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(72) Inventor: **Lindström, Göran**
S-184 61 Akersberga (SE)

(74) Representative: **Eriksson, Kjell**
Norrtälje Patentbyrå AB,
P.O.B. 38
761 21 Norrtälje (SE)

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(71) Applicant: **Fromm Holding AG**
Steinhausen/ZG (CH)

(54) **Stretch wrapping machine**

(57) The present invention relates to a stretch wrapping machine comprising a base unit (1) that in active position of the machine is intended to rest upon a foundation, a rotatable turntable (3) arranged upon the base unit (1), a mast (5) arranged upon the base unit (1), said mast (5) supporting a carriage (7) displaceable along the mast (5), said carriage (7) in its turn supporting a stretch film unit (9).

It is significant for the invention that the base unit (1) comprises at least four elements (10-14), each element including a web, said elements (10-14) extending

essentially parallel to each other in the longitudinal direction of the stretch wrapping machine, that adjacent elements (10, 11 and 13, 14 respectively), along the longitudinal edges of the stretch wrapping machine, between themselves define box girder constructions that apart from said elements (10, 11 and 13, 14 respectively) also comprise essentially parallel plates (19, 21 and 15, 23 respectively) being at a distance from each other, said plates being connected with the elements (10, 11 and 13, 14 respectively) in a suitable way, preferably by welding.

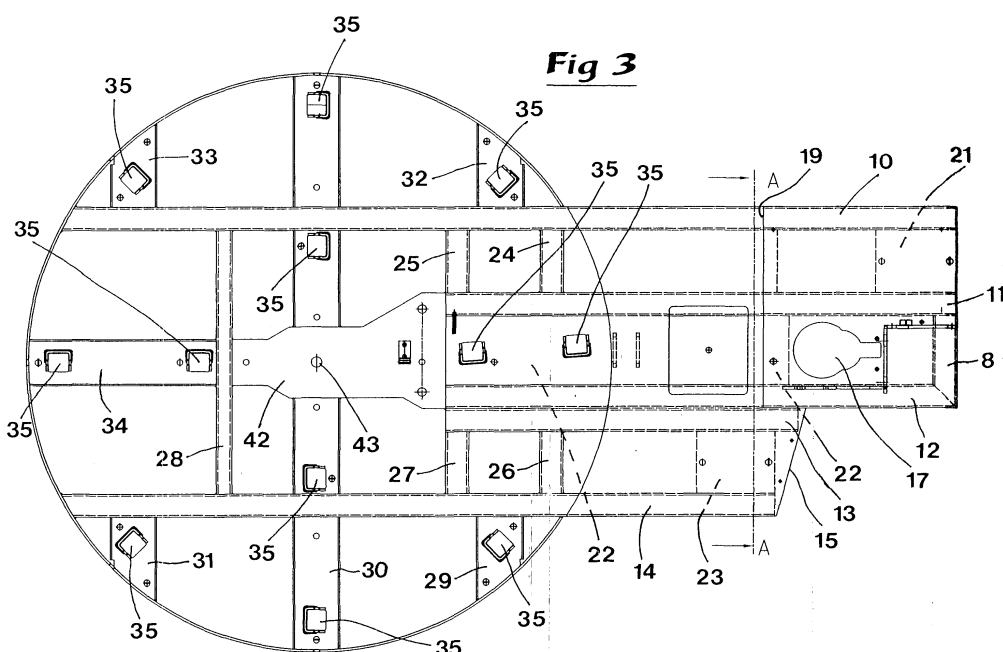


Fig 3

Description

Technical Field of the Invention

[0001] The present invention relates to a stretch wrapping machine comprising a base unit that in active position of the machine is intended to rest upon a foundation, a rotatable turntable arranged upon the base unit, a mast arranged upon the base unit, said mast supporting a carriage displaceable along the mast, said carriage in its turn supporting a stretch film unit.

Prior Art

[0002] The base unit of stretch wrapping machines according to the type defined above is normally designed in such a way that it comprises two square tubes extending in the longitudinal direction of the stretch wrapping machine, said base unit having a certain height. Generally, the height of the base unit should be as small as possible since the goods that is to be wrapped by a stretch film normally is pushed on to the turntable via a ramp, i.e. in principle a gradient plane that constitutes an accessory to stretch wrapping machines of the type in question. On that occasion it is extremely important that the turntable is located as close as possible to the foundation since in this connection each cm is of extremely great importance as regards the force that is required to push the goods up the ramp.

[0003] However, said base unit must also possess a considerable rigidity since on one hand the mast of stretch wrapping machines of the type in question are subjected to considerable loads in connection with handling of the stretch film and on the other hand stretch wrapping machines of the type in question are often transported by means of fork lift trucks, the forks being inserted in the square tubes. The requirement regarding rigidity and accessibility for the forks brings about that the square tubes must have a certain height, thus the requirement regarding the sufficient rigidity and the requirement regarding a low height of the base unit are contradictory. However, the final structural solution must meet both these requirements in the best way.

Objects and Features of the Invention

[0004] A primary object of the present invention is to define a stretch wrapping machine of the type defined above where the base unit has been given as low height as possible.

[0005] A further object of the present invention is that the base unit should have a sufficient rigidity in order to on one hand handle the floating of the mast of the stretch wrapping machine and on the other hand it should be possible to transport the stretch wrapping machine by means of a fork lift truck.

[0006] Still an object of the present invention is that the base unit of the stretch wrapping machine should be

structurally simple.

[0007] At least the primary object of the present invention is realised by means of a stretch wrapping machine of the type defined above that has been given the features of the appending independent claim 1. Preferred embodiments of the invention are defined in the dependent claims.

Brief Description of the Drawings

[0008] Below an embodiment of a stretch wrapping machine according to the present invention will be described, where:

- 15 Figure 1 shows a stretch wrapping machine according to the present invention, said machine being in a position for transport;
- Figure 2 shows the stretch wrapping machine according to figure 1 in operative position, where a piece of goods and the stretch film are indicated schematically;
- 20 Figure 3 shows a top view of the base unit of the stretch wrapping machine according to the present invention;
- 25 Figure 4 shows a section along A-A in figure 3;
- Figure 5 shows a top view of a first plate that is part of the base unit according to figure 3;
- Figure 6 shows a top view of a second plate that is part of the base unit according to figure 3;
- 30 Figure 7 shows a horizontal section through a support roller and its appurtenant holder, said support roller being included in the base unit according to figure 3;
- Figure 8 shows a section along B-B in figure 7;
- 35 Figure 9 shows a side view of the holder of the roller; and
- Figure 10 shows a top view of the holder according to figure 9.

Detailed Description of a Preferred Embodiment of the Stretch Wrapping Machine According to the Present Invention

[0009] The stretch wrapping machine according to the present invention, shown in figures 1 and 2, comprises a base unit 1 that in operative position of the machine is intended to rest upon a foundation, a turntable 3 arranged upon the base unit 1, a mast 5 arranged upon the base unit 1, said mast 5 supporting a carriage 7 displaceable along the mast 5, said carriage 7 in its turn supporting a stretch film unit 9. The mast 5, the carriage 7 and the stretch film unit 9 are not described more in detail since they do not constitute any essential parts of the present invention. In figure 1 the stretch wrapping machine is shown in a position for transport, i.e. the mast 5 is lowered and extends parallel to the base unit 1 while in figure 2 the stretch wrapping machine is shown in operative position, i.e. the mast 5 extends substantially

perpendicular to the base unit 1.

[0010] The base unit 1 is shown in top view in figure 3, i.e. the turntable 3 and the mast 5 are omitted for reasons of clarity. Said base unit 1 comprises a number of square tubes 10, 11, 12, 13, 14, in the disclosed embodiment five, that are essentially parallel to each other and run in the longitudinal direction of the stretch wrapping machine, said square tubes being shown in cross section in figure 4. As is evident from figure 3 the square tubes 10-14 have a varying length, this being the consequence of different structural considerations. As is evident from figure 3 a first transverse square tube 8 extends between the second square tube 11 and the third square tube 12 in the area of the ends of said square tubes 11 and 12 that face away from the turntable 3. In exemplifying and non-restricting purpose it may be mentioned that the square tubes 8 and 10-14 may have an external height of 40 mm, an external width of 60 mm and a material thickness of 5 mm.

[0011] As is evident from figure 4 a first plate 15, being shown separately in figure 5, is attached on top of the square tubes 10-14, said plate 15 preferably being connected to the square tubes 10-14 by means of welding. Said first plate 15 may have a thickness of 5 mm. As is evident from figure 5 the plate 15 is equipped with a recess 16, a first opening 17 and a second opening 18. For information purposes it may be mentioned that the object of the first opening 17 is to make it possible for a sprocket of a drive motor of the turntable 3 to reach sufficient far downwards and that the second opening 18 is arranged for purposes of inspection and service.

[0012] A second plate 19, shown separately in figure 6, is attached on top of the first plate 15, said second plate 19 being suitably connected to said first plate 15 by means of welding, preferably all over welding. The second plate 19 has suitably a thickness of 5 mm and is provided with a third opening 20, which has dimensions that in principle are identical with the dimensions of the first opening 17 of the first plate 15. When mounting the second plate 19 on top of the first plate 15 it is seen to that the first opening 17 and the third opening 20 are located directly opposite each other. As is evident from figure 4 a mast base 5a is attached, preferably welded, on top of the second plate 19, said mast 5 being mounted on the mast base 5a in a suitable way.

[0013] In order to create a space for one of the forks and a sufficient rigid base unit 1 according to the present invention the first and second square tubes 10 and 11 respectively are mutually connected at their bottom by means of a third plate 21 that suitably is welded to the first and second square tubes 10 and 11 respectively. Besides, a fourth plate 22 is attached at the bottom between the second and the third square tube 11 and 12 respectively. Said fourth plate 22 extends from the area of the first opening 17 and the third opening 20 in direction towards the turntable 3 (not shown in figure 3) and a certain distance on the lower side of said turntable 3 corresponding to about 1/4 of the diameter of the turn-

table 3. The object of the fourth plate is primarily to give the base unit 1 a sufficient rigidity. As is evident from figure 4 also a fifth plate 23 is provided at the bottom between the fourth and the fifth square tube 13 and 14 respectively, said fifth plate 23 also suitably being connected to the appurtenant square tubes 13 and 14 respectively by means of welding. The object of the fifth plate 23 is in principle identical with the object of the third plate 21. In exemplifying and non-restricting purpose it may be mentioned that the third and fifth plates 21, 23 may have a thickness of 8 mm while the fourth plate 22 may have a thickness of 4 mm.

[0014] From figure 3 it is evident that the third and fifth plates 21 and 23 respectively only have a relatively small extension in the longitudinal direction of the square tubes 10, 11, 13, 14.

[0015] In the area of the turntable 3 (not shown in figure 3) the first and second parallel, longitudinal square tubes 10 and 11 are mutually connected by means of second and third transverse square tubes 24 and 25 respectively and the fourth and fifth parallel, longitudinal square tubes 13 and 14 respectively mutually connected by means of fourth and fifth transverse square tubes 26 and 27 respectively. Further away towards the ends of the first and fifth square tubes 10 and 14 respectively, facing away from the mast 5, said square tubes being mutually connected by means of a sixth transverse square tube 28. These square tubes 24-28 are suitably connected to the appurtenant longitudinal parallel square tubes 10, 11, 13, 14 by means of welding.

[0016] In the area of the turntable 3 (not shown in figure 3) the base unit 1 comprises a number of U-profiles 29-34 that support support rollers 35, see figures 7 and 8, that in their turn support the turntable 3 (not shown in figure 3). The U-profiles 29-34 are arranged in a pattern that distributes the support rollers 35 relatively even over the surface defined by the turntable 3. One U-profile 34 extends parallel to the parallel, longitudinal square tubes 10-14 while the rest of the U-profiles 29-33 extend transverse to the parallel, longitudinal square tubes 10-14. The U-profiles 29-34 are suitably connected to the parallel, longitudinal square tubes 10-14 and the transverse square tubes 24-28 by means of welding. Each U-profile 29-34 accommodates at least one support roller 35 with its appurtenant holder. Such as support roller 35, with its appurtenant holder 36, is shown in detail in figures 8-10. The holder 36 is fixed relative to the appurtenant U-profile 29-34 by having tongues 37 of the holder 36 received and welded in holes (not shown) of the appurtenant U-profile 29-34. On the outside of the holder 36 a clamp 38 is provided, said clamp 38 fixing a shaft 39 of the support roller 35 in the holder 36. As is shown in figure 7 bearings 40 are provided between the shaft 39 and the support roller 35.

[0017] From figure 8 it is evident that an opening 41 is arranged in the bottom of the U-profile 29-34 below each support roller 35. By the arrangement of said opening 41 it is possible to lower the support roller 35 closer

to the foundation that the base unit 1 rests upon, i.e. the height of the turntable 3 above the foundation is reduced compared to conventional turntables. As is evident from figure 8 there must however be a certain play between the support roller 35 and the foundation that the U-profile 29-34 of the base unit 1 rests upon.

[0018] In the middle of the portion of the base unit 1 that supports the turntable 3 a centre plate 42 is provided, said centre plate 42 inter alia supporting a spigot 43 upon which the turntable 3 is rotatably journaled. Said centre plate 42 is in a suitable way, preferably by means of welding, connected to the adjacent square tubes 11, 12, 28 and the U-profile 30. The turntable 3 is thus supported by the support rollers 35 and rotated by a not shown arrangement that normally comprises an endless chain or transmission belt that is driven by an electric motor.

[0019] The above-described base unit 1 according to the present invention is generally 20-30 mm lower than prior art base units of stretch wrapping machines of the type in question. In the embodiment described above of a stretch wrapping machine according to the present invention the turntable is located at a height of about 55 mm from the foundation that the base unit 1 rests upon. The low height of the turntable 3 has been achieved by having the base unit 1 according to the present invention comprising a number of square tubes 10-14 having relatively low height. In order to provide a sufficient rigidity of the base unit 1 two intermediate and adjacent each other located square tubes 11, 12 are included in a box girder construction, see figure 4, that besides said second and third square tubes 11, 12 also includes a part of the first plate 15, i.e. the part located between the second and third square tubes 11 and 12 respectively and the fourth plate 22. As an extra bonus also a part of the second plate 19 is included, see figure 4, in the box girder construction mentioned above, i.e. the part of the second plate 19 that is located between the second and third square tubes 11 and 12 respectively and arranged on top of the first plate 15. By having said first and second plates 15 and 19 respectively mutually connected, preferably by welding, they cooperate in an excellent way when carrying bending stresses on the base unit 1.

[0020] Also the first and second square tubes 10 and 11 respectively are included in a box girder construction, see figure 4, where the second plate 19 and the third plate 21 are included in said box girder construction. In the corresponding way also the fourth and fifth square tubes 13 and 14 respectively are included in a box girder construction see figure 4, together with a part of the first plate 15 and the fifth plate 23.

[0021] If figure 4 is studied in detail it is evident that the distance between the second plate 19 and the third plate 21 is larger than the distance between the first plate 15 and the fifth plate 23. It is at once realised that the difference between said distances corresponds to the thickness of the first plate 15. When studying figure 3 it is evident that the space between the second plate

19 than the third plate 21 is located further to the right in figure 3 than the space between the first plate 15 and the fifth plate 23. The reason for this is that thereby a surface is created to the right of the first plate 15 and the fifth plate 23 in figure 3 where the film stretching unit 9 may be displaced directly adjacent to the foundation of the base unit 1 without interfering with the base unit 1. The above-mentioned spaces between the plates 15, 23 and 19, 21 respectively are especially designed to receive forks of fork lift trucks, by which stretch wrapping machines of the type in question may be transported. By this structural arrangement of the above discussed spaces it is realised that a larger length of the appurtenant fork will be received in the space between the second plate 19 and the third plate 21 than in the space between the first plate 15 and the fifth plate 23. Thereby, the necessary spaces for the forks have been made as small as possible without risking a proper handling of the stretch wrapping machine by means of a fork lift truck. In exemplifying and non-restricting purpose it may be stated that the distance between the second plate 19 and the third plate 21 is at least 37 mm and that the distance between the first plate 15 and the fifth plate 23 is at least 32 mm. The reason for this difference as regards the height of the spaces in question is that the forks have a height that declines towards the tip.

Feasible Modifications of the Invention

[0022] According to the embodiment described above the base unit 1 is also provided with an intermediate box girder construction, i.e. the box girder construction including the square tubes 11 and 12. However, within the scope of the present invention it is feasible to have an alternatively designed intermediate portion of the base unit. In exemplifying and the non-restricting purpose it may be mentioned that said intermediate portion, at least along a certain portion of its length, may include further square tubes that cooperate with the adjacent square tubes in a different way than through a box girder construction.

[0023] In the embodiment described above it has been stated that the elements included in the base unit suitably are connected to each other by means of welding. However, within the scope of the present invention it is also feasible that at least certain of the connections between elements included in the base unit are effected in an alternative way. In exemplifying and non-restricting purpose screw joints may be mentioned.

[0024] In the embodiment described above a number of square tubes 8, 10-14, 24-34 are included in the base unit 1. However, within the scope of the invention it is also feasible that at least certain of these square tubes constitute other elements having a web, said elements being load-carrying in connection with operation or handling of the stretch wrapping machine. These elements, having a web, may in a corresponding way as the square tubes be included in box girder constructions.

Claims

1. A stretch wrapping machine comprising a base unit (1) that in active position of the machine is intended to rest upon a foundation, a rotatable turntable (3) arranged upon the base unit (1), a mast (5) arranged upon the base unit (1), said mast (5) supporting a carriage (7) displaceable along the mast (5), said carriage (7) in its turn supporting a stretch film unit (9), **characterized** in that the base unit (1) comprises at least four elements (10-14), each element including a web, said elements (10-14) extending essentially parallel to each other in the longitudinal direction of the stretch wrapping machine, that adjacent elements (10, 11 and 13, 14 respectively), along the longitudinal edges of the stretch wrapping machine, between themselves define box girder constructions that apart from said elements (10, 11 and 13, 14 respectively) also comprise essentially parallel plates (19, 21 and 15, 23 respectively) being at a distance from each other, said plates being connected with the elements (10, 11 and 13, 14 respectively) in a suitable way, preferably by welding, and that the box girder constructions, when necessary, function as receiving spaces for lifting forks. 5 10 15 20 25
2. A stretch wrapping machine according to claim 1, **characterized** in that adjacent elements (11, 12), in an intermediate, longitudinal portion of the stretch wrapping machine, between themselves define a box girder construction that apart from said elements (11, 12) also comprises essentially parallel plates (15, 22) that are connected to the elements (11, 12) in a suitable way, preferably by welding. 30 35
3. A stretch wrapping machine according to claims 1 or 2, **characterized** in that the elements (10-14) extend below the turntable (3), at least a distance corresponding to 1/4 of the diameter of the turntable (3). 40
4. A stretch wrapping machine according to any of the previous claims, **characterized** in that the distance between the parallel plates (19, 21 and 15, 23 respectively) is of the same magnitude as the height of the elements (10-14) that each includes a web. 45
5. A stretch wrapping machine according to any of the previous claims, **characterized** in that the distance between the plates (19, 21) that belong to the elements (10, 11) along one longitudinal edge is larger than the distance between the plates (15, 23) that belong to the elements (13, 14) along the other longitudinal edge. 50 55
6. A stretch wrapping machine according to any of the previous claims, **characterized** in that the base unit (1) comprises five elements (10-14), each including a web.
7. A stretch wrapping machine according to any of the previous claims, **characterized** in that the base unit (1) comprises a number of further elements (8, 24-28), each including a web, that extend transverse to the elements (10-14) running in the longitudinal direction of the stretch wrapping machine, and that said further elements (8, 24-28) are connected to the elements (10-14) running in the longitudinal direction, preferably by welding.
8. A stretch wrapping machine according to claim 7, **characterized** in that a majority of the transverse elements (24-28) are arranged in connection with the turntable (3).
9. A stretch wrapping machine according to any of the previous claims, **characterized** in that at least certain of the elements, each including a web, constitute square tubes.
10. A stretch wrapping machine according to any of the previous claims, said base unit (1) comprising a number of profiles (29-34) supporting a number of rotatable support rollers (35), **characterized** in that in the area of each support roller (35) an opening (41) being provided, and that said support rollers (35) extend into the opening (41) a distance corresponding to a portion of the material thickness of said profiles (29-34).

Fig 1

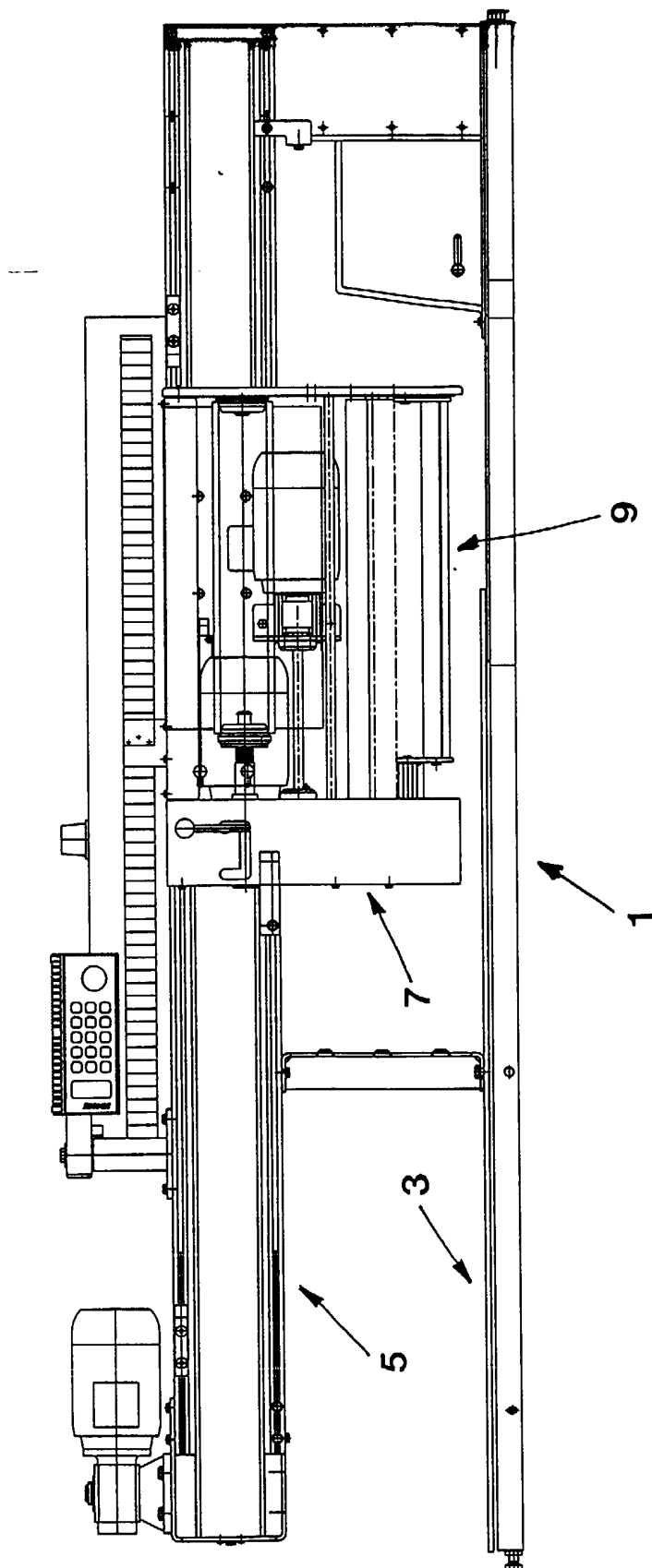
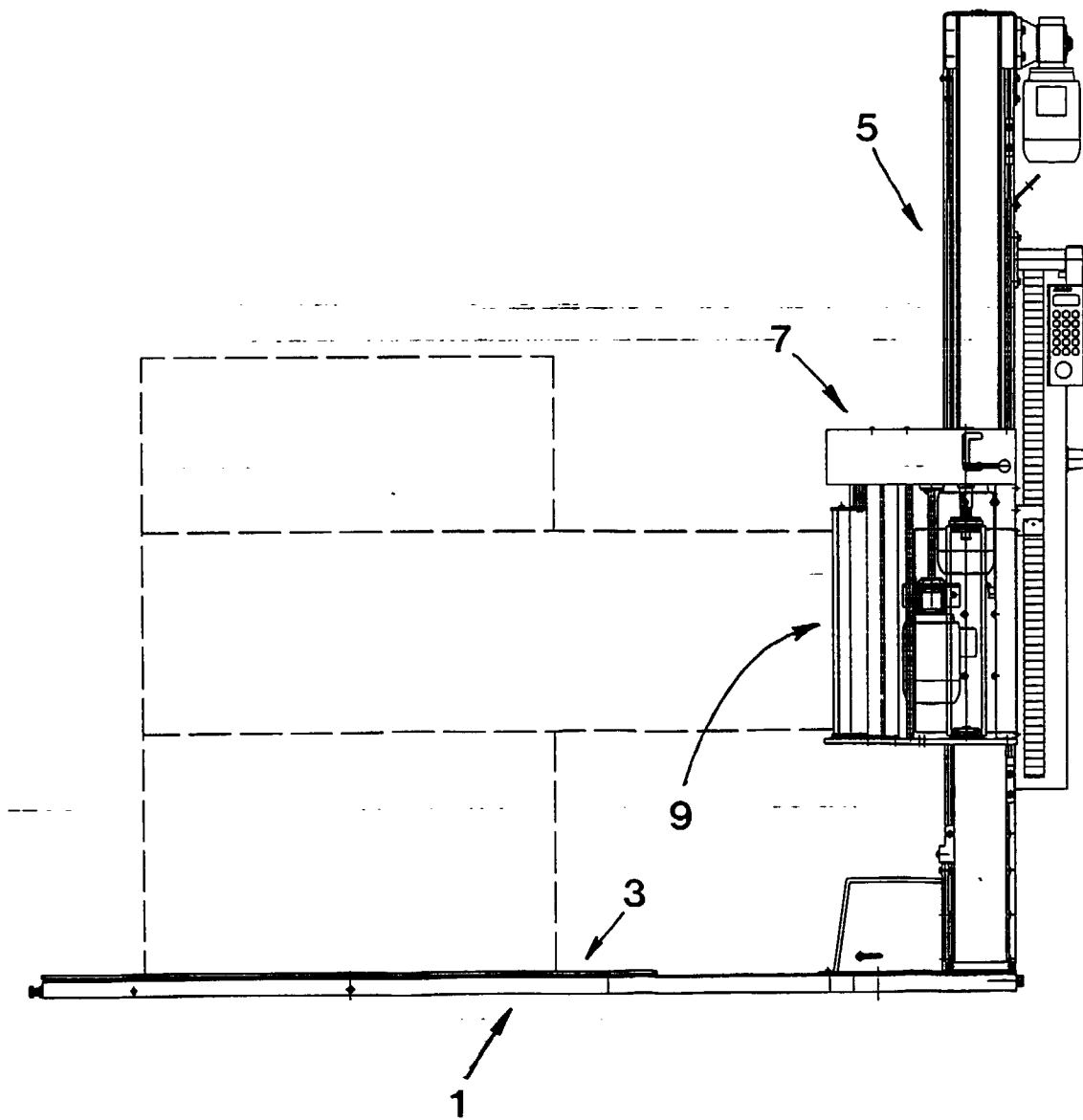


Fig 2



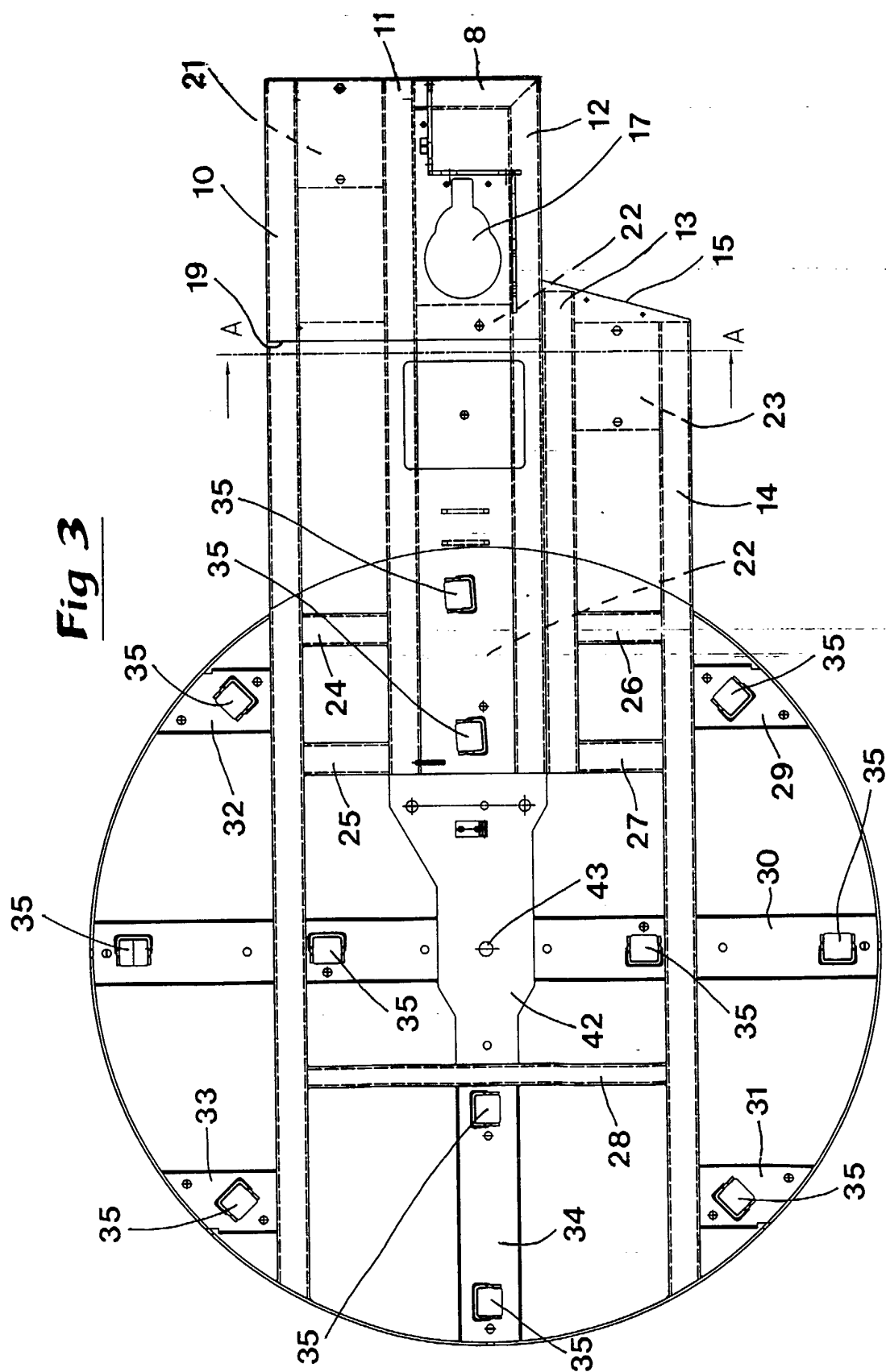


Fig 4

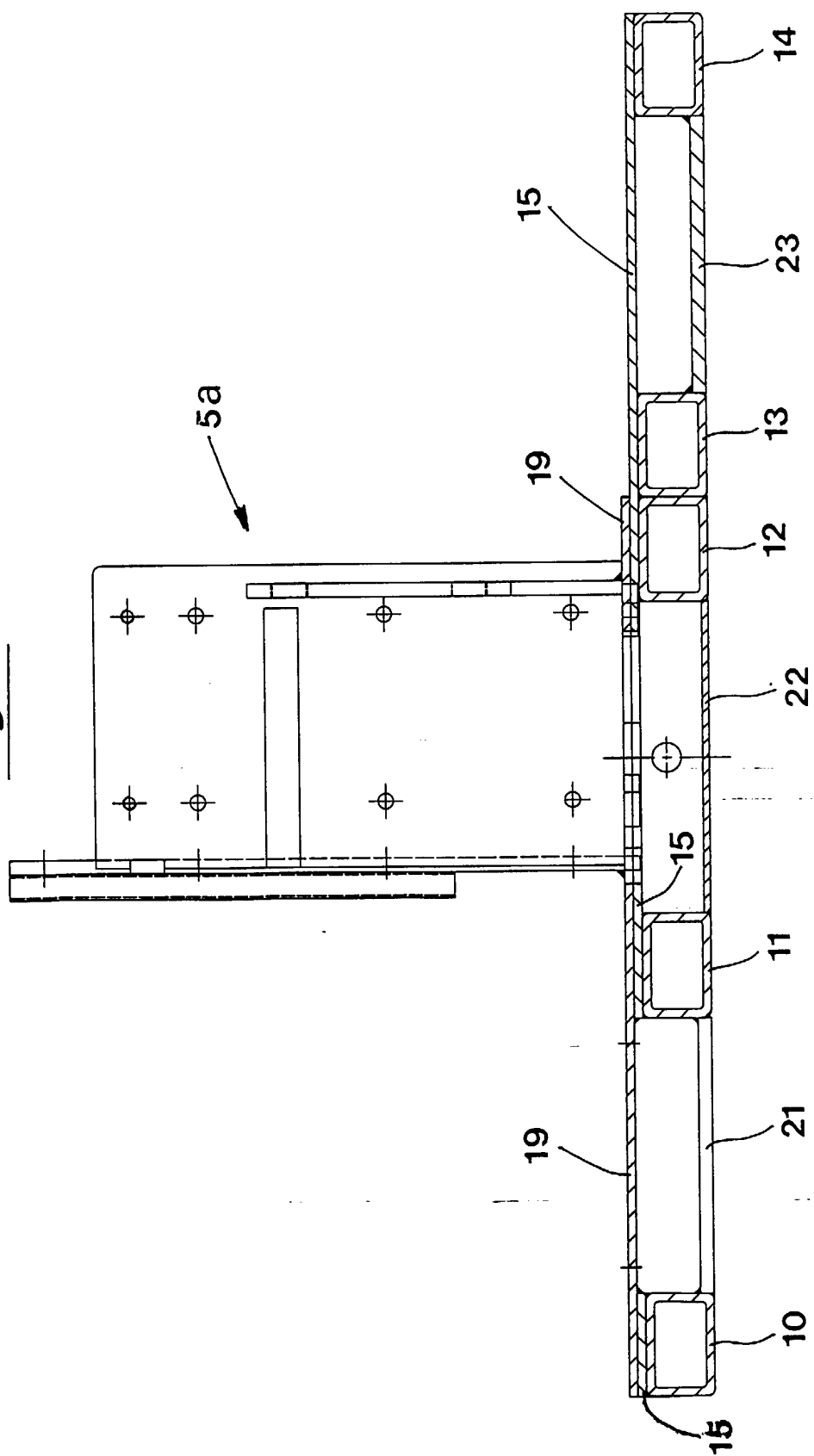


Fig 5

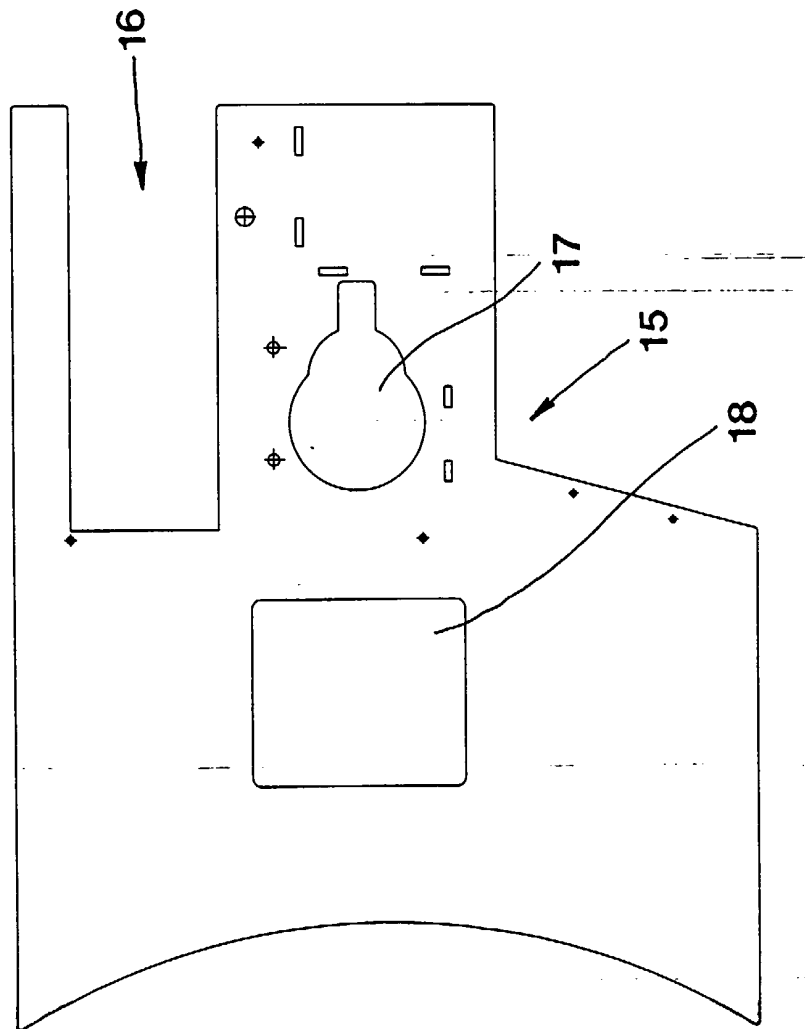


Fig 6

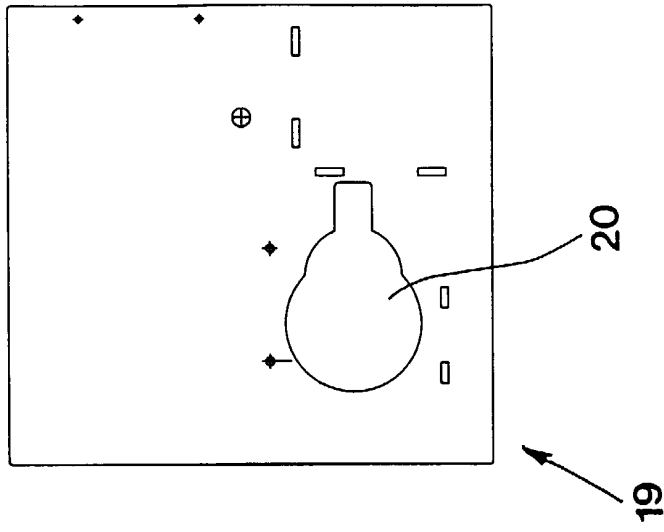


Fig 8

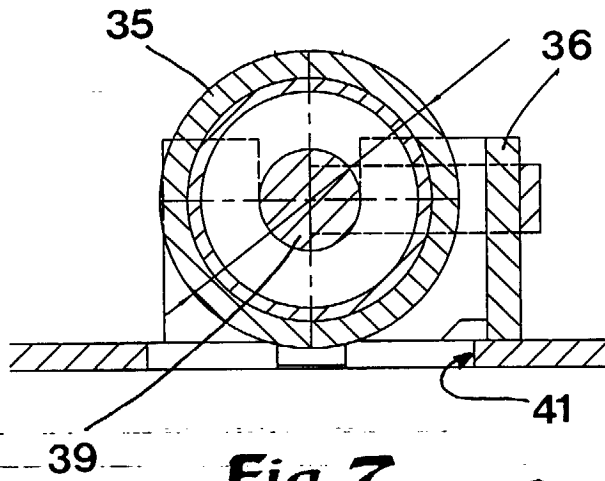


Fig 7

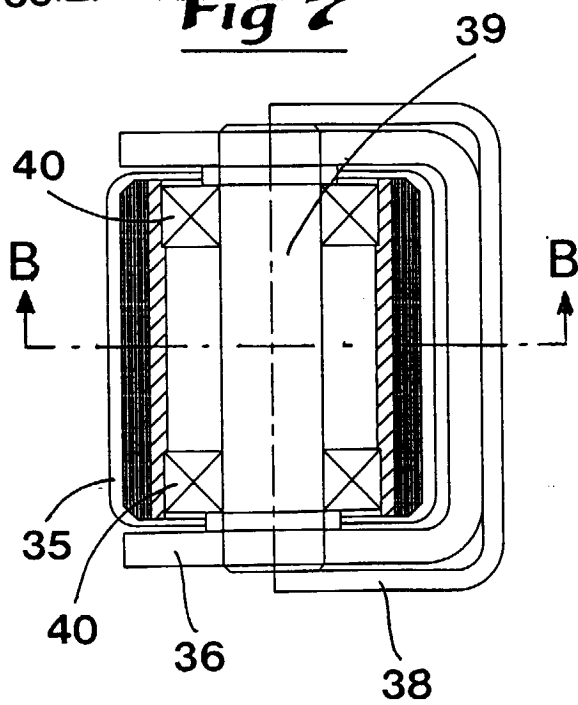


Fig 9

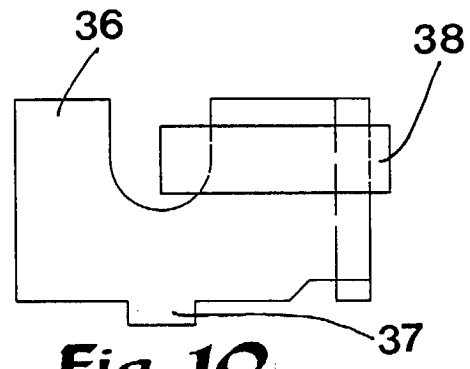


Fig 10

