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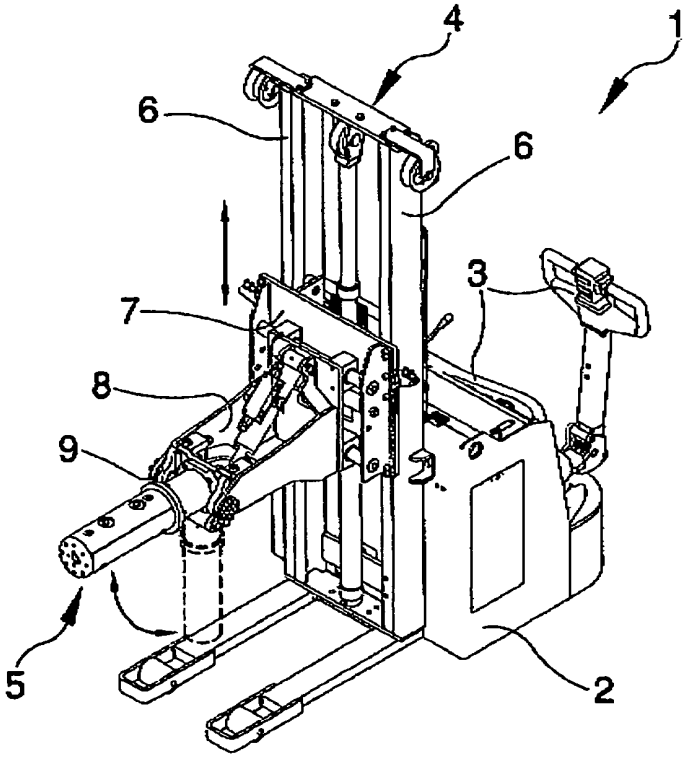
(54) **Elevating machine for lifting reels**

(57) The elevating machine for lifting reels or the like comprises a base frame moving on the ground having lifting means for lifting a grip unit for gripping a reel.

The grip unit comprises a liner that can be fitted in the sleeve of the reel, attachment means for attaching to the inner surface of the sleeve that are associated with the liner, and detection means for detecting the position of the sleeve.

Fig. 1



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Description

[0001] The present invention relates to an elevating machine for lifting reels in sheets or the like.

[0002] It is known that reels of film in sheets consist of a film, made of material that differs according to the intended use, which is wound around a hollow sleeve of mainly cylindrical shape.

[0003] Depending on the size of the sleeve, on the type of material making up the film and on the number of windings of the film around the sleeve, the reels can reach dimensions that are very different the one from the other.

[0004] In numerous industrial fields, for example, the overall dimensions and the weight of the reels is such as to make very inconvenient or completely rule out the possibility of handling them manually; in these cases the use has to be made of special types of fork-lift trucks used to lift, overturn and transport the reels.

[0005] Such trucks usually consist of a motorised base frame having a reel grip unit and a grip unit lifting and overturning system.

[0006] The grip unit usually consists of an elongated cylindrical liner that can be fitted axially inside the sleeve and which has side walls extensible in a radial direction so as to grip the inner surface of the sleeve.

[0007] The lifting and overturning system on the other hand consists of a vertical structure along which slides a slide that supports a horizontal support arm for supporting the grip unit.

[0008] Between the horizontal arm and the grip unit, rotating means are placed that permit turning the grip unit between a vertical and a horizontal position.

[0009] During use, the reels to be handled are usually placed resting on one side and the axis of the sleeve is arranged vertically; during the reel gripping phase, therefore, the grip unit is positioned vertically above the reel, is aligned coaxially with the sleeve and is then fitted in the sleeve by the lowering of the slide along the vertical structure of the fork-lift truck.

[0010] Once the sleeve has been gripped by means of the extension of the side walls of the cylindrical liner, the grip unit can be easily lifted to move the reel off the ground and, if necessary, return it to horizontal position, so as to allow 90° overturning of the reel.

[0011] These fork-lift trucks of known type have a number of drawbacks.

[0012] In particular, the fact is underlined that the operation of aligning the grip unit with the axis of the sleeve is not always simple and easy.

[0013] Often, in fact, taking into account the large size of the reels that have to be handled, the operator at the controls of the truck has only partial and/or completely obstructed visibility at the centring opening defined by the reel sleeve.

[0014] These problems are particularly felt in the case of reels stacked the one on the other or placed on high shelves, because the centring opening of the reels positioned at a considerable distance off the ground could be arranged higher up with respect to the height of the operator and thus be impossible to see.

[0015] In such circumstances, it is usually necessary to make use of the services of a supplementary operator who, standing in elevated position, provides the operator driving the fork-lift truck with the instructions needed in order to align the grip unit with the reel sleeve.

[0016] This, obviously, results in higher costs of labour and management of hired personnel.

[0017] To avoid such drawbacks furthermore, the reels can be positioned at a limited height, so that the operator driving the fork-lift truck can see them without leaving his/her place of work; such solution, however, represents a strong limitation to the exploitation of the available storage space, with consequent costs due to failure to make use of such space.

[0018] The main aim of the present invention is to provide an elevating machine for lifting reels or the like that can be used in a practical and easy way even by just one operator and which, at the same time, allows rationally exploiting the space available in the store, permitting the positioning of the reels in stacks or on shelves.

[0019] A further object of the present invention is that it is particularly attractive from an economic viewpoint, and permits a big cut in labour management costs and/or storage costs.

[0020] Another object of the present invention is to provide an elevating machine for lifting reels or the like that allows overcoming the above-mentioned drawbacks of prior art within the ambit of a simple, rational and low-cost solution.

[0021] The above objects are all achieved by this elevating machine for lifting reels or the like, comprising at least a base frame moving on the ground having lifting means for lifting a grip unit for gripping at least one reel, said grip unit comprising a liner that can be fitted in the sleeve of said reel and attachment means for attaching to the inner surface of said sleeve that are associated with said liner, characterized in that said grip unit comprises detection means for detecting the position of said sleeve.

[0022] The above objects are all achieved also by the present grip unit for lifting reels or the like on elevating machines, comprising a liner that can be fitted on an elevating machine and that can be inserted in the sleeve of a reel to be gripped, and attachment means for attaching to the inner surface of said sleeve which are associated with said liner, characterized in that it comprises detection means for detecting the position of said sleeve.

[0023] Further characteristics and advantages of the present invention will appear even more evident from the detailed description of a preferred, but not exclusive, embodiment of an elevating machine for lifting reels or the like, illustrated by way of non limiting example in the accompanying drawings, wherein:

figure 1 is a perspective view of the machine according to the invention;

figure 2 is a perspective view of the machine according to the invention in the lifting phase of a reel;
figure 3 is a perspective view of the grip unit according to the invention in retracted configuration;
figure 4 is a perspective view of the grip unit according to the invention in extended configuration;
figure 5 is a section view along an axial plane of the grip unit according to the invention in retracted configuration;
figure 6 is a section view along an axial plane of the grip unit according to the invention in extended configuration;
figure 7 is a section view along the trace plane VII - VII of figure 6.

[0024] With special reference to such figures, the reference numeral 1 globally designates an elevating machine for lifting reels or the like.

[0025] The machine 1 comprises a base frame 2 which has wheels for movement on the ground, not shown in the illustrations, and a driving and control post 3 for an operator.

[0026] The base frame 2 also has lifting means 4 for lifting a grip unit 5 suitable for gripping and releasing a reel B of film in sheets.

[0027] The lifting means 4 are of the type of a structure of vertical uprights 6 along which slides a slide 7 that supports a horizontal support arm 8 supporting the grip unit 5; between the horizontal arm 8 and the grip unit 5 are placed rotation means 9 that allow turning the grip unit 5 between a vertical and a horizontal position.

[0028] The grip unit 5 comprises a liner 10 which can be fitted axially inside the sleeve M of the reel B; this has an elongated cylindrical conformation and a connection end 11 connecting it to the lifting means 4 and a free end 12 opposite the connection end 11.

[0029] To the liner 10 are associated attachment means 13 to the inner surface of the sleeve M.

[0030] In detail, the attachment means 13 comprise a plurality of contact elements 14, of the curvilinear plate type arranged around the liner 10 and moving crossways with respect to the longitudinal axis of the liner 10 between a retracted configuration, in which the plates 14 are arranged close to the liner 10, and an extended configuration, in which the plates 14 are arranged away from the liner 10.

[0031] Inside the liner 10 a piston 15 is arranged sliding longitudinally and suitable for operating the plates 14 transversally.

[0032] The outer side surface of the piston 15, in fact, has a series of surfaces 16 sloped with respect to the axial direction, on which slide corresponding wedges 17 that support the plates 14.

[0033] The coupling between the sloped surfaces 16 and the wedges 17, in point of fact, permits transforming the axial movement of the piston 15 into the radial movement of the plates 14.

[0034] Advantageously, the grip unit 5 comprises detection means 18 for detecting the position of the sleeve M of the reel B.

[0035] Such detection means are of the optical type and involve a camera 19 fitted inside the liner 10 close to the free end 12.

[0036] In detail, at the free end 12 the liner 10 has a support flange 20 for supporting the camera 19, which has an open centre portion 21 onto which faces the lens of the camera 19.

[0037] Close to the free end 12, furthermore, the piston 15 has an end section 22 having a housing seat 23 for the camera 19; the presence of the housing seat 23, in point of fact, permits an excellent integration of the camera 19 inside the liner 10, exploiting to the utmost the available room and preventing awkward limitations of the stroke of the piston 15.

[0038] Usefully, the detection means 18 comprise reproduction means for reproducing the images taken by the camera which, for example, consist of a monitor, not shown in the illustrations, which is fitted to the base frame 2 at the driving and control post 3.

[0039] It has in fact been ascertained how the described invention achieves the proposed objects.

[0040] It must be underlined in fact that the presence of a camera fitted at the free end of the grip unit allows the operator to operate the elevating machine in a practical, easy and independent way, meaning without the aid of other operators.

[0041] By means of the camera and the monitor connected to it, the operator controlling the movement of the elevating machine is able to see the entrance of the sleeve to be gripped even when the reel is arranged in raised position, on shelving or on a stack of other reels.

[0042] It should also be noted that the particular simplicity and considerable functionality of the grip unit according to the invention are such as to allow not only their fitting on newly-made elevating machines, but also installation on elevating machines already made and in use, thus also permitting their marketing as highly practical and affordable separate accessories.

[0043] The invention thus conceived is susceptible to numerous modifications and variations, all of which falling within the scope of the inventive concept.

[0044] Furthermore all the details can be replaced with others that are technically equivalent.

[0045] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements without because of this moving outside the protection scope of the following claims.

Claims

1. Elevating machine for lifting reels or the like, comprising at least a base frame moving on the ground having lifting means for lifting a grip unit for gripping at least one reel, said grip unit comprising a liner that can be fitted in the sleeve of said reel and attachment

means for attaching to the inner surface of said sleeve that are associated with said liner, **characterized in that** said grip unit comprises detection means for detecting the position of said sleeve.

2. Machine according to claim 1, **characterized in that** said detection means are of the optical type.

3. Machine according to one or more of the preceding claims, **characterized in that** said detection means comprise at least one camera.

4. Machine according to one or more of the preceding claims, **characterized in that** said detection means comprise reproduction means for reproducing the images taken by said camera which are associated to said base frame.

5. Machine according to one or more of the preceding claims, **characterized in that** said reproduction means for reproducing the images are fitted to said base frame at the driving and control post for one operator.

6. Machine according to one or more of the preceding claims, **characterized in that** said liner has a substantially elongated shape and has a connection end to said lifting means and a free end opposite said connection end.

7. Machine according to one or more of the preceding claims, **characterized in that** said attachment means comprise at least one contact element moving crossways with respect to said liner and at least one piston sliding longitudinally in said liner and suitable for operating said contact element transversally.

8. Machine according to one or more of the preceding claims, **characterized in that** said detection means are fitted in said liner.

9. Machine according to one or more of the preceding claims, **characterized in that** said detection means are fitted at said free end.

10. Machine according to one or more of the preceding claims, **characterized in that** at said free end said liner has a support flange for supporting said detection means.

11. Machine according to one or more of the preceding claims, **characterized in that** said support flange has an open portion onto which said detection means face.

12. Machine according to one or more of the preceding claims, **characterized in that** said piston has an end section which is arranged close to said free end and has a housing seat for said detection means.

13. Grip unit for lifting reels or the like on elevating machines, comprising a liner that can be fitted on an elevating machine and that can be inserted in the sleeve of a reel to be gripped, and attachment means for attaching to the inner surface of said sleeve which are associated with said liner, **characterized in that** it comprises detection means for detecting the position of said sleeve.

14. Grip unit according to claim 13, **characterized in that** said detection means are of the optical type.

15. Grip unit according to one or more of the claims 13 and 14, **characterized in that** said detection means comprise at least one camera.

16. Grip unit according to one or more of the claims 13 to 15, **characterized in that** said detection means comprise reproduction means for reproducing the images taken by said camera which can be associated to said elevating machine.

17. Grip unit according to one or more of the claims 13 to 16, **characterized in that** said reproduction means for reproducing the images are fitted to said elevating machine at the driving and control post for one operator.

18. Grip unit according to one or more of the claims 13 to 17, **characterized in that** said liner has a substantially elongated shape and has a connection end to said elevating machine and a free end opposite said connection end.

19. Grip unit according to one or more of the claims 13 to 18, **characterized in that** said attachment means comprise at least one contact element moving crossways with respect to said liner and at least one piston sliding longitudinally in said liner and suitable for operating said contact element transversally.

20. Grip unit according to one or more of the claims 13 to 19, **characterized in that** said detection means are fitted in said liner.

21. Grip unit according to one or more of the claims 13 to 20, **characterized in that** said detection means are fitted at said free end.

22. Grip unit according to one or more of the claims 13 to 21, **characterized in that** at said free end said liner has a support flange for supporting said detection means.

23. Grip unit according to one or more of the claims 13

to 22, **characterized in that** said support flange has an open portion onto which said detection means face.

24. Grip unit according to one or more of the claims 13 to 23, **characterized in that** said piston has an end section which is arranged close to said free end and has a housing seat for said detection means.

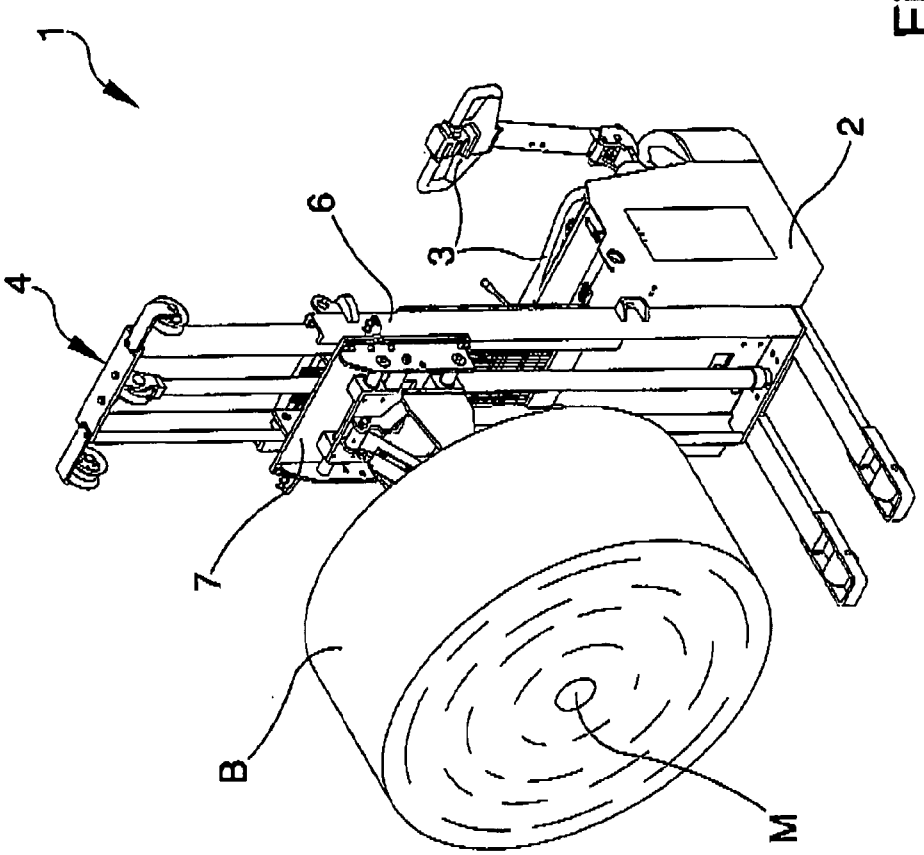

Fig. 2

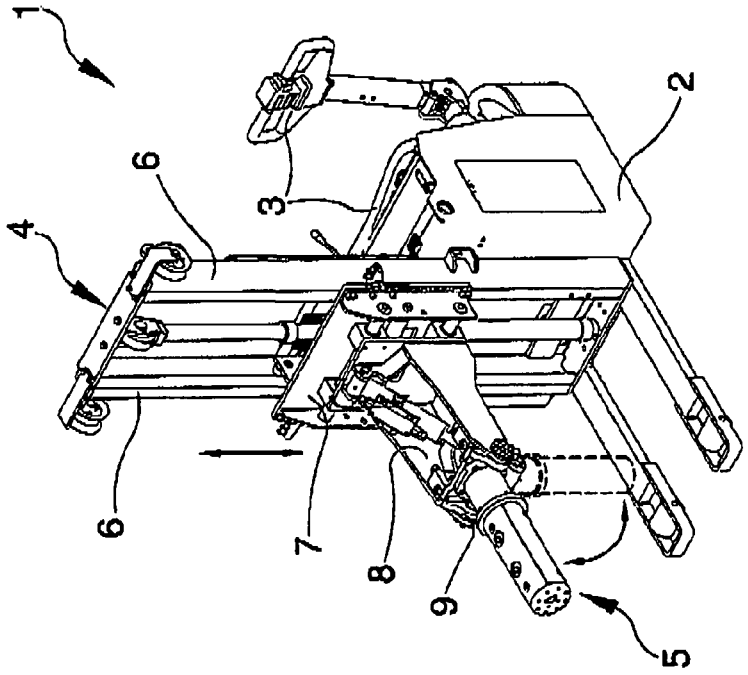

Fig. 1

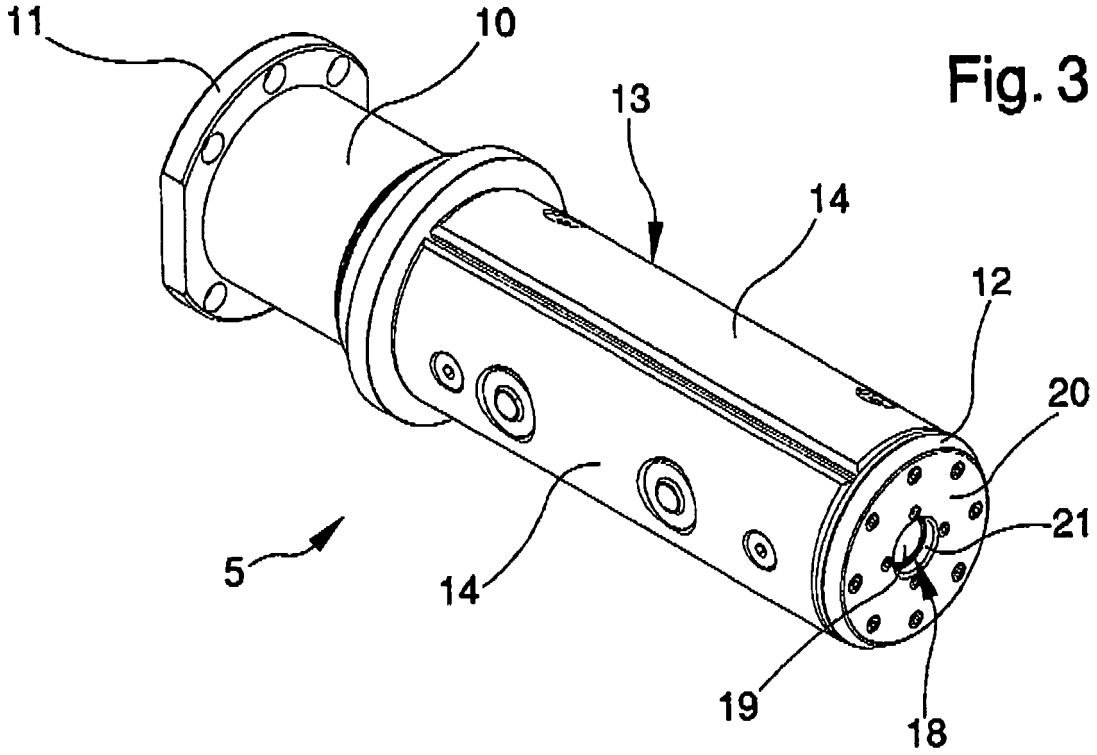

Fig. 3

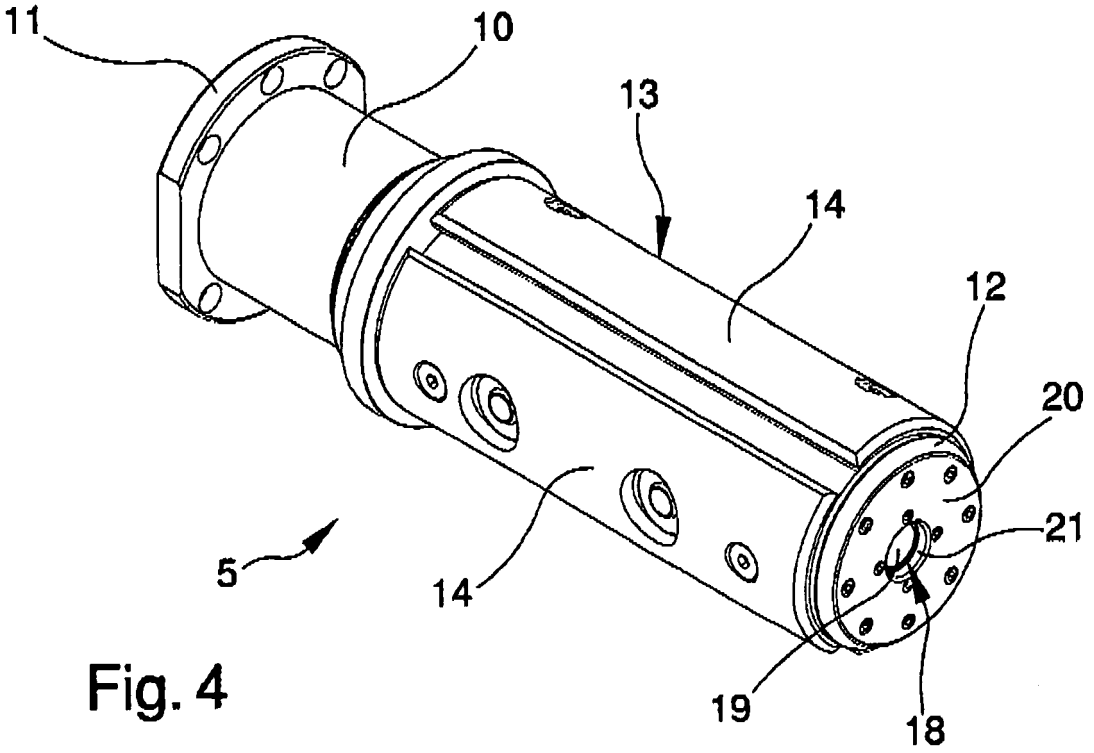

Fig. 4

Fig. 5

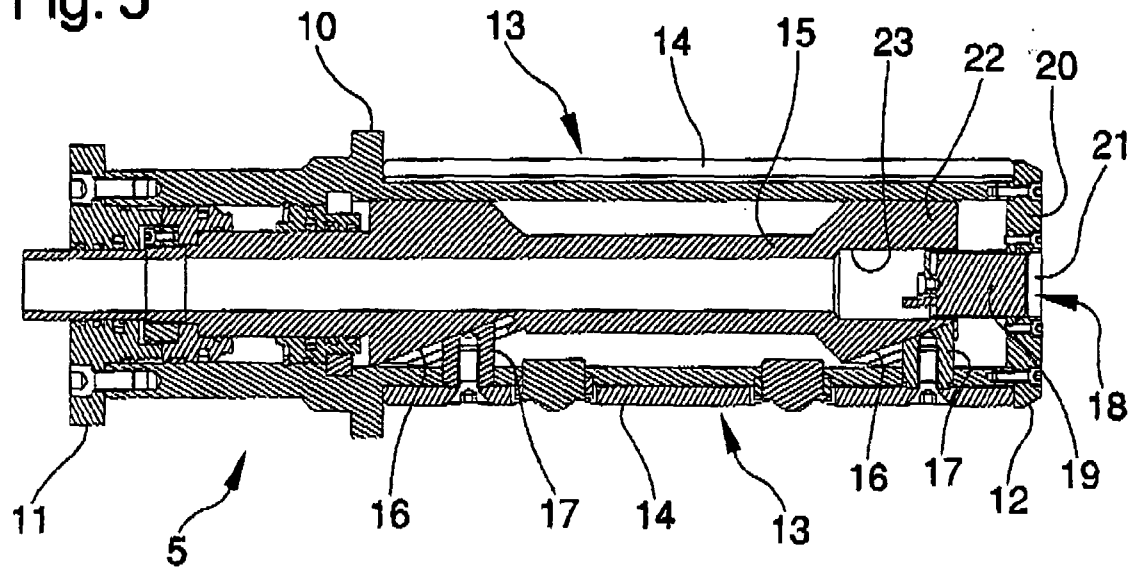

Fig. 6

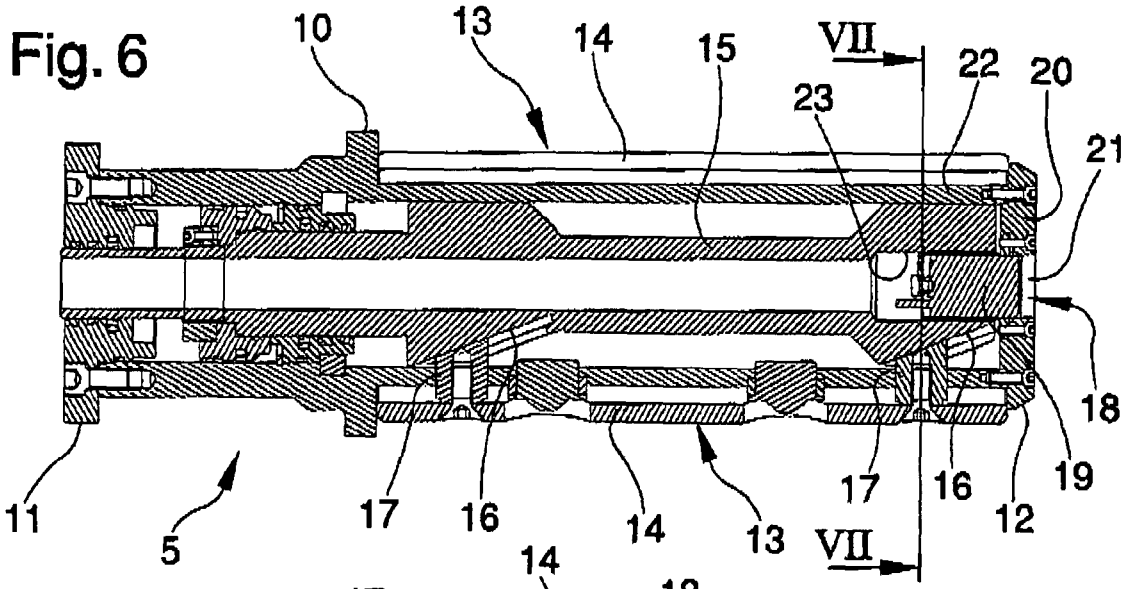

Fig. 7