each vibratory tub (31) having a base (34) provided with holes (35); at least one of the said stations (4-9) being a loading/unloading station (4) for the pieces undergoing treatment and including a fork element (50) with prongs (51) oriented towards said base (34) and removably insertable into the vibratory tub (31) through the holes (35) in said base.

Revendications

1. Une machine à mouvement vibratoire (1) du type ayant baquets de vibration (31) dans lesquelles sont placèes les pieces qui doivent être travaillèes, comprenante une pluralité des baquets de vibration (2), une structure de support annulaire tournante (3) sur laquelle les baquets de vibration (2) sont supportè d'une façon telle qu'ils puissent se déplacer, une ou plusieurs stations de travail (4-9) face à la dite structure tournante (3) caracterisée par le fait que:
   la machine (1) comprend des moyennes de guide intermitants (10) pour faire avancer la pluralité des baquets de vibration (2) sur la structure de support (3) relativement a les stations de travail (4-9), chaque baquet de vibration (31) ayant une base (34) avec des trous (35); au moins une des stations (4-9) étant une station de chargement et déchargement (4) pour le pieces traitées et ayant un élément en forme de fourche (50) avec les dents (51) orientées vers la base (34) et qui peuvent être inserées et retirées du baquet de vibration (31) à travers les trous (35) de la base même.

Ansprüche

1. Eine Maschine (1) mit Schwingbewegung mit Schwingertanken (31) wohin die Teile die berabaiten werden sollen gestellt werden, die eine Mehrheit von Schwingertanken (2), eine ringformige Struktur (3) worauf die genannte Schwingertanken (2) beweglich getragen sind, eine oder mehrere Bearbeitungstelle (4-9) die der obengenannten Struktur (3) gegenüberstehen, aufweist dadurch gekennzeichnet, daß die Maschine (1) intermittierende Führungsmittel (10) zum Fortschritt der Schwingertanken (2) auf die genannte Struktur (3) im Verhältnis zu der genannten Bearbeittungstellen (4-9) aufweist; jeder Schwingertanke (31) eine Basis (34) mit Löchern (35) aufweist; mindestens eine der genannten Bearbeitungsstellen (4-9) eine Ladung/Ausladungstelle (4) für die Teile die bearbeiten werden ist und eine Gabel (50) mit Spitzen (51) nach der Richtung der genannten Basis (34) die durch die gennanten Löchern (35) in den Schwingertank (31) eingeschieben und herausgezogen werden können aufweist.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63
62
25a
56a
2g
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64
2a
66
56b
37
17b
70
4
III
5
9
25b

Fig-1

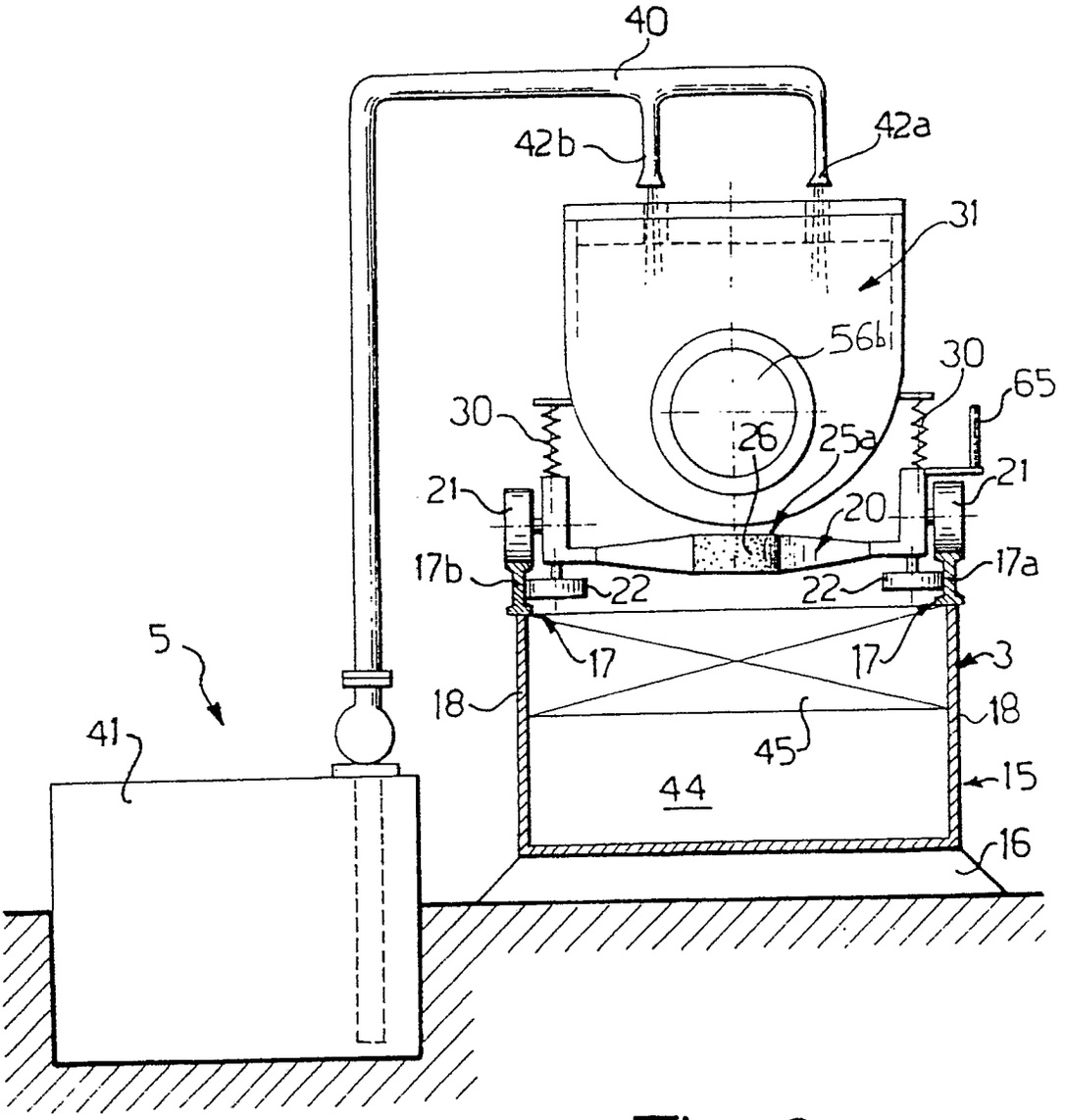
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Fig-2

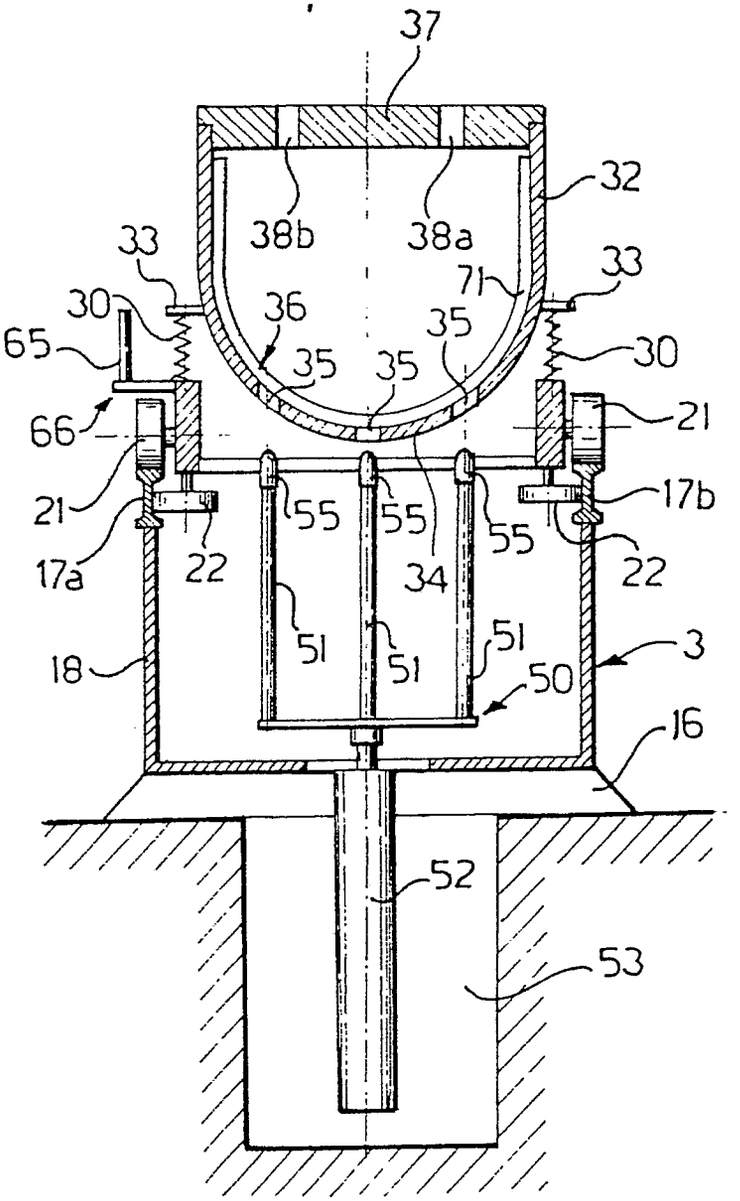
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Fig-3

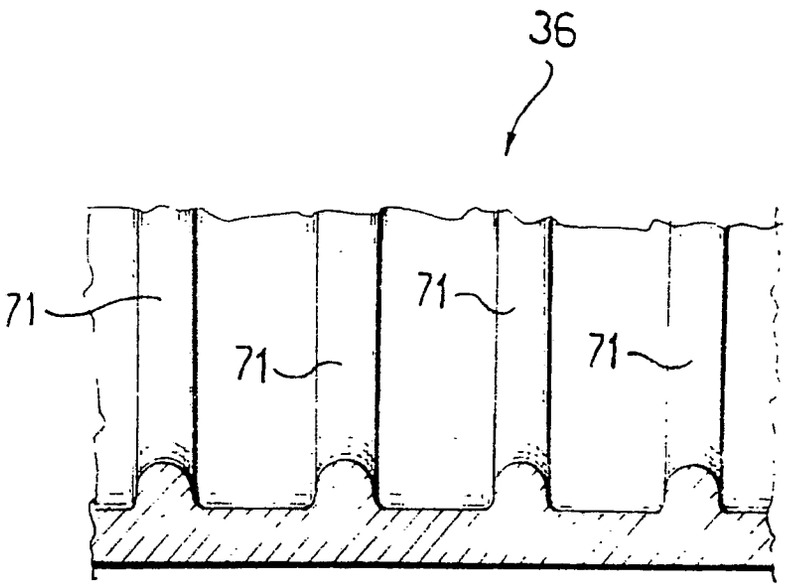

Fig-4