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(54) **Material handling means**

(57) A material support (33) comprising a body (42), a first roller (43) mounted at both ends thereof on the supporting body with its axis of rotation inclined to the horizontal, a second roller (44) also mounted on the body (42) and extending upwardly of the body and which is

adjacent the lower end of the first roller. The first roller (43) may be powered by a hydraulic motor (45). Two spaced apart supports (33) may be arranged to form a material handling means (30) with each support (33) being mounted on a respective displacement means (47,48,51).

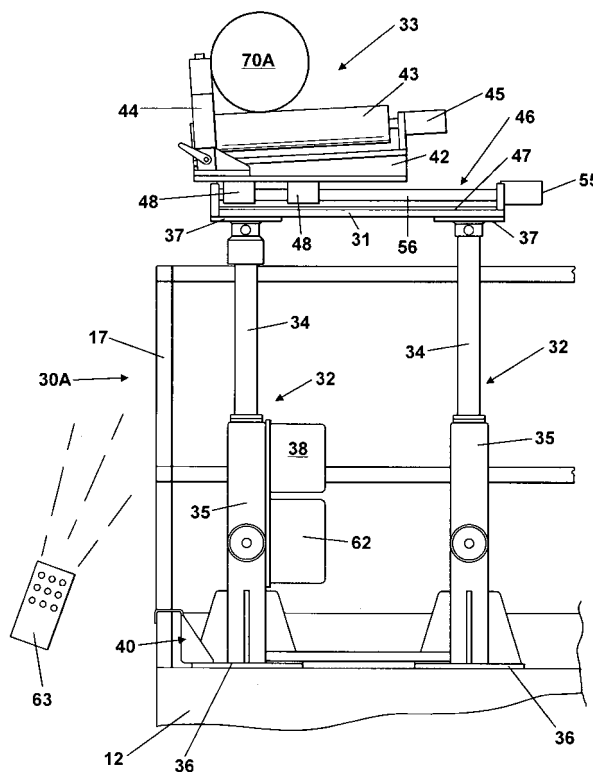


Fig. 2

Description

Field

[0001] This invention relates to material handling means and in particular to means used for lifting or supporting lengths of materials such as pipes or tubes during the construction of buildings.

Background of the Invention

[0002] Building construction sites for large buildings frequently employ construction equipment for lifting large and heavy components into position during the construction of a building. For example, lengths of standard 8 inch (200mm) diameter steel pipe are typically 6 meters in length and may weigh in the order of 150 kgs. During construction of commercial building the overhead pipe-work is typically fixed into position using a pair of spaced apart aerial lifts working in synchronisation with the pipe being finally lifted and manoeuvred into position manually.

[0003] A typical aerial lift is a mobile scissor lift available from JLG Ind. and which has a work platform which may be lifted into the air by a hydraulically operable scissor mechanism. For safety the work platform is surrounded by a safety barrier or fence.

[0004] These lifts may be provided with auxiliary material handling equipment which is secured to the platform for manoeuvring lengths of pipe into location within a building. An example of such equipment is described in PCT patent application WO 2005/077711.

[0005] The present invention is also concerned with auxiliary material handling equipment for lifting and locating lengths of materials, such as pipes or tubes, into position during building construction and which when utilised on a standard lift platform provides for improved access.

Statements of Invention

[0006] According to a first aspect of the present invention there is provided a material support having a body, a first roller mounted on the body at both ends thereof with its axis of rotation inclined to the horizontal, a second roller also mounted on the body and extending upwardly of the body and which is adjacent the lower end of the first roller.

[0007] The first roller may be a powered roller rotated by any suitable means, for example a hydraulic motor or an electrical motor. The first roller may be covered by a non-slip polymeric layer on which the material rests. The first roller may be inclined at up to 30° of arc from the horizontal and preferably is inclined at between 5-15° of arc.

[0008] Preferably the axis of rotation of the second roller is substantially vertical and the second roller is off-set to one side of the first roller.

[0009] The material support may further comprise a rowlock mounted on the body via a substantially vertical leg, the rowlock being rotatable about a vertical axis. Preferably the rowlock comprises a pair of rollers in a V formation substantially a right angles to each other. The rowlock may further comprise an arm extending radially outwardly from the rowlock (that is radially with respect to the axis of rotation of the rowlock) and having at its distal end a retaining hook opening downwards. Preferably the retaining hook comprise an S or Z shaped hoop, one side opening downwardly and the other side opening upwardly.

[0010] The invention further comprises material handling means comprising a pair of spaced apart material supports according to the first aspect of the invention, each support being mounted on a respective displacement means. Each displacement means may comprise an actuator and slide means mounted on fixed base. The body of each support is preferably slidably mounted on a respective slide means which may comprise a pair of substantially parallel slides, and the respective actuator, preferably a hydraulic actuator, is operable to move the body relative to the slide means to displace the material support relative to the fixed base.

[0011] The material handling means may further include a plurality of jacks, for lifting the material supports. Preferably each support is mounted on a pair of jacks. Each jack comprises an upright ram which is secured to the supporting body and may be operated by any suitable means, for example the ram may be displaced by mechanical means such as a pawl and ratchet mechanism, or screw threaded drive means, and is preferably a hydraulic jack. The jacks may be interconnected so that they are raised and lowered in unison.

[0012] The material handling means may be used in combination with an aerial lift having a work platform surrounded by a safety barrier, the jacks in use resting on the platform with coupling means securing the jack to said barrier. Suitable coupling means is disclosed the applicants co-pending GB Patent application 0612263.

[0013] The material handling means may further include a hydraulic control means to which the hydraulic actuators and hydraulic jacks are connected.

[0014] The aerial lift is preferably a mobile self drive lift having a platform which is raised by a powered hydraulic system, wherein said hydraulic control means are connected into the powered hydraulic system of the lift.

[0015] Yet another aspect of the present invention there is provided a material support comprising a rowlock mounted on a body via a substantially vertical leg, the rowlock being rotatable about a vertical axis. Preferably the rowlock comprises a pair of rollers in a V formation substantially a right angles to each other. The rowlock may further comprise an arm extending radially outwardly from the rowlock (that is radially with respect to the axis of rotation of the rowlock) and having at its distal end a retaining hook opening downwards. Preferably the retaining hook comprise an S or Z shaped hoop, one side

opening downwardly and the otherside opening upwardly.

Description of the Drawings

[0016] The invention will be described by way of example and with reference to the accompanying drawings in which:-

- Fig. 1 is a side elevation of an aerial lift in a lowered condition and provided with material handling means according to the present invention,
- Fig. 2 is an end view of the aerial lift shown in Fig.1 with the material handling means in a raised condition with a large diameter pipe thereon.
- Fig. 3 is an end view of the aerial lift shown in Fig.1 with a modified material handling means in a lowered condition with a plurality of smaller diameter pipes thereon and with a rowlock thereon .
- Fig. 4 is a plan view of the body and slide means with other components omitted for the sake of clarity,
- Fig. 5 is a section through the slide means of Fig 4 taken on the line V-V
- Fig. 6 is a side elevation of the rowlock used with the pipe support in Fig 3 and
- Fig. 7 is a front elevation of the rowlock shown in Fig 6.

Detailed Description of the Invention

[0017] With reference to Figs 1 the drawings, there is shown an aerial lift 10 in the form of a self drive mobile scissor lift available from JLG Ind.. The lift 10 has a drivable vehicle body 11 having wheels 15 and a work platform 12 located on its body and which in use can be raised or lowered relative to the ground. The platform 12 is shown in a lowered condition. The vehicle body is provided with stabilisers 16 at its corners which are lowered to provide stability during use of the lift. The work platform 12 is raised or lowered by a scissor type mechanism 13 typically operated by a powered hydraulic system provided on the lift 10. The hydraulic system is provided with a manifold 14 whereby hydraulic power may be taken from the powered system of the lift and used to operate material handling means 30 of the present invention. The platform 12 may have extendable end portions 19 and the whole platform is provided with a safety barrier 17 formed from rails and a kick plate. An access ladder 18 is provided on the body 11 for access to the platform 12 when in the lowered condition.

[0018] The aerial lift 10 is provided with material handling means 30 comprising two spaced apart material handling apparatus 30A and 30B located one adjacent each extendable end portion 19 and which is shown in Figs. 1 & 2 in raised conditions. In the present embodiment, the material handling means 30 is for use in handling lengths of pipe 70, large diameter pipe 70A (250mm) as shown

in Fig. 2 or a plurality of lengths of smaller diameter pipe 70B(38mm) as shown in Fig 3.

[0019] With reference now to Fig.2, and Fig.3, the two apparatus 30A & 30B are substantially similar and therefore only the handling apparatus 30A will be described in detail. The apparatus 30A includes a material support 33 mounted on a displacement means 47,48, 51 having a fixed base 31 in turn mounted on a pair of upright jacks 32. Each jack 32 is substantially vertical and comprises a jack body 35 having a reciprocable ram 34 telescopically mounted within the body 35. Each jack body 35 has a foot 36 that rests on the platform 12 and the head of the ram 34 is provided with an adaptor plate 37 to which the base 31 is attached. The jacks 32 are hydraulically operable for movement of the rams into and out of the respective bodies.

[0020] One of the two jacks 32 is located adjacent the barrier 17 and is secured to the inside of the barrier rail 17 by means 40 disclosed in the applicants co-pending GB Patent application 0612263.

[0021] The hydraulic jacks 32 are operated in unison through an electronic control means 38 fixed to one of the jack bodies 35 and which controls a hydraulic valve block 62. The valve block 62 is connected by flexible hydraulic hose 39 to the manifold 14 for take-off of hydraulic power from the lift hydraulic system. At least one of the electrical control means 38 on the two apparatus 30A & 30B include a radio receiver which receives commands from a remote control hand set 63 for operation of the valves in the valve blocks 62 in accordance with command signals received from the hand set 63. The electrical control means 38 is connectable via a standard plug to the electrical power system of the lift 10.

[0022] The material/pipe support 33 comprises a body 42 with a first roller 43 inclined relative to the horizontal and supported at each end thereof on the body 42. A second substantially vertical roller 44 is located at the lower end of the first roller 43 off-set to one side thereof. The first roller 43 may be a powered roller (as shown) driven by a hydraulic motor 45 located at its upper end. In an alternative embodiment shown in Fig. 3 the roller 43A may be a freely rotating roller. The roller 43 is covered in a none-slip elastomeric layer to improve the grip between the driven roller 43 and the pipe 70.

[0023] The roller 43 is inclined at up to 30° to the horizontal, preferably between 5-15°. The vertical roller 44 is a freely rotatable roller and is located adjacent the lower end portion of the first roller 43. This ensures that the pipe 70 remains on the two inclined roller in contact with the vertical rollers 44.

[0024] Referring also to Figs 4 & 5, the body 42 is slidably mounted on slide means 46 fixed to the base 31. A plurality of sliders 48 secured to the underside of the body 42 allow for sliding movement along the slide means 46 which comprises a pair of spaced apart substantially parallel longitudinal slideways 47. The body 42 is displaced back and forth along the slideways 47 by an actuator 51 having a rotatable screw-threaded strut 56

which extends substantially parallel with the slideways 47 and which is supported at its far end by a bearing bracket 52. The motor 55, preferably a hydraulic motor, is connected rotatably fast with the strut 56 through a connector 53. The screw strut 56 is threadedly connected to a screwthread bracket 54 on the body 42 so that rotation of the strut 56 in one direction of the other moves the body 42 relative to the base 31. Limit switches 58 (only one of which is shown may be provided at the ends of the slideways 47 for control of the actuator 51.

[0025] The hydraulic actuators 51, hydraulic motor 45 and the hydraulic jacks' 32 are connected to the respective valve block 62 and the two hydraulic valve blocks 62 and control means 38 on the two material handling apparatus 30A, 30B are interconnected for operation of the jacks and movement of the material supports 33 so that they are raised or lowered in unison this prevents tipping of the elongate load, in this case pipe 70.

[0026] In use the jacks 32 of the two material handling apparatus 30A & 30B are raised or lowered to position the first rollers 43 to a convenient level for accepting a length of material, for example a pipe 70. The pipe 70 is then held in position between the first rollers 43 and the vertical rollers 44. The non-slip layer on the first rollers and their inclination help keep the pipe in position. The pipe 70 may then be lifted proximate the required location on the aerial lift 10. The pipe length may then be manoeuvred into its final position using the jacks 32, actuators 55 and powered rollers 43.

[0027] In use, the material handling means 30 is utilised for lifting over small height range for example from the lift platform 12 to a height of up to 2 metres above the platform.

[0028] With reference to Figs. 3,6 & 7, there is shown a material handling apparatus 30B which is substantially similar to that shown in Fig 2, with the jacks 32 in a lowered condition. A plurality of smaller diameter (38-40mm) pipes is stored on the first roller 43A. The roller 43A is a non-motorised freely rotating roller.

[0029] A rowlock 72 is rotatably mounted on the body 42, conveniently coaxially with the vertical roller 44. The rowlock 70 comprises a pair of rollers 71 in a V formation assembly, substantially at right angle to each other, mounted on a vertical leg 73. The rowlock 70 is capable of rotation about a substantially vertical axis relative to the supporting body 42. The roller assembly may rotate relative to the leg 73, or alternatively, the leg 73 may be rotatably mounted relative to the body. An arm 74 projects radially and horizontally from the leg 73 adjacent the rollers 71. A downwardly facing hook 75 is mounted on the distal end of the arm 74 and preferably a second upwardly facing hook 76 is also provided at the distal end of the arm 74. These two hooks may be conveniently provided by a single S or Z shaped component.

[0030] In use, the end portion of a pipe 70B is placed in the rowlock 72 on the two rollers 71 and the pipe may now be easily manually manoeuvred from its other end portion longitudinally on the rollers, or rotationally about

the vertical axis or combinations of both. The pipe 70A may be temporarily latched under the downward hook 75 or rested on the upward hook 76 during the manoeuvrings of a length of pipe 70B.

Claims

1. A material support comprising a body, a first roller mounted at both ends thereof on the supporting body with its axis of rotation inclined to the horizontal, a second roller also mounted on the body and extending upwardly of the body and which is adjacent the lower end of the first roller.
2. A support as claimed in Claim 1 wherein the first roller is a power roller rotated by a suitable motor.
3. A support as claimed in Claim 1 or Claim 2, wherein the first roller is inclined at up to 30° of arc from the horizontal, preferably at between 5-15° of arc.
4. A support as claimed in any one of Claims 1 to 3, wherein the axis of rotation of the second roller is substantially vertical and the second roller is off-set to one side of the first roller.
5. A support as claimed in any one of Claims 1 to 4, wherein the support further comprise a rowlock mounted on the body via a substantially vertical leg, the rowlock being rotatable about a substantially vertical axis.
6. A support as claimed in Claim 5 wherein the rowlock comprises a pair of rollers in a V formation substantially a right angles to each other.
7. A support as claimed in Claim 6, wherein the rowlock further comprises an arm extending radially outwardly from the axis of rotation and has at its distal end a retaining hook.
8. A material handling means comprising a pair of spaced apart material supports as claimed in any one of Claims 1 to 7, the body of each support being slidably mounted on a respective displacement means comprising slide means mounted on a base.
9. A material handling means as claimed in Claim 8, wherein each respective slide means comprises a pair of substantially parallel slideways, and a respective actuator is operable to move the body relative to the slide means to displace the material support.
10. A material handling means as claimed in Claim 8 or Claim 9 and further including a plurality of jacks, for lifting the material supports, each base being mounted on a pair of hydraulic jacks which are intercon-

nected to a hydraulic control means so that they are raised and lowered in unison.

- 11.** An aerial lift comprising material handling means as claimed in any one of Claims 8 to 10, the aerial lift having a work platform surrounded by a safety barrier, with the jacks in use resting on the platform with coupling means securing the jack to said barrier. 5
- 12.** An aerial lift as claimed in Claim 11 being a mobile self drive lift the work platform of which is raised by a powered hydraulic system, wherein said hydraulic control means are connected into the powered hydraulic system of the lift. 10
- 13.** A material support comprising a rowlock mounted on a material supporting body via a substantially vertical leg, the rowlock being rotatable about a substantially vertical axis. 15
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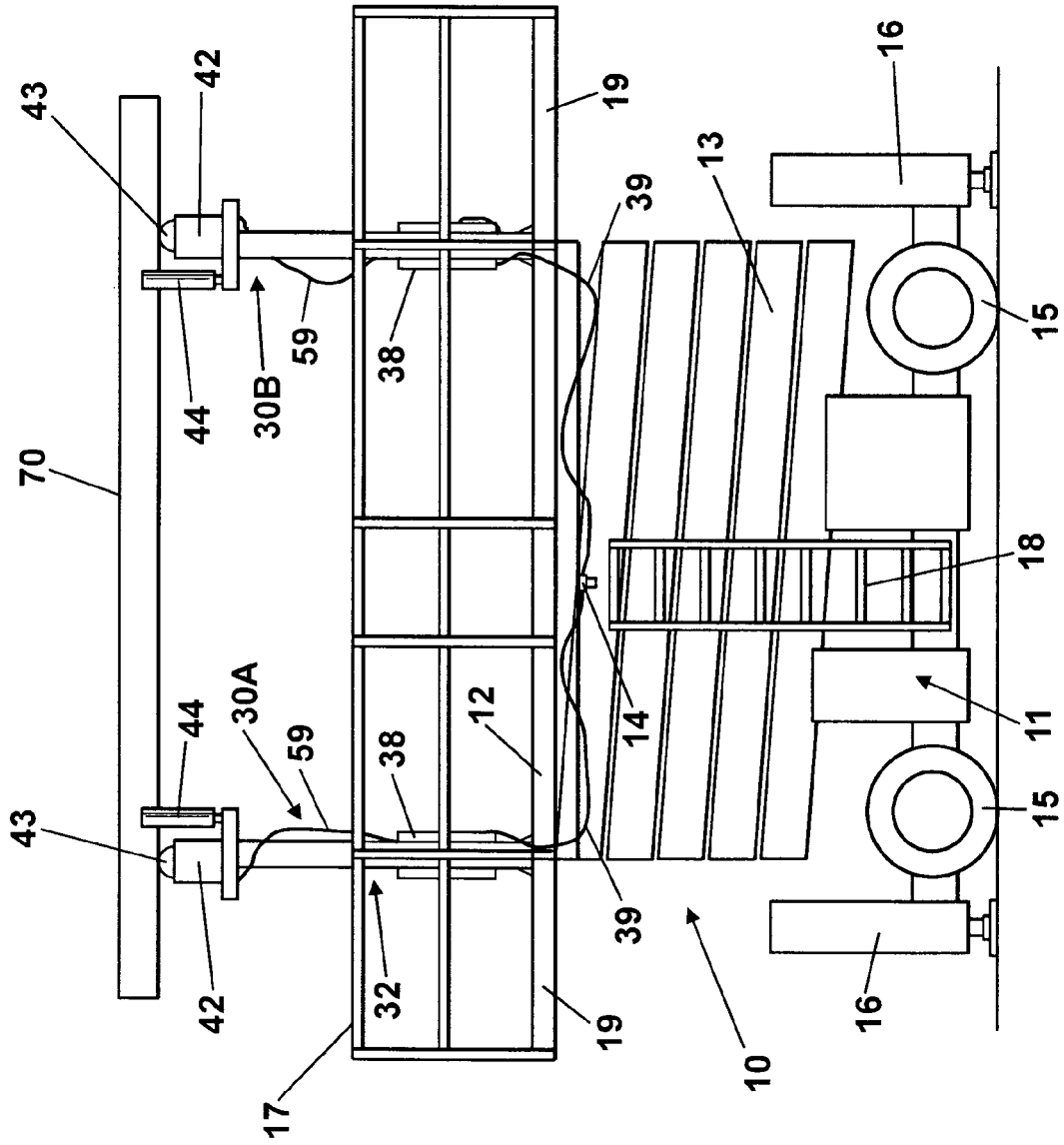


Fig. 1

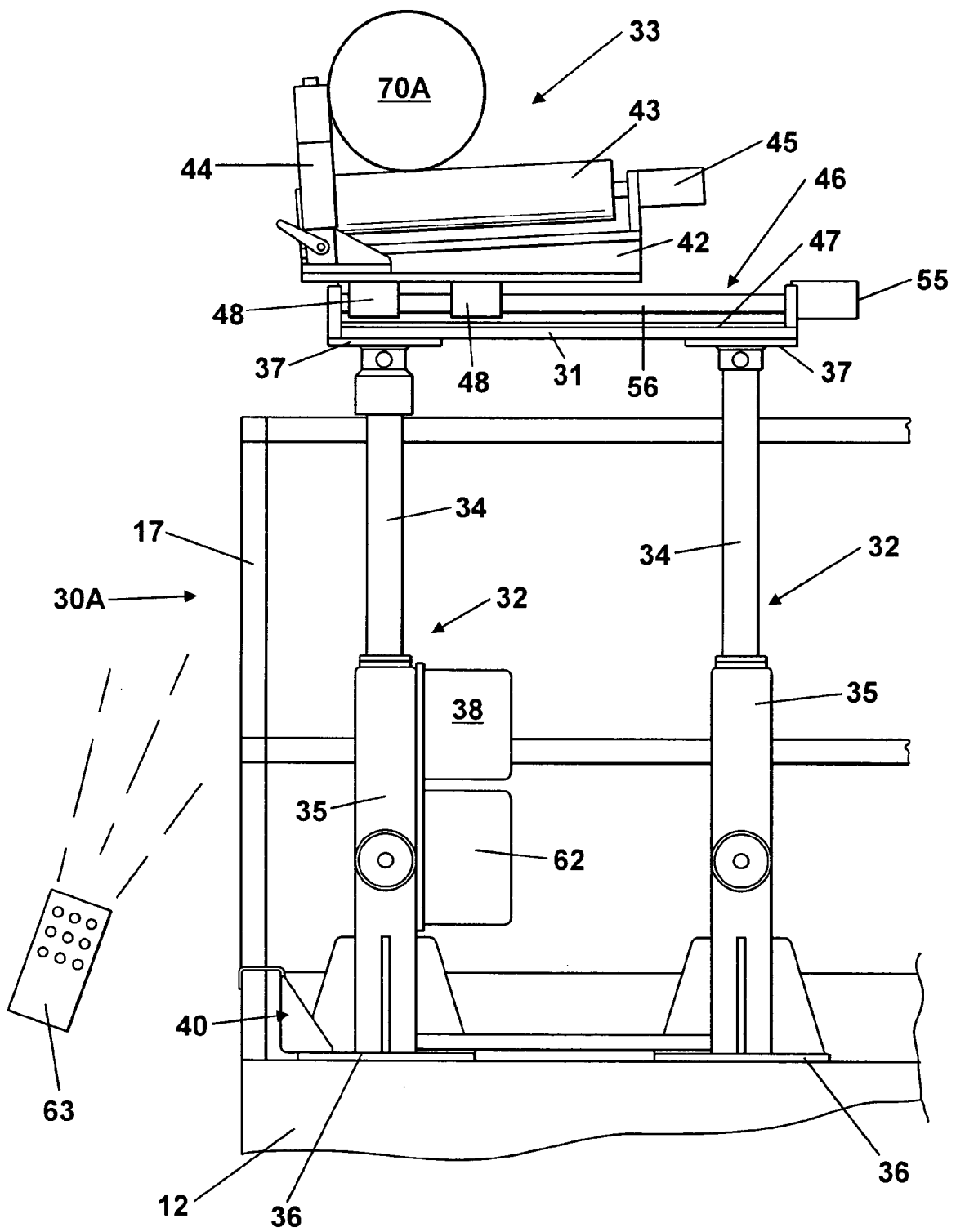


Fig. 2

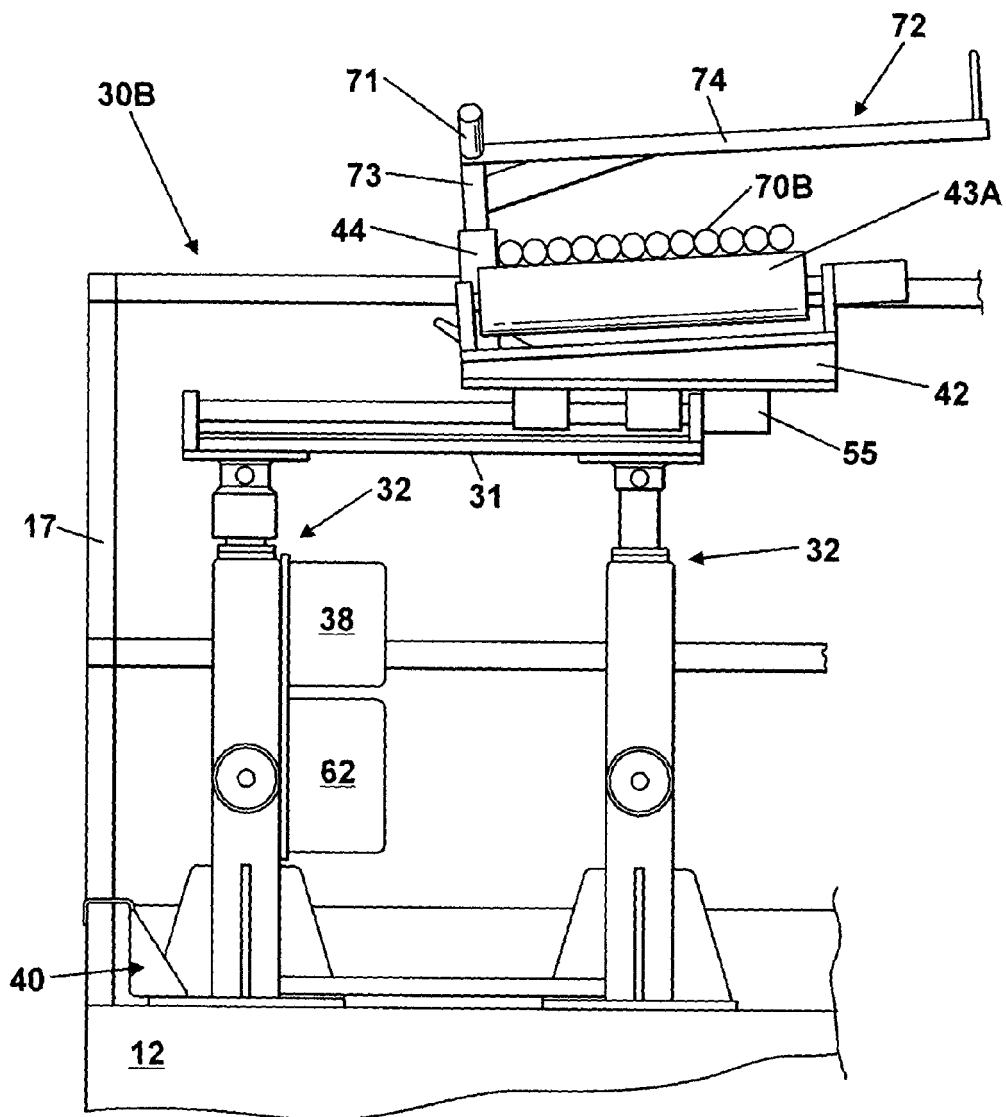


Fig. 3

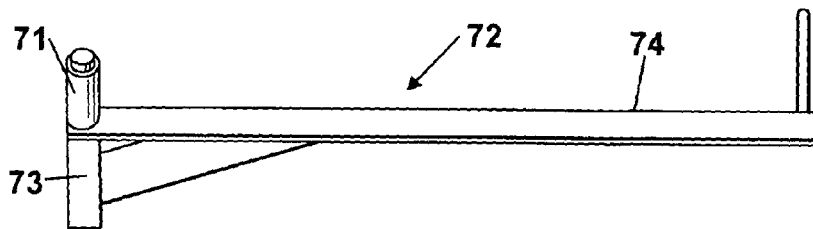


Fig. 6

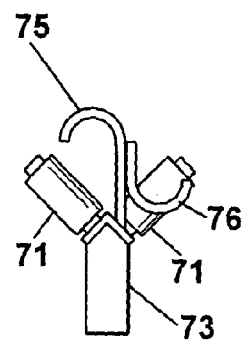


Fig. 7

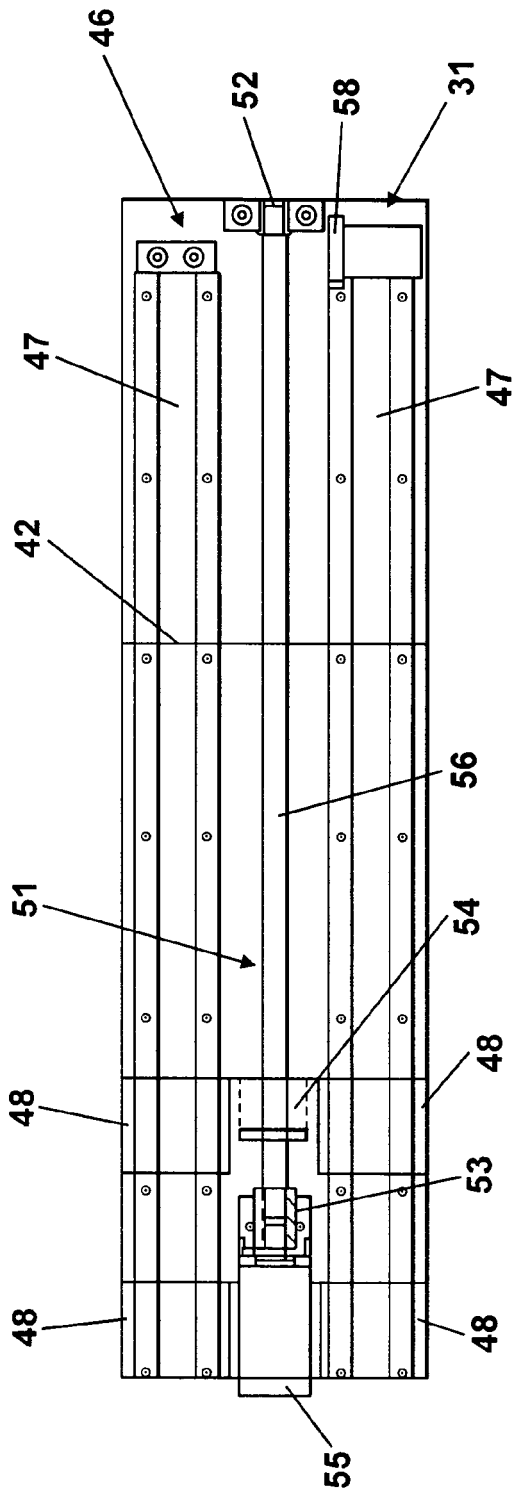


Fig. 4

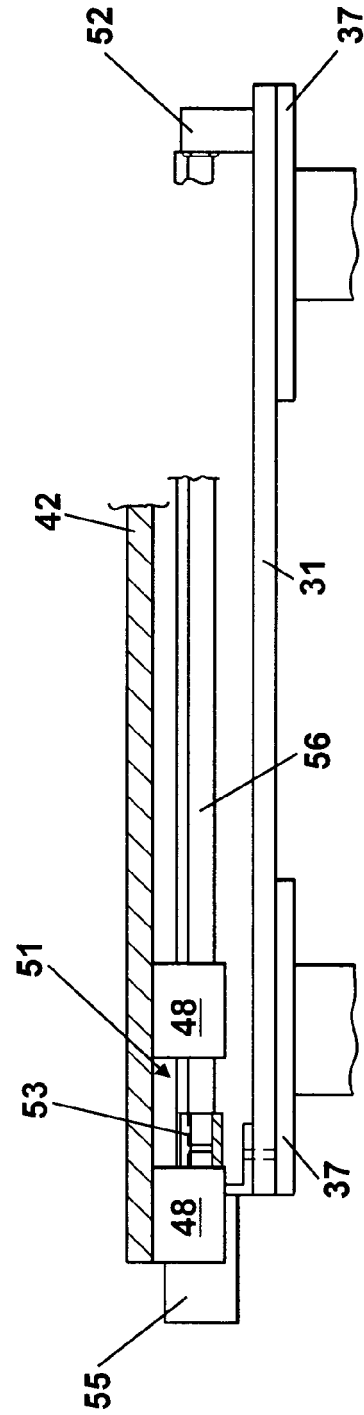


Fig. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 25 3764

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 March 2008	Examiner Ferrien, Yann
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	

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EPO FORM 1503 03.82 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- 1-12
- ☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 25 3764

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

material support characterised by a first roller inclined to the horizontal and a second roller extending upwardly adjacent the lower end of the first roller

2. claim: 13

material support characterised by a rotatable rowlock

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 25 3764

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-03-2008

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