

12

EUROPEAN PATENT APPLICATION

21 Application number: 82108634.5

51 Int. Cl.³: **F 26 B 7/00**
F 26 B 15/04

22 Date of filing: 18.09.82

30 Priority: 01.10.81 IT 354281

43 Date of publication of application:
13.04.83 Bulletin 83/15

84 Designated Contracting States:
CH DE FR GB LI LU SE

71 Applicant: **T.I.F.A.S. S.n.c. di Maradini Gildo & C.**
Via Cerreto
I-29013 Carpaneto Piacentino Piacenza(IT)

72 Inventor: **Maradini, Gildo**
Via Carreto
29013 Carpaneto Piacentino Piacenza(IT)

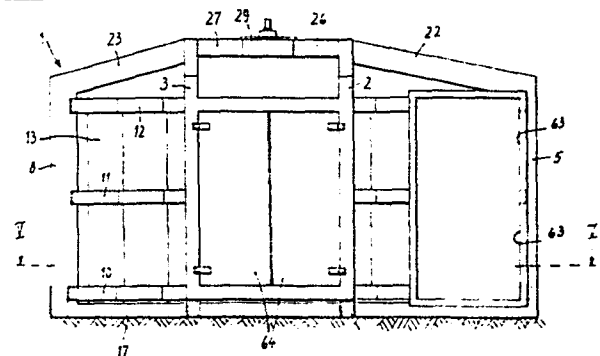
74 Representative: **Modiano, Guido et al,**
MODIANO, JOSIF, PISANTY & STAUB Modiano &
Associati Via Meravigli, 16
I-20123 Milan(IT)

54 **Apparatus for drying textile articles of manufacture, in particular textile yarn skeins.**

57 The apparatus comprises a coil-like pattern chamber (14), wherein a reel (48) rotates, whereon carriages (66) loaded with articles of manufacture are arranged. The chamber comprises an axial drying air inlet port (31) and a tangential drying air outlet port (63), thereby as the reel (48) is rotated, air is caused to follow a radial path to sweep the articles of manufacture, and, in combination with the centrifugal force, provide their drying.

Thus the loading step of the article to be dried is facilitated and the drying step is made faster and more effective without inducing matting or otherwise damaging the yarns.

Fig. 1



This invention relates to an apparatus for drying textile articles of manufacture, in particular textile yarn skeins.

As is known in the textile industry, textile yarn
5 skeins are usually dyed in special chamber into which the skeins are introduced from transport carriages. To support the skeins on the carriages, mutually adjoining rods are provided from which the skeins are suspended, and which bear with their opposed ends on
10 guides provided on two opposite walls of a carriage. Upon completion of the dyeing operations, the carriages are withdrawn from the chambers and the skeins subjected to drying processes. For the drying step, an apparatus has been proposed which comprises essentially
15 a reel or carousel wheel set for rotation about a horizontal axis inside a housing. The rods are hooked to the reel periphery such as to lay parallel to the rotation axis thereof. The reel rotation creates a centrifugal force which forces the liquid out of the
20 fibres. The centrifugal action is aided by the blowing of air into the housing.

This prior apparatus has considerable drawbacks: first of all, transferring the skeins from a carriage to the reel and their removal have shown to be
25 laborious and time-consuming operations. Furthermore, centrifugation creates overwhelming problems of stability owing to the loaded skeins being somewhat unbalanced as the reel is started. Finally, air blowing has shown to be ineffective because the airflow, owing to the
30 reel rotation, can only sweep the sideways outermost

portions of the skeins.

Thus the task of the present invention is to provide a novel apparatus which can obviate the drawbacks of conventional apparatus, particularly by
5 facilitating the loading steps and making the drying step faster and more effective, without inducing, however, matting or otherwise damaging the yarns.

Within this task it is an object of the invention to provide such an apparatus which is simple and economical
10 construction-wise and highly reliable in operation.

The above task and objects are achieved by an apparatus for drying textile articles of manufacture, in particular textile yarn skeins, characterised in that it comprises a chamber defined by a vertical cylindrical
15 coil-shaped housing having a top drying air inlet port and a tangential drying air outlet port, at least one port for introducing and withdrawing into/from said chamber carriages carrying articles of manufacture to be dried, a reel carried
20 rotatably within said chamber and having a plurality of angularly distributed seats for accommodating respective carriages, and means of orienting the carriages in said seats such that the articles of manufacture are caused to take, as the reel is being
25 rotated, a perpendicular orientation to the rotation axis.

Further features and advantages of this invention will be apparent from the following description of a preferred embodiment thereof, illustrated by way of
30 example and not of limitation in the accompanying

drawings, where:

Figure 1 is a side elevation view of this apparatus;

5 Figure 2 is a plan view of the apparatus of Figure 1;

Figure 3 shows a view in elevation and in section along the line III-III of Figure 2;

10 Figure 4 is a sectional view of the apparatus upper portion, taken in the plane of line IV-IV of Figure 2;

Figure 5 is a plan view taken along the section line V-V of Figure 1;

15 Figure 6 shows a view, in elevation and in section along the line VI-VI of Figure 5, also illustrating means effective to orient and load onto the apparatus a carriage loaded with yarn skeins; and

20 Figure 7 is a detail plan view of the means for holding the carriages on the reel, taken along the line VII-VII of Figure 6.

25 Making reference to the cited drawing figures, this apparatus comprises an outer framework, generally indicated at 1 and including a series of eight uprights 2-9 arranged essentially at the vertices of a octagon and being interconnected by three polygonal pattern rings, 10, 11 and 12.

30 Associated internally with the rings 10-12 is a paneling 13, which extends along a complementary contour to said rings and delimits a peripheral chamber 14. The uprights 2-9 are located, with respect

to the centre of the framework 1, at increasingly longer radial distances so that the paneling takes the form of a cylindrical surface coil.

5 The bottom ends of the uprights 2,3,4,5 are respectively connected to those of the uprights 7,6,9,8 by longitudinal stringers 15,16,17,18 laid parallel in pairs. The longitudinal stringers 15,16, moreover, are perpendicular to the longitudinal stringers 17,18, so as to form a double cross pattern.

10 In a similar manner, the tops of the uprights 2,3 are respectively connected to the tops of the uprights 7,6 by a pair of mutually parallel beams 19,20 in the pattern of a flattened trapezium, as is more clearly shown in Figures 1 and 4. The beams 19,20 are joined
15 to the uprights 8,9 and 4,5 by connective elements 21, 22,23,24 which, from the tops of said uprights, extend obliquely to the corner points defined by the slanting portions of the beams 19,20 with the horizontal portions 19a, 20a of the same.

20 From the meeting points between the beams 19 and 20 and the connective elements 21-24 there extend arms 25, 26,27,28 which are arranged along the diagonals of a square and support a central ring 29 of square shape. Expediently, the uprights, longitudinal stringers,
25 beams, coupling elements, as cited hereinabove, and the ring 29 are constructed from tubular members of rectangular cross-section.

The chamber 14 is closed at the top by a deck or
cover 30, which delimits centrally a port 31, and
30 peripherally is connected to the top edge of the

paneling 13. The paneling 13 and cover 30 form the apparatus housing. The port 31 communicates upwardly to a conduit 32 defined by a hood member, generally indicated at 33. The hood comprises two horizontal panels 34,35, which close the areas defined between the portion 19a of the beam 19 and the arms 25,26, and between the portion 20a of the beam 20 and the arms 27,28, as well as two vertical panels 36,37 which close the areas between the portions 19a and 20a and the cover 30, and lastly a slanting panel 38 which extends laterally between the slanting edges of the vertical panels 36,37 and is rigid at the bottom with the ring 29 and cover 30, respectively. At an opposite location to the panel 38, the panels 36,37 and an additional panel 39, which extends between the arms 25,28, define a port 40, which through said conduit 32 communicates to the access port 31 of the chamber 14.

The framework described hereinabove bears onto a bed 41, to which it is secured by means of anchor bolts 42. It should be noted that the bed 41 acts as the bottom for the housing formed by the paneling 13 and cover 30, and has a channel 43 for collecting the liquid issuing from the articles of manufacture, as will be explained more clearly hereinafter.

On the upper ring 29 and at the point of intersection of a cross located in the central square formed by the longitudinal stringers 15-18, there are arranged supports 45 and 46 for the shaft 47 of a reel or carousel wheel generally indicated at 48 and set

for rotation about a vertical axis.

The reel comprises two crosses 49,50, each of which is composed of four arms 49a,50a, arranged mutually perpendicular and to extend radially from the shaft 47 with which they are made to rotate integrally.

To the ends of the arms 49a,50a, there are attached two respective superimposed frames 51,52, the latter of which is shown in Figure 5.

More specifically, the frame 52 includes four longitudinal stringers 53-56 which, similarly to what has been specified above for the longitudinal stringers 15-18, are arranged parallel in pairs, the longitudinal stringers 53,54 being also perpendicular to the longitudinal stringers 55,56. Thus, there are formed pairs of parallel arms 53a,54a; 53b,54b; 55a,56a; and 55b,56b. The ends of each arm pair are interconnected by a rod 57, whilst the ends of the arms in adjacent pairs are interconnected by rods 58.

Secured on the arms 53a-56b are guides 59, each comprising an upwardly open channel sectional member. The guides 59 of each arm pair are parallel to each other and aligned on shanks 60 protruding radially out of the arm ends. The upper frame 51 of the reel has an entirely similar construction to the lower frame 52, excepting for the guides 59 and shanks 60. Moreover, the upper frame is exactly superimposed on the lower frame, to which it is connected by axial uprights 61 which interconnect the intersection points of the longitudinal stringers 53,54 with the longitudinal stringers 55,56, and by axial outer uprights 62 which

interconnect the ends of the longitudinal stringers together.

As may be gathered from Figure 5, the reel 48 configures the rotor of a centrifugal fan, in which
5 air is admitted axially through the port 31 in the cover 30. The outlet of said fan, indicated at 63, is located tangentially to the paneling 13 where the latter, owing to its coil pattern, is at a greater distance from the reel periphery. The pairs of parallel arms of
10 the lower frame 52 identify, with a pair of parallel arms in the upper frame, seats wherein carriages loaded with skeins to be dried are inserted. The carriages are introduced into such seats through a door in the paneling which comprises a pair of wings 64, which can be opened
15 outwardly and are hinged to the uprights 2 and 3. The carriages move out of the chamber 14 through an additional door in the paneling, offset by 90° with respect to the former and being also composed of a pair of wings 65 which can be opened outwardly and are hinged
20 to the uprights 4,5. The opening of the wings 64,65 can be automated in accordance with the drying cycle program. Each carriage (see Figure 6, where it is indicated at 66) has a parallelepipedal shape with two longitudinal walls 67,68 connected on one side to a cross wall 69, such as
25 to take a U-like shape, that is one open at the top and bottom and on the opposed side to the wall 69. The top and bottom edges of the walls 67-69 are fastened to stiffening frames 70,71 of rectangular perimeter. Along
the upper portions of the walls 67,68, there are secured
30 pairs of sectional members 72,73 parallel to each other,

which delimit guiding channels 74 in which quadrangular blocks 75 can slide. With the blocks 75, there are associated the opposed ends of rods 76, from which skeins M to be dried are suspended. The rods 76 with the
5 skeins are introduced into the channels 74 from the carriage side opposite to the wall 69, such that the blocks are close behind one another. The rods 76 are locked by means of pins 77 being inserted into holes in the sectional members 72-73, which intercept the sliding movement
10 of the blocks along the guides 74.

Each carriage 66 has pairs of running wheels 78,79 by means whereof it can be transferred from the dyeing chambers to a transport carriage and hence to a tippler. In fact, the carriage, for introduction into the
15 apparatus, is previously tilted through 90°, so that it bears onto the wheel pair 78 and an additional wheel pair 80 supported close to the carriage top edge of the carriage..

To tip the carriage over, a tippler is provided,
20 generally indicated at 81, which is arranged in front of the door 64. Said tippler comprises a support 82 composed of a pair of brackets 82a made rigid, to form a right angle, with an additional pair of brackets 82b. The brackets 82a lay on the same plane as the brackets 82b
25 and are at a mutual distance apart which is equal to that of the pairs of arms 53a-56b. To the inner faces of the brackets 82a,82b, there are attached guides 83,84 comprising channel members similar to the previously cited sectional members 59 and adapted to receive wheels
30 78,79 and 80.

The support 82 is hinged to a pin 85 of a molding 86 secured to the base 41 in front of the door 64 and has a flange 87 to which is particularly connected the rod of a fluid-dynamic jack 88 the cylinder whereof
5 is articulated to the molding 86. By means of the jack 88, the support 82 is enabled to perform a 90° oscillation to move from a position where the brackets 82a are horizontal to receive a carriage into another position where the carriage weight is transferred onto the
10 brackets 82b. During this oscillation the ends of the brackets 82b enter the chamber 14 through the open door 64 and bear against the shanks 60. Expediently, the ends of the arms 82b are of a yoke-like configuration, such as to hook onto the shanks 60 to
15 ensure alignment of the guides 84 with the guides 59 of the arms 53a-56b and allow transfer of the carriage from the support 82 into the reel 48. The transfer is effected by thrust even though it is possible to provide automatic actuating means.

20 As the carriage 66 is inserted into the respective seat on the reel 48, the holding members prevent the same from being thrown outwards by centrifugal force during the rotation of the reel 48. Such members comprise, for each seat, two bars 89,90 which are
25 vertical (see Figures 6 and 7) and rotatable in supports 91 of the frames 51,52.

Rotatively rigid with the bars 89,90 are respective hook pairs 92,93 and two-armed levers 94,95. With one arm of the levers 94,95 there engage respective sliders
30 96,97 which are guided slidably in sleeves 98,99 rigid

with the arms 53a-56b. The sliders are parallel to the arms 53a-56b, and their opposed ends to those of engagement with the levers 94,95 protrude outwards with respect to the rods 57 and are arranged on the sides of the shanks 60. Such ends are also provided with idle rollers 100,101. The other arms of the levers 94,95 penetrate the cavities of the arms 53a-56b and have springs 102 (in Figure 7 the one relating to the arm 54a is shown) hooked thereto which extend inside the cited arms to be anchored to a small bridge member 103. Owing to the effect of the springs 102, the bars 89,90 are rotated such that the hooks 92,93 are caused to project toward the inside of the carriage housing seats to hook onto the lower edges of the walls 67,68 after their upsetting. By contrast, when one wishes to bring the hooks into a disengagement position, the sliders 96,97 are acted upon to force the hooks open against the bias of the springs 102. The displacement of the sliders is accomplished by means of specially provided cams 104 which are mounted on the ends of the brackets 82b of the toppler 81 and adapted to act on the sliders upon the brackets 82b being tilted into the position shown in Figure 6.

Expediently, at the door 65, there is provided a similar toppler which, during the apparatus loading and unloading steps, for each carriage being introduced into the chamber 14 through the door 64, allows one carriage to be withdrawn from that same chamber.

The apparatus described hereinabove operates as follows.

First, the carriages are loaded onto the reel 48. For this purpose, the support 82 will occupy the position shown in dash-and-dot lines in Figure 6, with the bracket pair 82a laying horizontal to receive a carriage from the dyeing stations. The carriage, during the transfer operation, runs with the wheels 78,79 along the guides 83 and its orientation on the support 82 is selected such that the cross wall 69 is adjacent the brackets 82b. With the carriage positioned on the support 82, the wheels 78,80 engage with the guides 84. Up to this time, the skeins are held hanging loose from the rods 76.

After opening the door 64, the jack 88 is actuated which produces a 90° rotation of the support 82. During this rotation, the skeins M will pile up one upon another against the wall 69 which has taken a horizontal lay. The brackets 82b are moved with their free ends into the chamber 14, where they will hook themselves onto the shanks 60 to ensure alignment of the guides 84 with the guides 59 of the frame 52. At the same time, under the effect of the cited cams 104, the hooks 92,93 are opened, so that the carriage, by rolling on the wheels 78,80 along the guides 74,59, can be pushed into its respective seat on the reel 48. Upon reaching said seat, the toppler 81 is moved back into its starting position to receive a fresh carriage. However, the lifting of the brackets 82b causes the cams 104 to disengage from the rollers 100,101 of the sliders 96,97, so that the latter are made free to slide outwards and allow the hooks 92,93, under the

action of the springs 102, to pivot and hook onto the walls 67,68, which will be engaged at their bottom edges, which edges, upon toppling over, have taken a vertical attitude.

5 Now the reel 48 is rotated through 90° to bring a fresh seat opposite the door 64 and effect the loading of a fresh carriage. The above-described operations are repeated until all the reel seats are occupied.

10 At this time, after closing the door 64, the drying step proper is initiated by rotating the reel through a drive motor installed on the apparatus and not shown in the drawings. Owing to the rotational movement, the carriage walls 67,68 will behave as the
15 blades of an impeller which draws in air axially from the outside through the port 40, conduit 32 and port 31, and discharges it tangentially through the port 63.

 The intake air is conveyed between the walls 67,
20 68 of the various carriages and flows through the gaps delimited by the overlapping layers of skeins, which owing to the centrifugal force effect, are thrown outwards and take accordingly a practically horizontal attitude. Thus, the skeins will be dried
25 both by virtue of the cited centrifugal action and of the evaporation effect as enhanced by the air sweeping the skeins themselves.

 The liquid removed by evaporation is conveyed through the port 63, whereas that ejected by
30 centrifugation, after flowing down the inside surface

of the paneling 13, is collected into the channel 43 in the bed and removed.

Upon completion of the drying operation, and after stopping the reel, the treated carriages are
5 replaced with others filled with fresh skeins to be dried. Expediently, the treated carriages are removed through the door 65, with which there is associated, as specified above, a toppler quite similar to the one indicated at 81. This expedient permits, for each
10 carriage removed, the introduction of another into the apparatus.

It will be recognized that the apparatus fully achieves the invention objects. In particular, the centrifugal fan design of the apparatus enables full
15 exploitation of the combined effects of centrifugal force and ventilation, thereby reducing the drying times to a considerable extent. Furthermore, the particular construction of the carriages requires no removal of the skein supporting rods, as is instead
20 required with conventional apparatus, with the result that the overall processing time can be greatly shortened. In addition thereto, the operators are no longer exposed to contact with the chemicals to which the skeins are subjected in the course of the dyeing
25 process.

The invention is susceptible to many modifications and variations without departing from its protective scope. One of these may be the provision of a heating battery located before the inlet 40, through which
30 the ventilation air can be heated prior to its

admission into the chamber 14.

In practicing the invention, the apparatus shape and dimensions may be varied to meet individual requirements.

- 5 Moreover, the technical details may be replaced with other equivalent ones.

CLAIMS

1 1. An apparatus for drying textile articles of
2 manufacture, in particular textile yarn skeins,
3 characterised in that it comprises a chamber 14 defined
4 by a vertical cylindrical coil-shaped housing
5 having a top drying air inlet port 31 and a
6 tangential drying air outlet port 63, at least
7 one port for introducing and withdrawing into/from
8 said chamber 14 carriages 66 carrying articles of manufacture
9 to be dried, a reel 48 carried rotatably within said
10 chamber 14 and having a plurality of angularly
11 distributed seats for accommodating respective
12 carriages, and means of orienting the carriages in
13 said seats such that the articles of manufacture are
14 caused to take, as the reel 48 is being rotated, a
15 perpendicular orientation to the rotation axis.

1 2. An apparatus according to Claim 1, character-
2 ised in that said reel 48 includes two superimposed
3 frames 51, 52 constructed from two pairs of longitudinal
4 stringers 53, 54, 55, 56 crossing each other such as to define a
5 double cross member. said longitudinal stringers
6 forming seats arranged radially with respect to the
7 rotation axis of said reel.

1 3. An apparatus according to Claim 2, character-
2 ised in that on said longitudinal stringers, 53, 56,
3 at said seats, carriage hooking and holding members
4 are provided.

1 4. An apparatus according to any of the preceding
2 claims, characterised in that said carriages 66 have
3 a parallelepipedal shape and comprise two longitudinal

4 walls 67,68 interconnected by a cross wall 69 such as to
5 define a U-like configuration, along the upper portions
6 of said longitudinal walls 67,68 there being provided
7 guides 74 for slidably accommodating supporting blocks
8 75 for yarn skein supporting rods 76.

1 5. An apparatus according to Claim 4; character-
2 ized in that it comprises a toppler 81 adapted to
3 receive the carriages 66 with their walls lying vertical
4 to topple them over such that their cross wall 69
5 takes a horizontal lay.

1 6. An apparatus according to Claim 5, character-
2 ized in that said toppler 81 comprises a stand 82 includ-
3 ing a pair of brackets 82a rigidly connected, to form a
4 right angle, to an additional bracket pair 82b, said brack-
5 et pairs 82a,82b being located at the same distance apart
6 as said seats provided on the reel 48, and in that said
7 stand 82 is hinge connected to a molding 86 and actuatable,
8 by means of a fluid-dynamic jack 88, between a position
9 where one bracket pair 82a is in a horizontal lay for receiv-
10 ing a carriage 66 and a position where the other bracket
11 pair 82b are aligned to the reel seats to allow the intro-
12 duction of the carriage 66 thereinto after toppling.

1 7. An apparatus according to any of the preceding
2 claims, characterised in that the toppler brackets 82b
3 which are aligned with the reel seats are provided with
4 means for hooking on the latter and with members 60 for
5 actuating the carriage holding means in a position
6 suitable to allow said carriages 66 to be introduced into
7 their respective seats.

1 8. An apparatus for drying textile articles of

2 manufacture, in particular textile yarn skeins,
3 according to one or more of the preceding claims, and
4 substantially as herein described and illustrated
5 for the objects specified.

Fig. 1

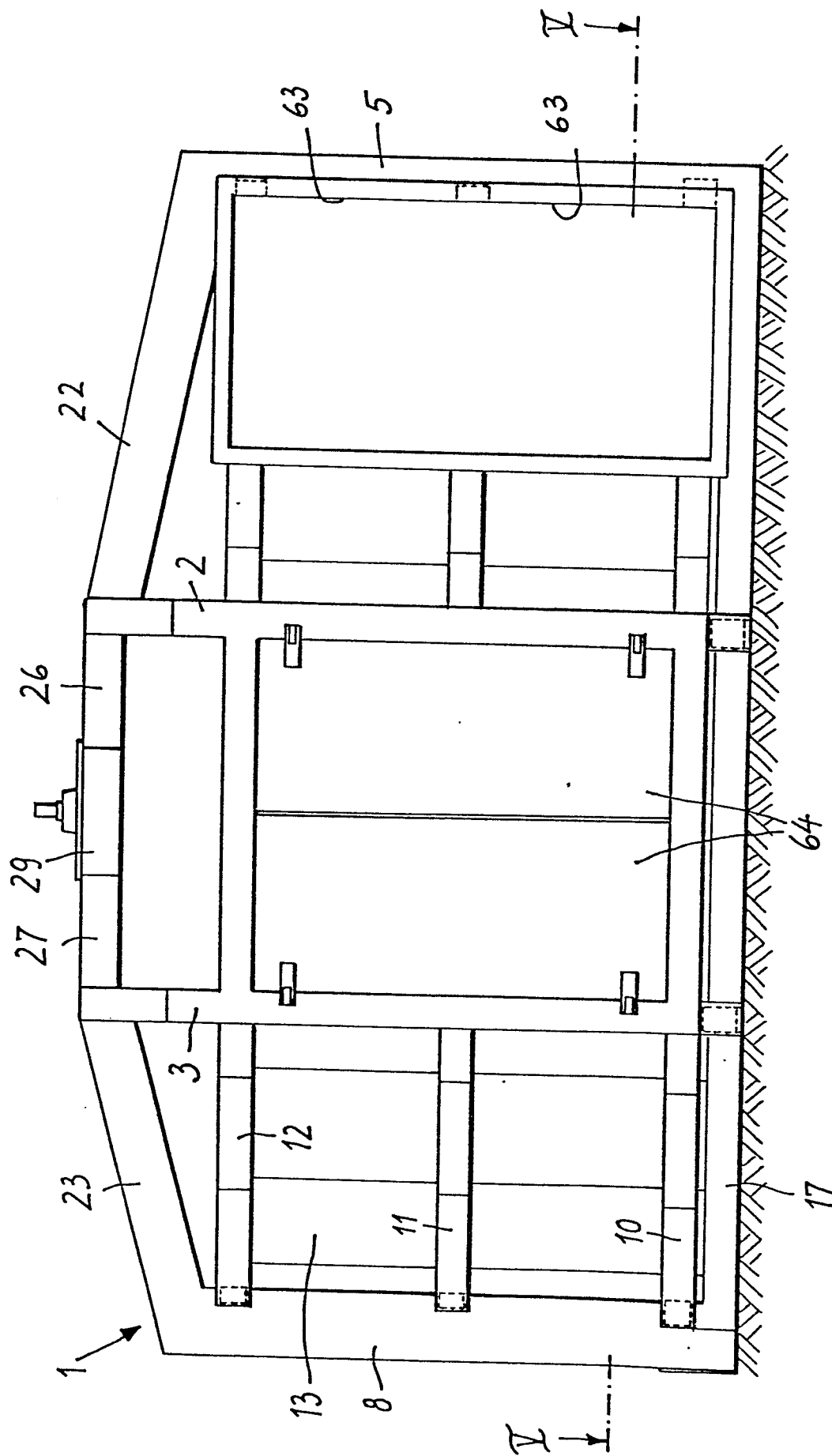


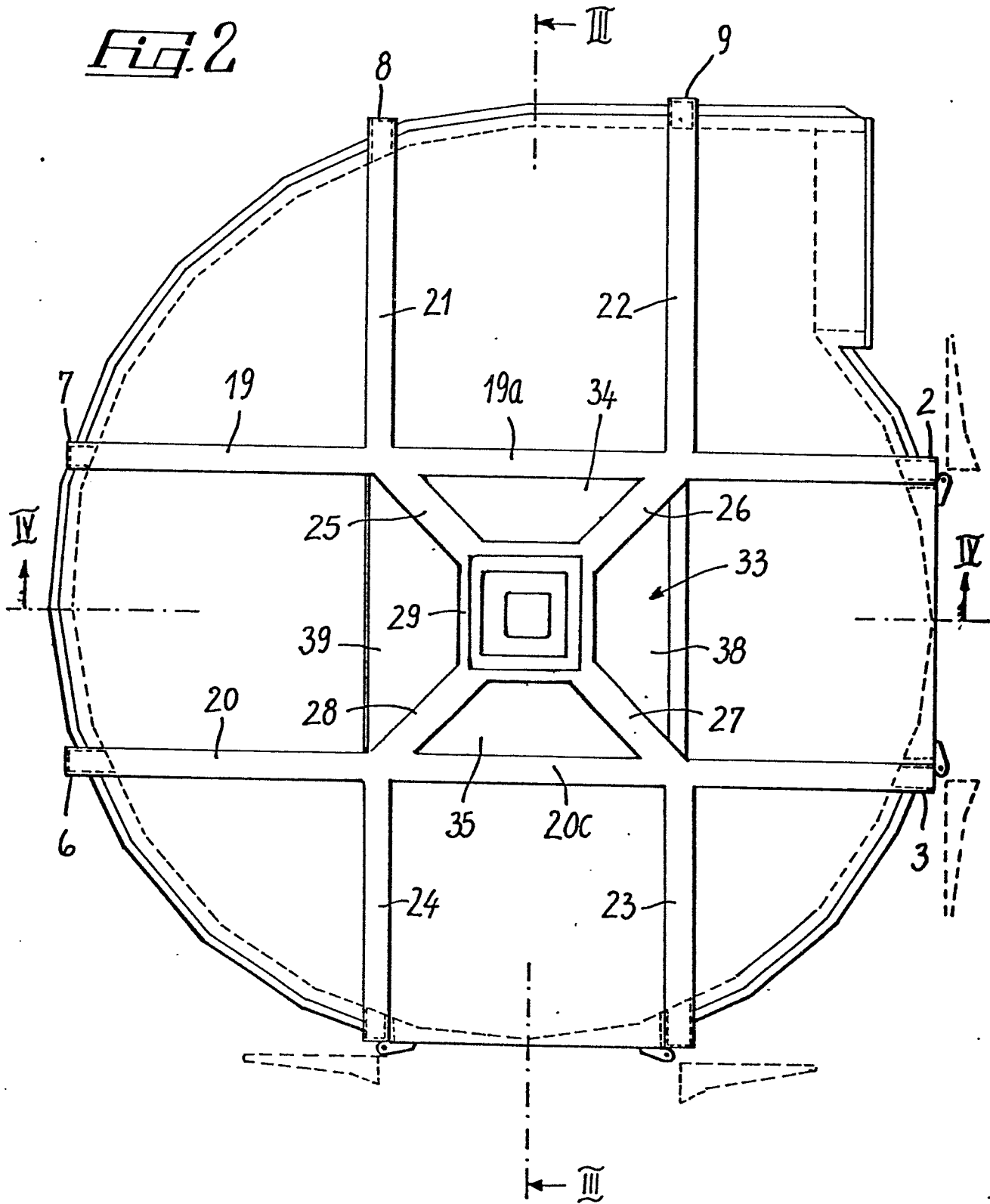
Fig. 2

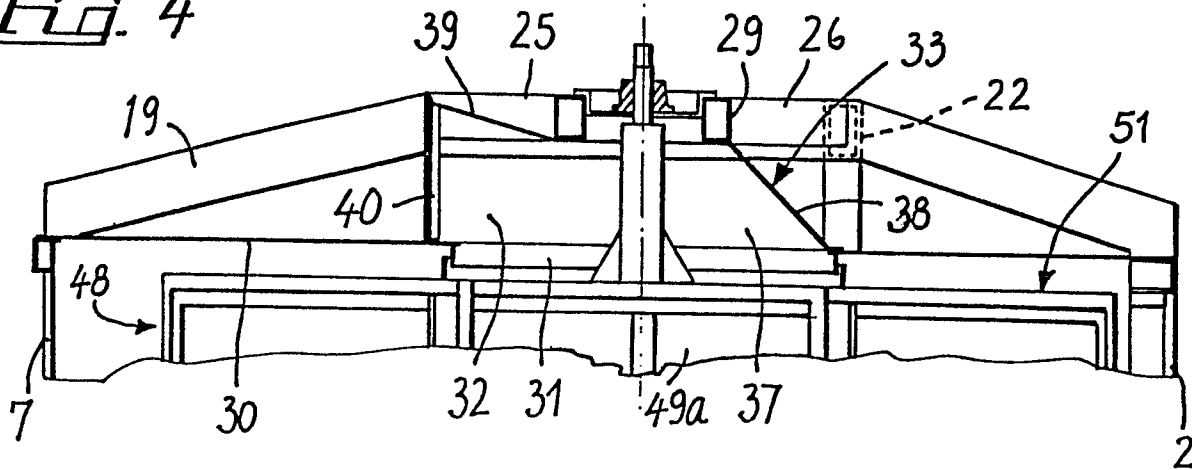
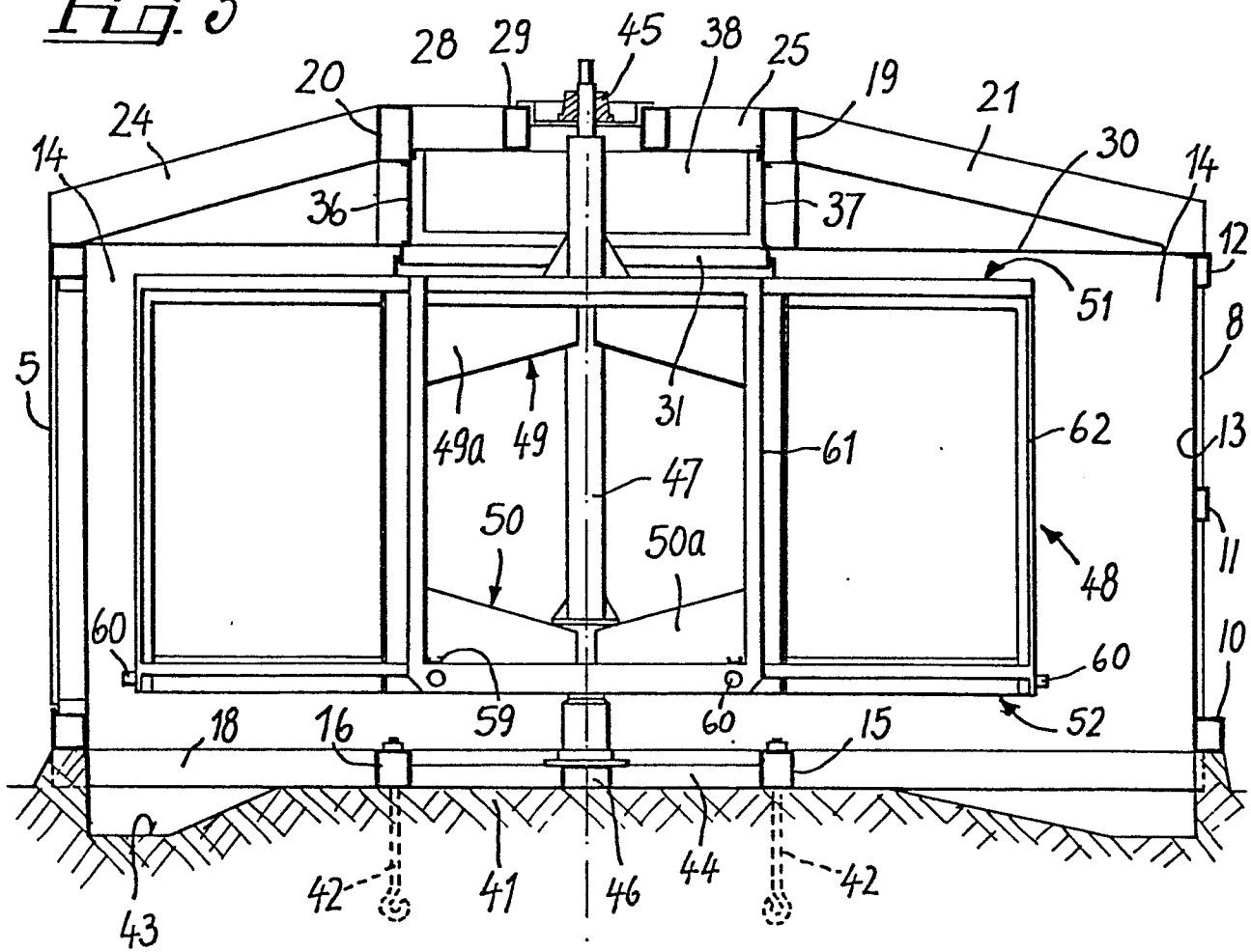
Fig. 4*Fig. 3*

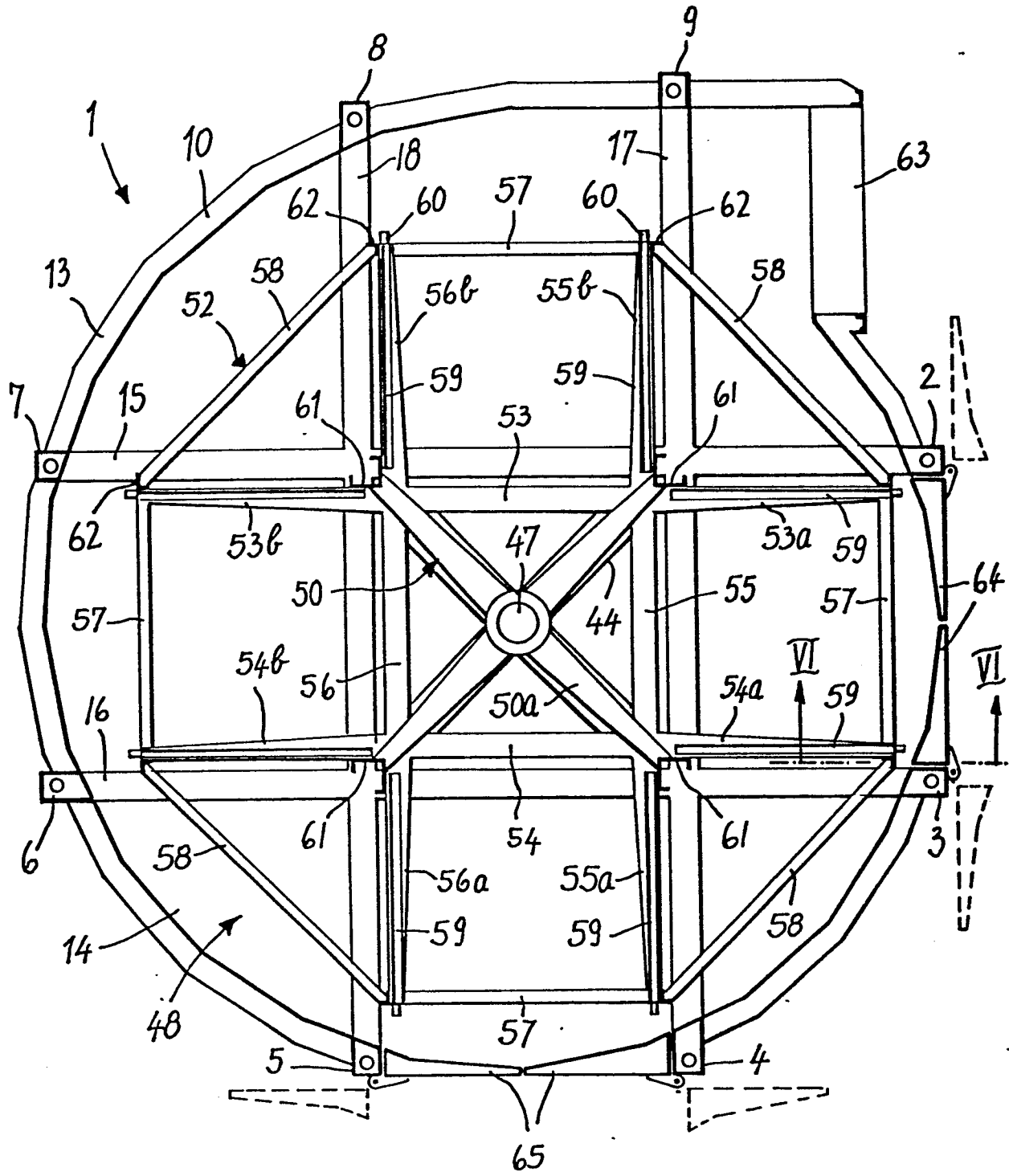
Fig. 5

Fig. 6

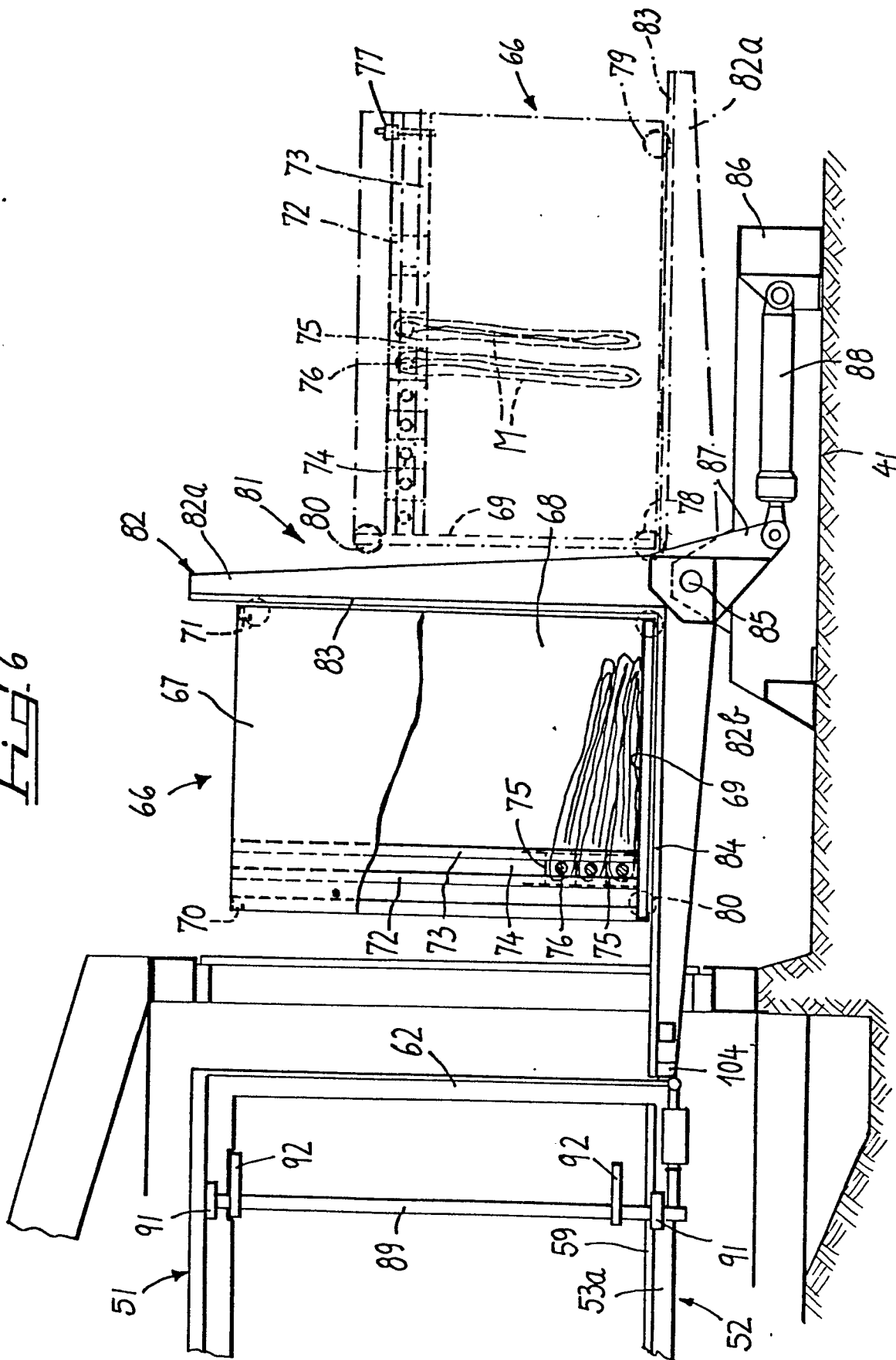


Fig. 7