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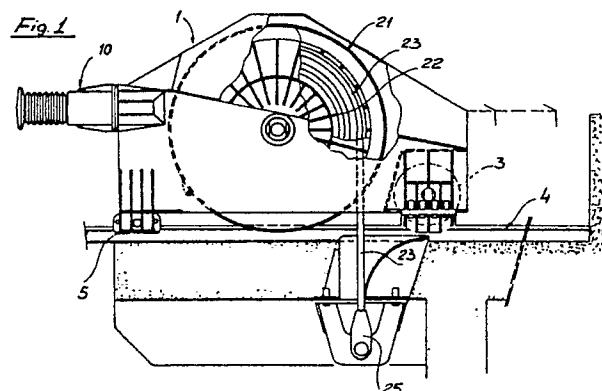
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54 **Emergency stop device, particularly designed for trains and the like.**

57 The present invention relates to an emergency stop device, particularly designed for trains and the like, comprising a wheeled frame, to be arranged on the railroad rails, at the zone provided for stopping the train, and supporting a rotating drum, thereon a rope is wound which is anchored, at one end thereof, to the ground.

The drum is provided with several seats or recesses to be engaged by a plurality of ribbon brakes which can be actuated by linkages driven by the translation movement of the wheeled frame.



EMERGENCY STOP DEVICE, PARTICULARLY DESIGNED FOR TRAINS AND THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to an emergency stop device, which has been particularly designed for stopping trains and the like.

As is known, at the end of overhead station rails there are usually provided emergency stop devices able of stopping the trains, as they cannot be stopped for example because of malfunctions of their braking systems.

These devices usually consist of stop masses thereon there are applied conventional buffers which are deformed, at a maximum, for several centimeters, with a practically negligible power dissipation.

Thus, in the case of a great impact between the stop mass and the train, all of the kinetic energy to be dissipated will be transformed into impact energy or power susceptible to greatly damage both the fixed stop structure and the train.

SUMMARY OF THE INVENTION

Accordingly, the task of the present invention is to overcome the above mentioned drawbacks, by providing a train emergency stop device which is able of absorbing or dissipating all of the kinetic energy of the train, so as to reduce to a minimum possible damages to persons in the case of an erroneous braking operation.

Within the scope of the above task, a main object of the present invention is to provide such a train emergency stop device which is able of automatically operating while providing a gradual braking effect and which, moreover, can be easily reset to its starting conditions.

Another object of the present invention is to provide such a train emergency stop device which is very reliable in operation and, moreover, can be constructed starting from easily available elements and materials.

According to one aspect of the present invention, the above mentioned task and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a train emergency stop device, characterized in that it comprises a wheeled frame, to be arranged on the railroad rails at the zone provided for emergency stopping the train, and supporting a rotatable drum, thereon a rope is wound having one end anchored to the ground, said rotatable drum being provided

with seats or recesses to be engaged by a plurality of ribbon brakes, adapted to be actuated by linkages driven as said wheeled frame is displaced.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed description of a preferred, though not exclusive, embodiment, of an emergency quick stop device, particularly designed for trains and the like, which is illustrated, by way of an indicative but not limitative example, in the accompanying drawings; where:

Figure 1 is a side partially cross-sectioned view illustrating the emergency stop device according to the invention in its not use condition;

Figure 2 is a front view of the emergency stop device according to the invention, taken from its end facing the train stop region;

Figure 3 is a schematic view showing the emergency stop device during the operation thereof;

Figure 4 is a cross-sectional view showing a buffer associated with the subject emergency stop device;

and

Figure 5 is another schematic view illustrating a ribbon brake.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the Figures of the accompanying drawings, the train emergency stop device according to the invention has been specifically designed for absorbing or dissipating, by friction, the kinetic energy of a train or the like to be stopped.

More specifically, said kinetic energy is absorbed by applying a force opposite to the movement direction and acting for a given displacement, and said energy corresponds to:

$$E = \int_0^s \mathbf{F}(s) \, ds = \mathbf{F} \cdot \mathbf{S},$$

where F is the average force which, in the case of the device according to the invention, has an essentially plastic evolution characteristic and substantially corresponds to the $F_{\max}$.

Then, after having set the energy to be dissipated and $F_{\max}$, the displacement will be automatically set, which displacement can be great at will.

According to one embodiment, the train emergency stop device according to the invention comprises a wheeled frame, overall indicated at the reference number 1, which is provided with wheels 3 for displacement on the railroad rails 5, and with anti-raising pads 5 acting on the intrados 6 of the rail stem in order to balance the tilting moment occurring as the train impacts against the subject device.

At its front portion, that is the portion thereof facing the train stop zone, there are provided a pair of buffers, indicated at 10, which are preloaded by an inert gas having a resilient type of characteristic curve; as shown, said buffers consist of a central or main body 11 which, at the bottom thereof, is provided with a buffer plate 12 and, at the rear thereof, defines a chamber 13 filled with a pressurized inert gas (see Figure 4).

The central body 11 is tightly slidably housed in the inside of a cylinder 14, closed by a bottom member 15 provided with an axial ridge or projection 16 susceptible to be tight coupled to the chamber 13.

Between the central body 11 and cylinder 14 there is formed an annular chamber 18, filled with oil, and adapted to preserve against wear the tightness gaskets 19 operating between said central body 11, cylinder 14 and axial projection 16.

In this connection, it should be pointed out that the oil chamber 18 is so shaped, at its end portion, to prevent said central body and bottom member 15 from impacting one against the other during the terminal portion of the stroke.

The chamber 13 and the gas preloading pressure, on the other hand, are so designed as to provide a resilient type of strain-deformation characteristic curve, having the desired stiffness.

In order to balance the pressure, and hence the reactive forces of the two buffers, the chambers 13 communicate with one another through a coupling duct 20.

The wheeled frame 1 rotatably supports a rotatable drum 21 which, preferably at an intermediate portion thereof, is formed with a seat or recess 22 for housing a high strength rope 23 which is wound on said drum by overlying coils, said rope 23 being anchored, at one end thereof, at 25, to the ground.

On the outer surface of the rotatable drum 21 there are providing engaging seats or recesses 30 adapted for engaging with a plurality of ribbon

brakes 31 which, in cross-section, have a friction surface 31a and a supporting surface 31b.

Said ribbon brakes, at their front ends, are anchored to a fixed point of the wheeled frame whereas, at the other ends thereof, after winding in the respective engaging seats, they are coupled to levers 40 of suitable linkages coupled to an adjustable torque limiting system adapted to operate after the starting of the carriage, as it will become more apparent hereinafter.

More specifically, coaxial with the rotatable drum 21, there is provided a driving gear wheel 41, thereon is entrained a chain 42 also entrained on a gear wheel 43 keyed on a shaft 44 thereon there are arranged torque restraining or limiting devices 45 of known type.

Each said torque restraining device 45, through a transmission chain 46, is coupled to the lever 40 articulated at a middle point thereof and coupled, at the other end thereof, to the respective ribbon brake.

Thus, the braking system will transmit to the rotatable drum a constant braking torque, for the overall duration of its movement.

The steel rope, as above mentioned, is wound by overlaying coils: thus, during the operation, the ratio of the constant braking force diameter and the rope winding diameter will change between a maximum diameter and a minimum diameter; thus, a progressive stop action will be provided, with an increasing value from the starting time to the end time.

With the disclosed arrangement, at the impact of the train against the wheeled frame, the buffers will be deformed: according to the invention, the stroke and reaction force of said buffers are designed according to a characteristic curve able of causing the wheeled frame to be brought to the train speed in a gradual manner thereby preventing great inertial reaction forces from being generated at the start of the braking operation.

Simultaneously with the displacement of the wheeled frame or structure, the rope is un-wound and the rotatable drum rotated, in a gradual manner, since the rope is anchored with respect to the rotatable drum. Thus, the rotatable drum will not be engaged by the ribbon brakes as far as its rotating speed does not reach, from the rest status, the condition or speed corresponding to the impact speed of a train.

At this time, as above mentioned, the ribbon brakes are actuated for gradually braking and stopping the train.

From the above disclosure it should be apparent that in the case of an impact, the overall device will be not damaged since it is able of resiliently yielding and, accordingly, can be quickly reset to its starting operation conditions.

From the above disclosure it should be further apparent that the invention fully achieves the intended task and objects.

In particular, the fact must be pointed out that has been provided a device which is able of absorbing and dissipating the impact kinetic energy without damaging the train or itself.

While the invention has been disclosed with reference to a preferred embodiment thereof, it should be apparent that the disclosed embodiment is susceptible to many modifications and variations, all of which will come within the spirit and scope of the appended claims.

Claims

1. A train emergency stop device, characterized in that it comprises a wheeled frame to be arranged on the railroad rails at the zone thereat a train is to be stopped, and supporting a rotatable drum thereon a rope is wound, said rope having one end anchored to the ground, said rotatable drum being provided with engaging seats adapted to engage with a plurality of ribbon brakes actuated by linkages driven by the translation of said wheeled frame.

2. An emergency stop device according to the preceding claim, characterized in that said wheeled frame is provided with rail wheels and, at the end portion thereof facing said train stop zone, with a pair of anti-raising pads engaged on the intrados of the rail stem.

3. An emergency stop device according to the preceding claims, characterized in that said wheeled frame, at the end thereof facing said train stop zone, is provided with a pair of inert gas preloaded buffers.

4. An emergency stop device, according to one or more of the preceding claims, characterized in that each said buffer has a central body supporting, at one end thereof, a buffer plate and defining, at the other end thereof, a chamber filled with a pressurized inert gas, said central body being adapted to tightly slide in a cylinder closed by a bottom member defining an axial projection adapted to be tightly engaged in said inert gas filled chamber.

5. An emergency stop device according to one or more of the preceding Claims, characterized in that said cylinder defines, in cooperation with said bottom member and central body, an oil filled chamber.

6. An emergency stop device according to one or more of the preceding claims, characterized in that it comprises a coupling duct adapted to interconnect the inert gas filled chambers of the two buffers.

7. An emergency stop device, according to one or more of the preceding claims, characterized in that said rotatable drum is provided with a seat or recess for winding said rope, said rope being wound by overlaying coils.

8. An emergency stop device according to one or more of the preceding claims, characterized in that said ribbon brakes are coupled, at respective ends thereof, to a fixed point of said wheeled frame and, at the other ends thereof, to said linkages, said ribbon brakes further engaging, at least partially, with the outer surface of said drum, at said engaging seats.

9- An emergency stop device, according to one or more of the preceding claims, characterized in that said linkages comprise a lever, articulated at an intermediate portion thereof, to said wheeled frame and having one end coupled to one end of one of said ribbon brakes and the other end thereof coupled to a transmission chain, associated with torque limiting devices, coupled to a gear wheel supported by a cross shaft of said frame, on said gear wheel there being entrained a chain driven by a driving gear wheel coaxial with said drum.

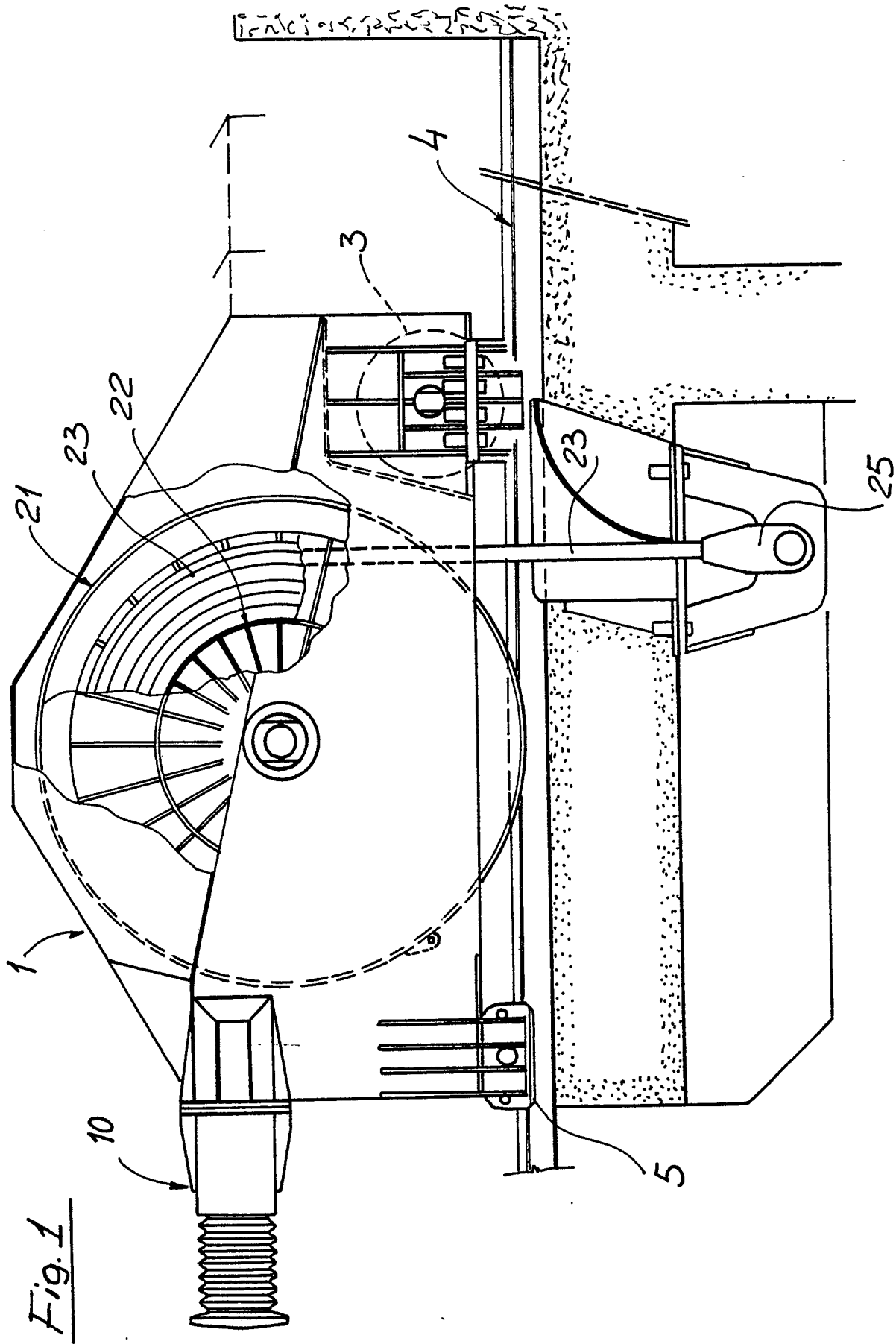
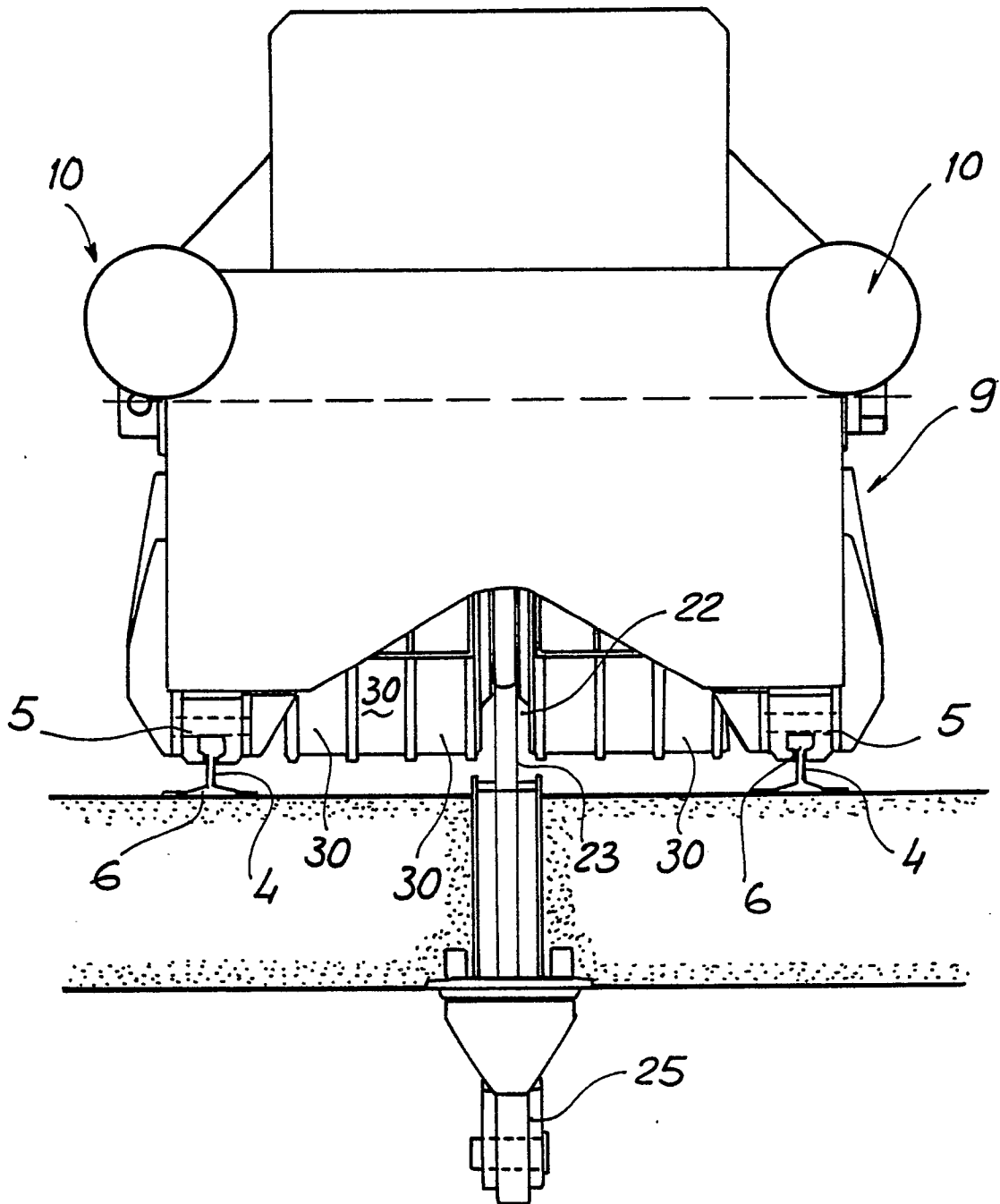
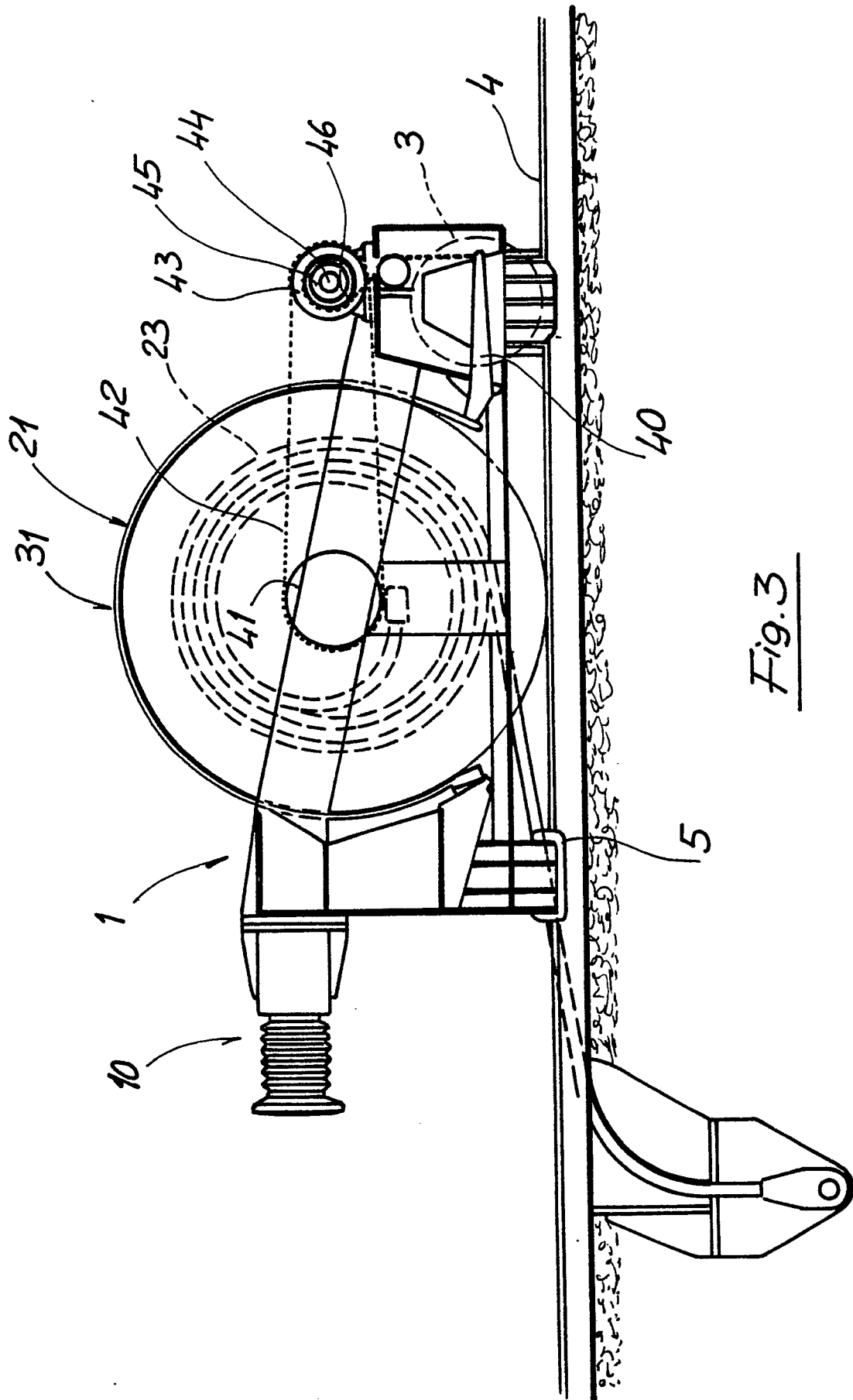


Fig.2



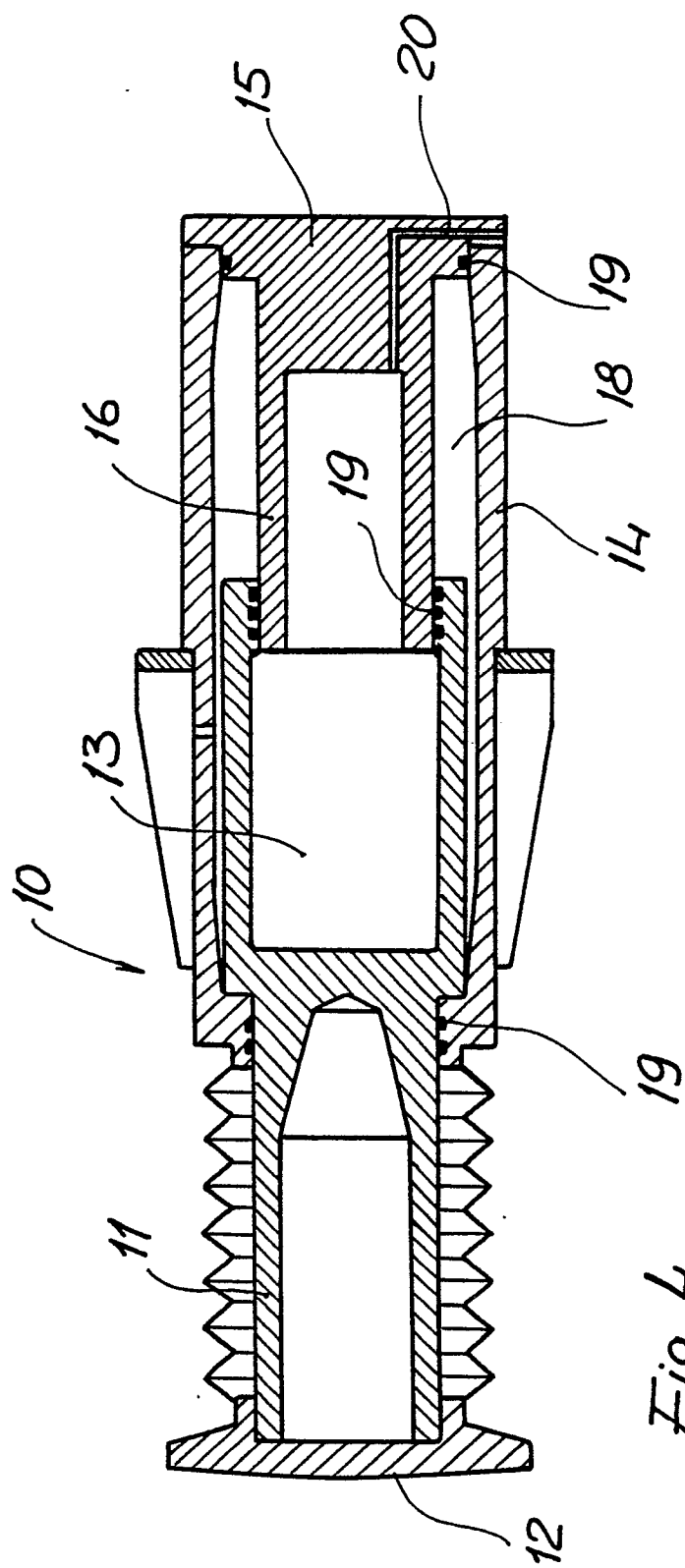


Fig. 4

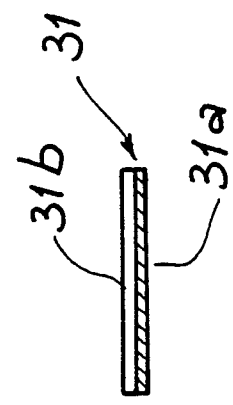


Fig. 5



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	FR-A-2 581 608 (MECANERAL) * Figures 1-3,10; page 4, line 16 - page 8, line 28 *	1	B 61 K 7/18 B 61 G 11/14
A	---	2,7	
Y	FR-A-2 073 485 (ALS BERGENS MEKANISKE VERKSTEDER) * Figures 1,2; page 2, line 12 - page 3, line 10 *	1	
A	---	1,2,7,9	
A	DE-C- 550 164 (SCHWÄBISCHE HÜTTENWERKE GmbH) * Figure 3; page 2, lines 36-48 *		
A	---	1,3	
A	DE-C- 182 373 (FIRMA FR. GEBAUER) * Figure 1; page 1, lines 36-58 *		
A	---	3,4	
A	GB-A- 900 220 (MEBOE LTD) * Figure 2; page 2, lines 31-82 *		
A	---	6	
A	DE-C- 807 949 (KRAUSS-MAFFEI AG) * Figure; claim 4 *		

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-06-1989	Examiner CHLOSTA P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			