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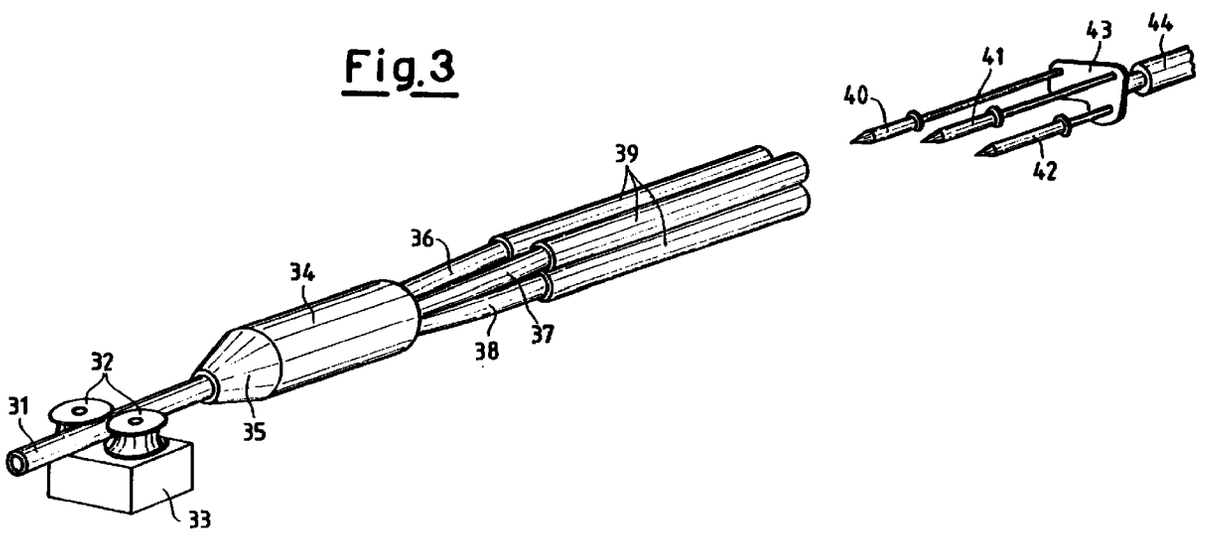
(54) Device for storing and loading reinforced rods for the front and vault of a tunnel

(57) Device for storing and loading reinforced rods for the front and vault of a tunnel mounted on a machine for the preventive consolidation of excavations in tunnels in correspondence to a working unit (19) of the machine, which is in turn mounted in correspondence to one end of telescopic standards (14, 15) hinged to the frame (10) of the machine itself, comprising a number of tubes (39) flanking each other containing the rods (36, 37, 38) for feeding to the working unit (19) singularly and selectively by means of a tapered conveyor (34) with a funnel (35); thrusting means (44) with fingers (40, 41, 42) which are longitudinally spaced are positioned in correspondence to the ends of each rod (36, 37, 38) opposite those fitted into the conveyor (34).

Fig.3



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Description

[0001] The object of the invention is a device for storing and loading reinforced bars for the front and vault of a tunnel.

[0002] In particular, the invention refers to a technique for inserting a reinforcement comprised of sections of glass reinforced resin of various sizes between perpendicular or angled perforations in relation to the front of excavation of the tunnel in order to prevent cave-ins (extrusion of the front).

[0003] Loaders currently for inserting said sections which are equipped with feed systems which function by means of frictions rollers or on return hoists and cables.

[0004] The traditional techniques involve storing the reinforcements in bulk, one on top of the other or piled in racks.

[0005] The haphazard nature of this kind of storage system means that it frequently happens that two or more reinforcements can be accidentally dragged due to reciprocal friction or due to two reinforcements next to each other being hooked together.

[0006] In addition, the existence of dust and detritus in the environment surrounding the storage means can frequently cause damage to parts of the machine and to the reinforced rods themselves.

[0007] The fact that the systems which use piled reinforcements exploit gravity to load them in succession onto the rollers should also be considered; in cases like this the system must of necessity be used in a vertical position with obvious problems in terms of space and organisation.

[0008] The aim of the present invention is to suggest a device for storing and loading reinforced rods for the front and vault of a tunnel which will not be subject to the inconvenient problems cited above and which will in particular avoid the accidental dragging of two or more reinforcements and take up a limited amount of space, permitting at the same time that the reinforced rods may be positioned in all the possible positions for perforation in conditions of absolute safety and reliability.

[0009] For this and further aims which will be better understood hereinafter the invention suggests the realisation of a device for storing reinforced rods for the front and vault of a tunnel of the type mounted on a machine for preventive consolidation of excavations in tunnels in correspondence to a working unit of the machine, which is in turn mounted in correspondence to one end of telescopic standards hinged to the frame of the machine itself, characterised by the fact that it comprises a number of tubes flanking each other containing the rods to feed to the working unit singularly and selectively by means of a tapered conveyor with a funnel; thrusting means with fingers spaced longitudinally being positioned in correspondence to the ends of each rod opposite those fitted into the conveyor.

[0010] The device according to the present invention will now be described, with reference to the attached drawings in which:

- FIG. 1 is a lateral view of a machine for the preventive consolidation of excavations in tunnels which may be equipped with the device according to the present invention;
- FIG. 2 is a frontal view of the machine equipped with the device according to the present invention; and
- FIG. 3 is an exploded view of the device according to the present invention.

[0011] FIGS. 1 and 2 illustrate a machine for the preventive consolidation of excavations in tunnels of the type described in patent application no. 67347-A/90 in the name of the same Inventor, which may be indicated for using the device according to the present invention.

[0012] While a specific embodiment of the machine is illustrated in FIGS. 1 and 2, it is to be understood that such disclosure is merely for the purposes of illustration in that various modifications are possible without altering in any way the principles, aims and advantages of the invention itself.

[0013] A frame 10 which forms the carrying structure of the machine is mounted on a motor driven tracked vehicle 11 and provided with pistons 12 having stabilising feet.

[0014] A central power unit 13 is located on top of the frame 10 and it works the rotary working unit and the auxiliary units used for moving and positioning the machine. As shown in the attached illustration, the working unit is single and it is formed by two telescopic standards 14 and 15 which are integral, at one extremity, with respective plates 16 and 17 and at the other extremity with a boom 18. Said boom is provided with a working unit 19, an engine 20 and a windlass 21 for moving the engine 2.

[0015] The plates 16 and 17 that support the telescopic standards 14 and 15 are also provided with engines 22 wherein the pinions rotate on a toothed circumference 23 which is part of the plates. The plates are provided with a cursor that is able to slide along slides 24 that are vertical when the machine is working and are turned down in a horizontal position during transport. For this purpose, the slides 24 are pivotally connected to the frame 10 and pistons 25 worked by the power unit 13 for rotating horizontally the slides 24 and the standards 14 and 15 from which the boom 18 has to be previously removed.

[0016] The device or loader according to the present invention is illustrated in its entirety in FIG. 2 with the reference 26, mounted on the machine by means of a support 2.

[0017] As can be observed in FIG. 3 the device or loader according to the present invention presents a number of rods 36, 37, 38. Each bar is housed in a tube 39 which isolates it from the bars on either side, the tube is in turn located inside a storage tube 3.

[0018] The front extremity of the storage tube 34 ends in a funnel shape 35, the function of which is to direct the rods between the friction roller 32, which are rotated by a motor drive unit 33. In this way only one of the rods 36, 37, 38 stored in the loader is presented for use at a time.

[0019] The tubes 39 should preferably be made of a material with a low friction coefficient which can slide easily. In addition, as the tube 39 is an element with closed sides it protects the rods from dust and detritus.

[0020] The feeding system for the rods is comprised of a thrusting means 44 at the end of which is fixed a plate 43 with fingers 40, 41 and 42 of different lengths, which make the rods 36, 37 and 38 advance in succession toward the pair of rollers 32. In this way the system can be used in any position in relation to the vertical.

[0021] The distance between the rollers 32 can be regulated by means of a piston, which optimises the friction of the rollers on the rods.

[0022] The bars should preferably be loaded by moving, for example by turning over or totally removing, the group of fingers 40, 41 and 42, in order to free rear access to the tube 39. It is thus possible to introduce the first rod 31 by hand making it advance until the rollers 32 can drag it.

[0023] The rod 36 is then introduced and made to advance to a position further back, inside the funnel 35, and so on for the other rods 37 and 38, each being in positions still further back. The backward step between the rods is constant and corresponds to the difference in length of the fingers 40, 41 and 42 of the thrusting means 4

[0024] It should be understood that the thrusting means 44, as well as being a single device equipped with fingers 40, 41 and 42 can, being comprised only of the fingers separate from each other, consequently work one independently of the others.

[0025] The loading operation is carried out with the personnel at the ground, that is with the perforation guide which carries the perforating equipment, and the loader, turned to its lowest position, thus ensuring that the work is carried out in conditions of the utmost safety.

[0026] The operations of placing the reinforced rods vice versa do not require any manual intervention and can be carried out in all possible positions of perforation.

Claims

1. Device for storing reinforced rods for the front and vault of a tunnel of the type mounted on a machine for preventive consolidation of excavations in tunnels in correspondence to a working unit (19) of the machine, which is in turn mounted in correspondence to one end of telescopic standards (14, 15) hinged to the frame (10) of the machine itself, characterised by the fact that it comprises a number of tubes (39) flanking each other containing the rods (36, 37, 38) to feed to the working unit singularly and selectively by means of a tapered conveyor (34) with a funnel (35); thrusting means (44) with fingers (40, 41, 42) spaced longitudinally being positioned in correspondence to the ends of each rod (36, 37, 38) opposite those fitted into the conveyor (34).

2. Device according to Claim 1 characterised by the fact that the fingers (40, 41, 42) are pushed to their extreme limit by a single thrusting means (44).

3. Device according to Claim 1 characterised by the fact that the fingers (40, 41, 42) are separate from each other and each constitute a single thrusting means (44).

4. Device according to Claim 1 characterised by the fact that the conveyor (34) is a tapered cylindrical tube with a funnel (35) at one end from which exits one rod at a time of those (36, 37, 38) fitted inside the tube (34).

Fig.1

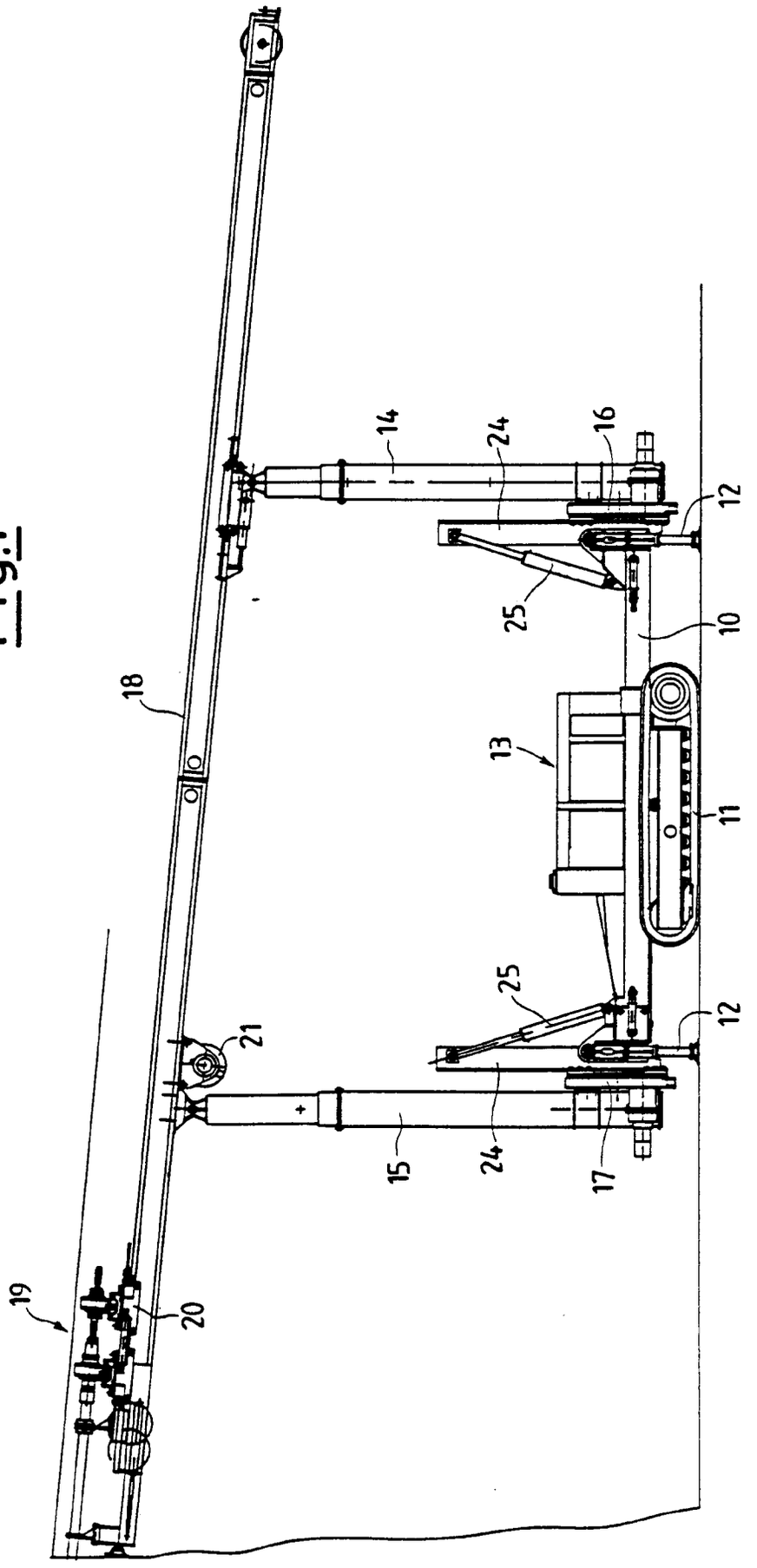
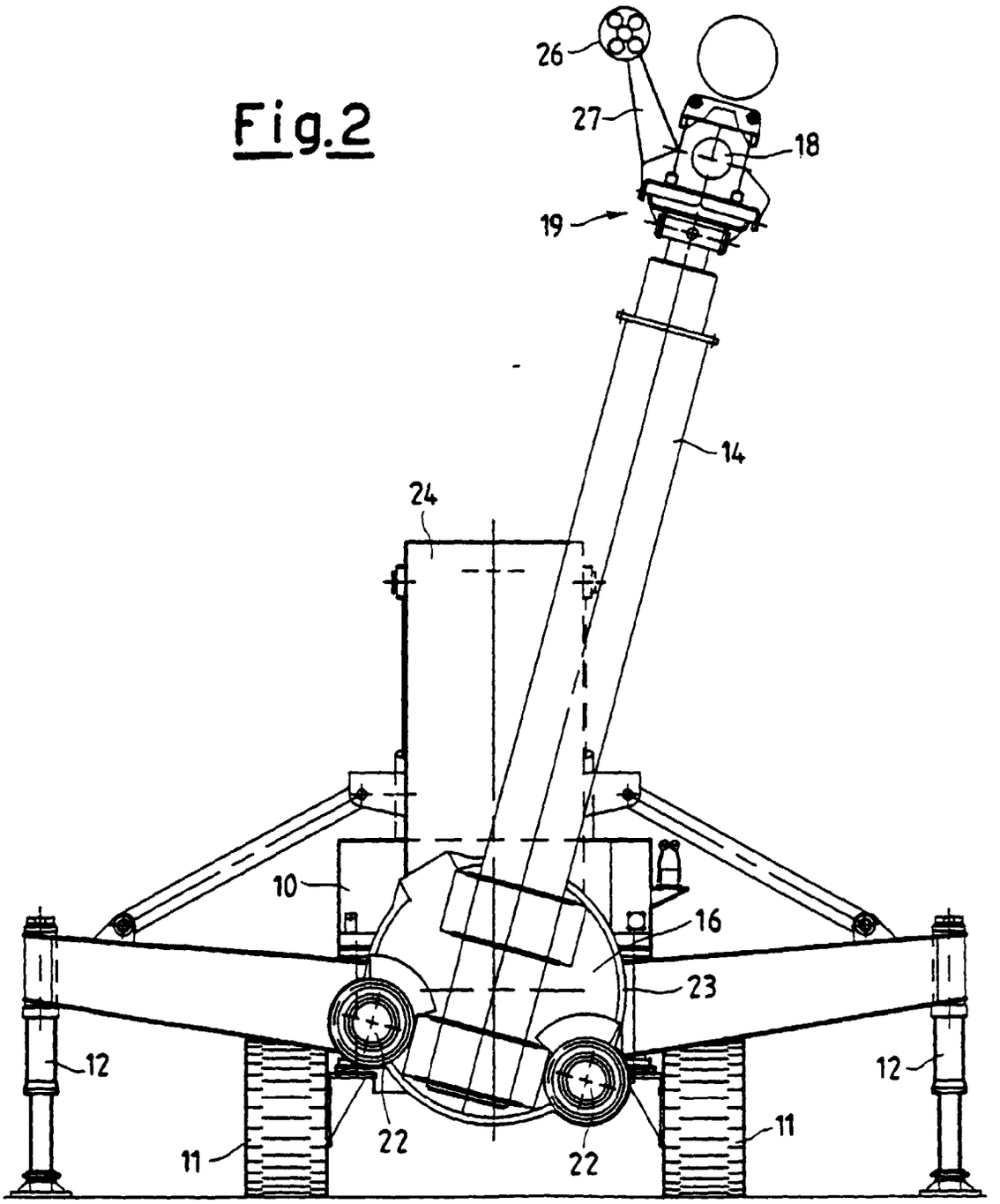


Fig.2



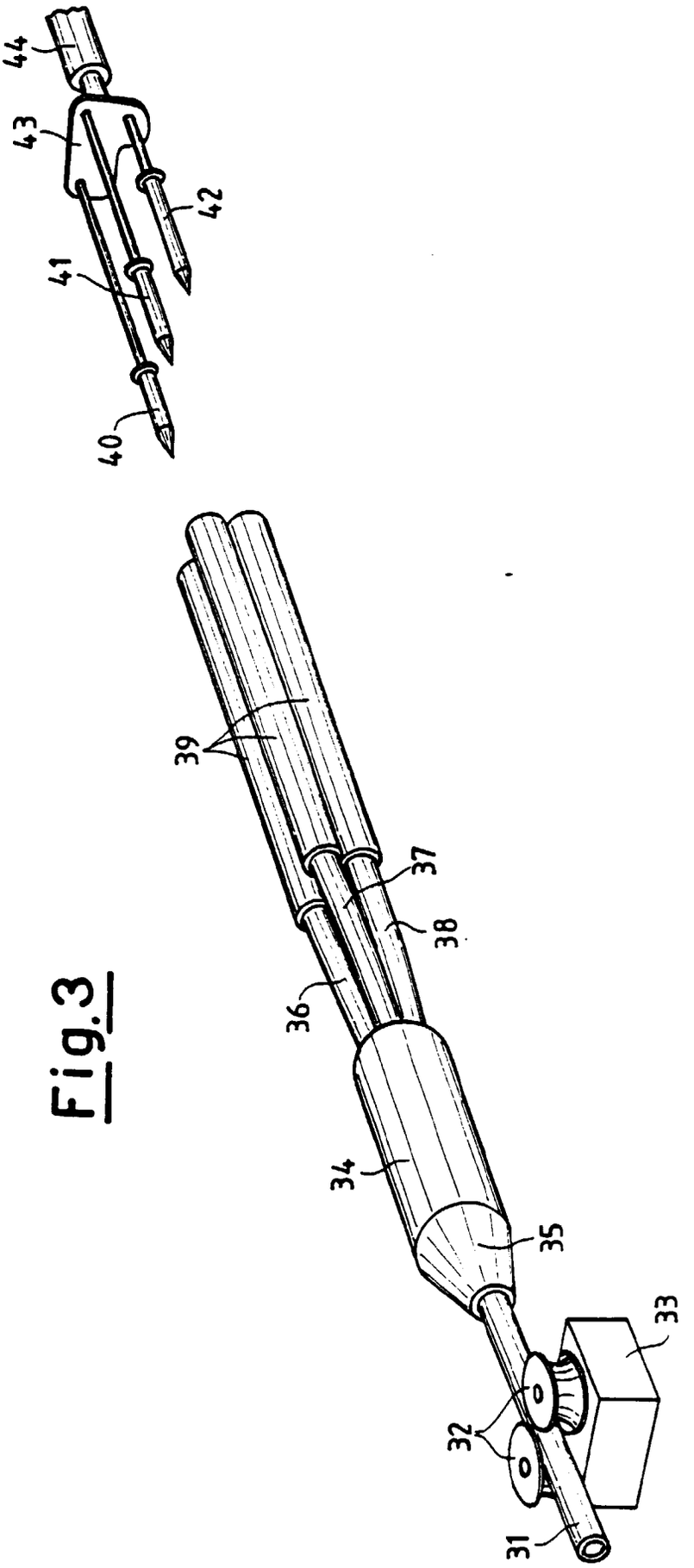


Fig.3