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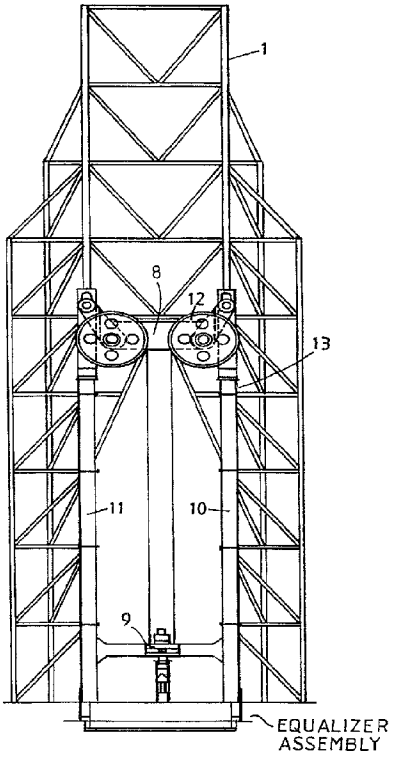
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(54) **MONTAGE CONCERNANT UN JOUG DANS UN SYSTEME DE HISSAGE POUR DERRICK**

(54) **ARRANGEMENT IN CONNECTION WITH A YOKE IN A HOISTING SYSTEM FOR A DERRICK**



(57) La présente invention concerne un équipement ayant trait à un derrick et comprenant deux, ou plus, ensembles hydrauliques piston-cylindre (10, 11) servant à hisser et à abaisser un joug (8) qui se déplace sur des rails de guidage (7) dans le derrick lui-même. Le joug (8) comprend au moins deux poulies (12), chacune agissant sur son propre câble (13). Les poulies (12) sont montées, de manière à pouvoir tourner, sur un organe de liaison rigide (20, 21, 24) situé entre elles et qui est relié, d'une manière permettant le pivotement, à l'extrémité supérieure de chaque ensemble piston-cylindre (10, 11).

(57) An apparatus connected with a derrick, comprising two or more hydraulic piston/cylinder arrangements (10, 11) for raising and lowering a yoke (8) which travels on guide rails (7) in the derrick (1) itself. The yoke (8) comprises at least two sheaves (12) each running its own wire line (13). The sheaves (12) are rotatably attached to a rigid connection (20, 21, 24) between the sheaves (12), and the rigid connection (20, 21, 24) is rotatably connected to the upper end of each piston/cylinder arrangement (10, 11).

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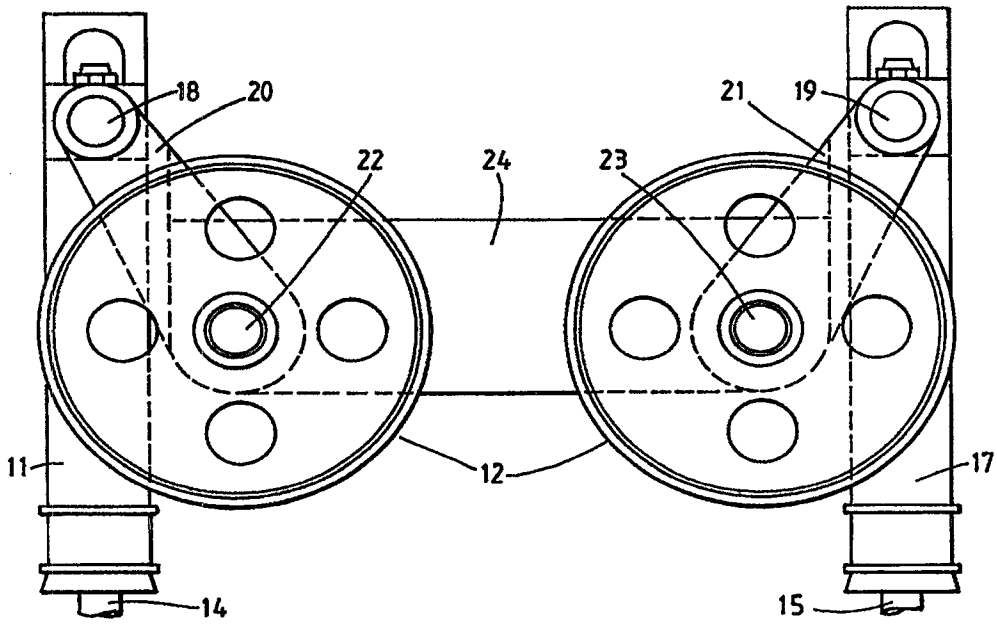
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(54) Title: ARRANGEMENT IN CONNECTION WITH A YOKE IN A HOISTING SYSTEM FOR A DERRICK



(57) Abstract

An apparatus connected with a derrick, comprising two or more hydraulic piston/cylinder arrangements (10, 11) for raising and lowering a yoke (8) which travels on guide rails (7) in the derrick (1) itself. The yoke (8) comprises at least two sheaves (12) each running its own wire line (13). The sheaves (12) are rotatably attached to a rigid connection (20, 21, 24) between the sheaves (12), and the rigid connection (20, 21, 24) is rotatably connected to the upper end of each piston/cylinder arrangement (10, 11).

ARRANGEMENT IN CONNECTION WITH A YOKE IN A HOISTING SYSTEM FOR A DERRICK

The present invention relates to an apparatus in connection with a derrick, comprising two or more hydraulic piston/-cylinder arrangements for raising and lowering a yoke which travels on guide rails in the derrick itself.

A derrick structure, developed by the present inventor in 1987, that has shown great promise is the RamRig™ concept. Two hydraulic piston/cylinder arrangements are used in the derrick for raising and lowering the drill string. The cylinders operate between the drill floor and a yoke which travels on guide rails in the derrick itself. The advantages of this concept are numerous, some of the most important being that it is possible to place the drill floor at a higher level than the platform floor, that a derrick having significantly lower air resistance can be constructed, and that the most expensive components of the derrick attain higher safety and a longer lifetime.

Since it is possible to position the drill floor higher than the platform floor, pipe handling is significantly simplified. There is no longer any need to arrange the pipe handling equipment at a high level in the derrick. All pipe handling equipment can be placed on the platform floor and the drill floor.

The object of the present invention is to solve important, practical problems in the realization of the RamRig™ concept. This object is achieved by means of the features apparent from the characterizing clause of the subsequently disclosed claim 1.

The invention will now be explained in greater detail with reference to the enclosed drawings, where

Figure 1 shows a RamRig™ derrick in every essential detail;

Figure 2 shows the derrick schematically, viewed from the side;

Figure 3 shows the derrick schematically, viewed from the front, with the top drive in its lowest position;

Figure 4 shows the derrick schematically, viewed from the front, with the top drive in its highest position;

Figures 5 shows a yoke according to the invention, viewed from the front;

Figure 6 shows the yoke of figure 6, viewed from the side; and

Figure 7 illustrates the self-adjusting function of the yoke.

Figure 1 shows a derrick 1 positioned on a drill floor 2. The drill floor is positioned at a higher level than the platform floor 3, so that the pipe handling equipment 4 can be placed, in the main, between the platform floor 3 and the drill floor 2. The derrick 1 is substantially gantry-shaped, with gantry legs 5, 6. Guide rails 7 for a yoke 8 and a top-drive 9 run along each gantry leg 5, 6. Hydraulic piston/cylinder arrangements 10, 11 are positioned so that they extend along each gantry leg 5, 6 and operate between the drill floor 2 and the yoke 8, for moving the yoke 8 vertically along the guide rails 7.

The yoke 8 is provided with a plurality of sheaves 12, preferably four, for running wire lines 13. The wire lines 13 run from the drill floor 2 along each gantry leg 5, 6, over the sheaves 12 and down to the top drive 9. By retracting and extending the piston/cylinder arrangement 10, 11, it is thus possible to raise and lower the top drive 9.

In Figures 2, 3 and 4, the function of the lift system is seen most clearly. In Figures 2 and 3, the piston/cylinder arrangement 10, 11 is shown in a completely retracted condition. The top drive 9 is then in its lowest position, quite close to the drill floor. The yoke 8 is at the upper end of the piston/cylinder arrangement.

When the pistons in the piston/cylinder arrangement are extended, the yoke 8 is lifted along the guide rails 7 up to the top of the derrick 1. The top drive is then lifted, as a result of the exchange created by the wire lines 13 being run over the sheaves 12, from its position adjacent to the drill floor 2 to a position directly below the yoke 8. The height to which the top drive 9 is lifted is thus the double of that to which the yoke 8 is lifted.

The piston/cylinder arrangement 10 will never provide a lifting force and length of stroke completely identical to that of the piston/cylinder arrangement 11. Therefore, there is a great risk that misalignment of the yoke 8 will occur and that the yoke will become stuck in the guide rails 7. In order to avoid this, it is obviously possible to choose piston/cylinder arrangements of such powerful dimensions that they will overcome such misalignments. The result, however, is that the structure becomes very expensive and heavy. According to the invention, the yoke 8 has therefore been given a special design which will eliminate misalignment and the hazard of becoming stuck.

The structure of the yoke 8 is best shown in Figures 5 and 6. Each of the piston rods 14 and 15 of the piston/cylinder arrangements 10, 11 is run through its own sleeve 16, 17 in the yoke 8. The top of the piston rods 14, 15 is attached to the top of the sleeves 16, 17. so that the attachment points of the piston rods 14, 15 are located above the sheaves 12.

Arms 20, 21, carrying the sheaves 12 are attached at point 18, respectively point 19, adjacent to the top of the sleeves 16, 17. Each arm 20, 21 carries preferably two sheaves 12 at its end 22, respectively 23, opposite to the attachment points 18, 19. A beam 24, rigidly connected to the arms 20, 21, extends between the ends 22, 23 of the arms 20, 21, and provides a constant distance between the sheaves 12.

As seen from Figure 6, guide roller assemblies 25, 26 are mounted at the upper and the lower portions of each of the sleeves 16, 17. These engage with the guide rails 7 so that the yoke 8 is only permitted to move along these. Figure 5 also shows the arrangement of the sheaves 12 in pairs.

When, for example, the piston/cylinder arrangement 10, as seen from Figure 7, attains a somewhat higher lift position than the opposite piston/cylinder arrangement 11, the beam 24 with the sheaves 12 will be drawn toward the piston/cylinder arrangement 10. Hence, the horizontal distance between the attachment point 19 of the arm 21 in the sleeve 17, and the sheave 12 will decrease, so that the vertical force operating in point 19 will increase. The opposite will occur with respect to the piston/cylinder arrangement 11, where the horizontal distance between the point 18 and the pertaining sheave 12 will increase, so that the vertical force operating in point 18 will decrease. The piston/cylinder arrangement 10 will thus carry a greater portion of the total load than the piston/cylinder arrangement 11 does. The piston/cylinder arrangement 10 will therefore encounter greater resistance than the piston/cylinder arrangement 11 does, and the latter will thus catch up with the piston/cylinder arrangement 10, so that the misalignment will be cancelled before it reaches a value which may have a detrimental effect on the structure.

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Patent Claims

1.
An apparatus in connection with a derrick, comprising two or more hydraulic piston/cylinder arrangements (10, 11) for raising and lowering a yoke (8) which travels on guide rails (7) in the derrick itself (1), the yoke (8) comprising at least two sheaves (12), each running its own wire line (13), that the sheaves (12) are rotatably attached to a rigid connection (20, 21, 24) between the sheaves (12) and that the rigid connection (20, 21, 25) is rotatably connected to the upper end of each piston/cylinder arrangement (10,11), c h a r a c t e r i z e d i n that the rigid connection (20, 21, 24) consists of a beam (24), running between the sheaves (12), and two arms (20, 21), extending obliquely upward from the beam (24) to the top end of each piston/ cylinder arrangement (10, 11).

2.
An apparatus according to claim 1, c h a r a c t e r i z e d i n that four sheaves (12) are arranged in pairs on opposite sides of the rigid connection (20, 21, 24).

3.
An apparatus according to claims 1 or 2, c h a r a c t e r i z e d i n that the rigid connection (20, 21, 24) at each end is rotatably mounted in the upper portion of a sleeve (16, 17), through which the piston rod (14, 15) of the piston/cylinder arrangement (10, 11) is passed, and to the upper end of which said piston rod is attached.

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Fig.1.

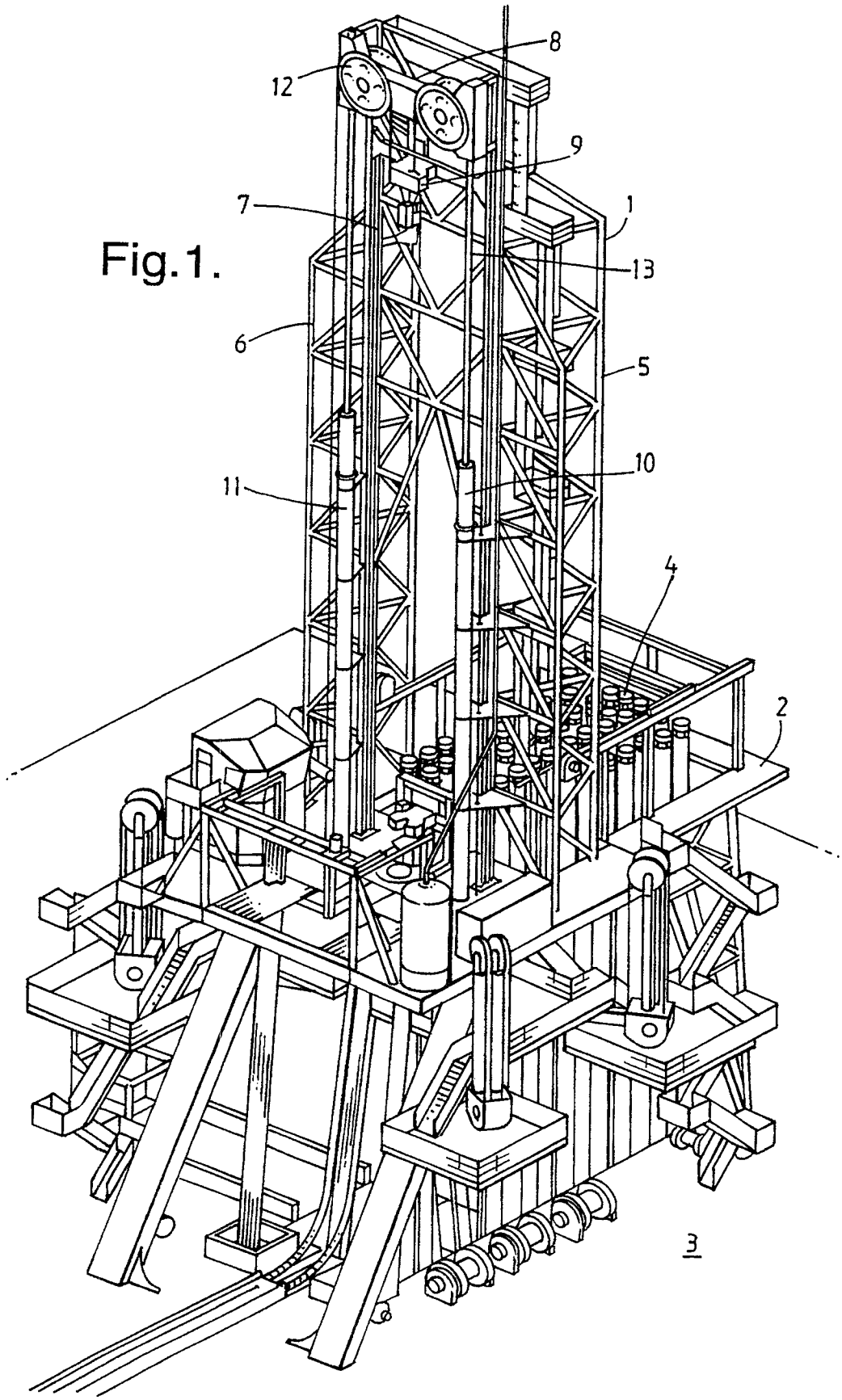


Fig.2.

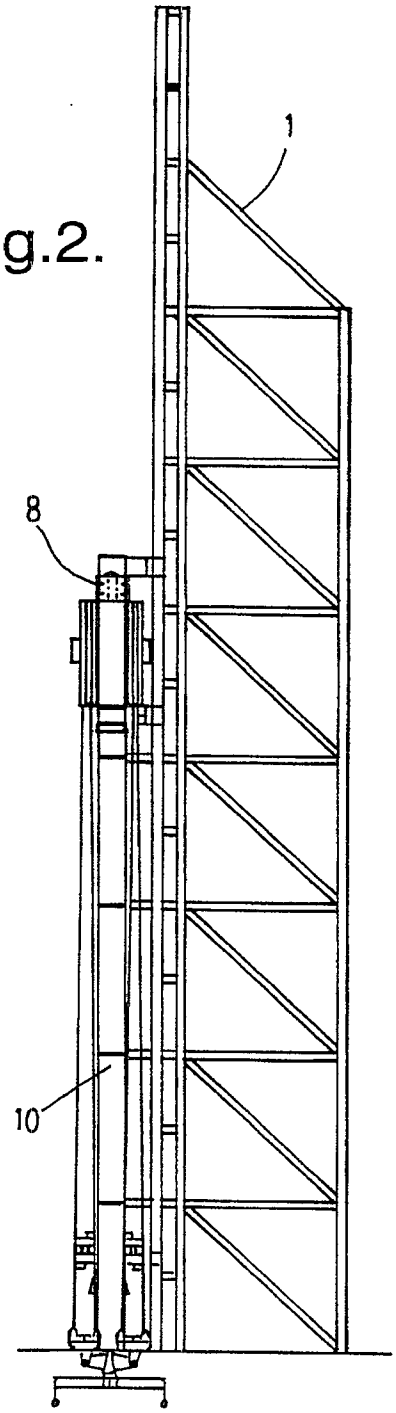


Fig.6.

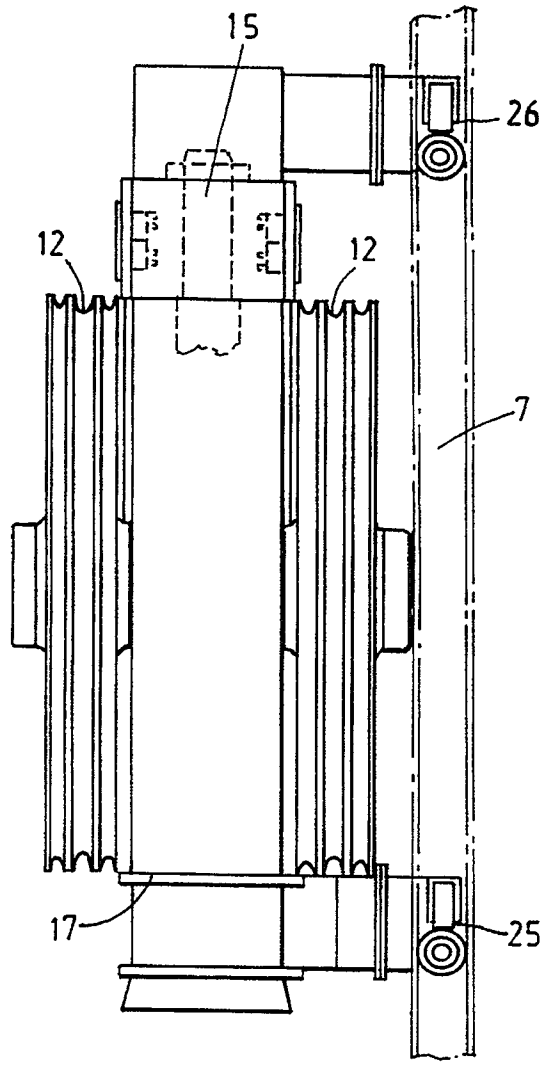


Fig.3.

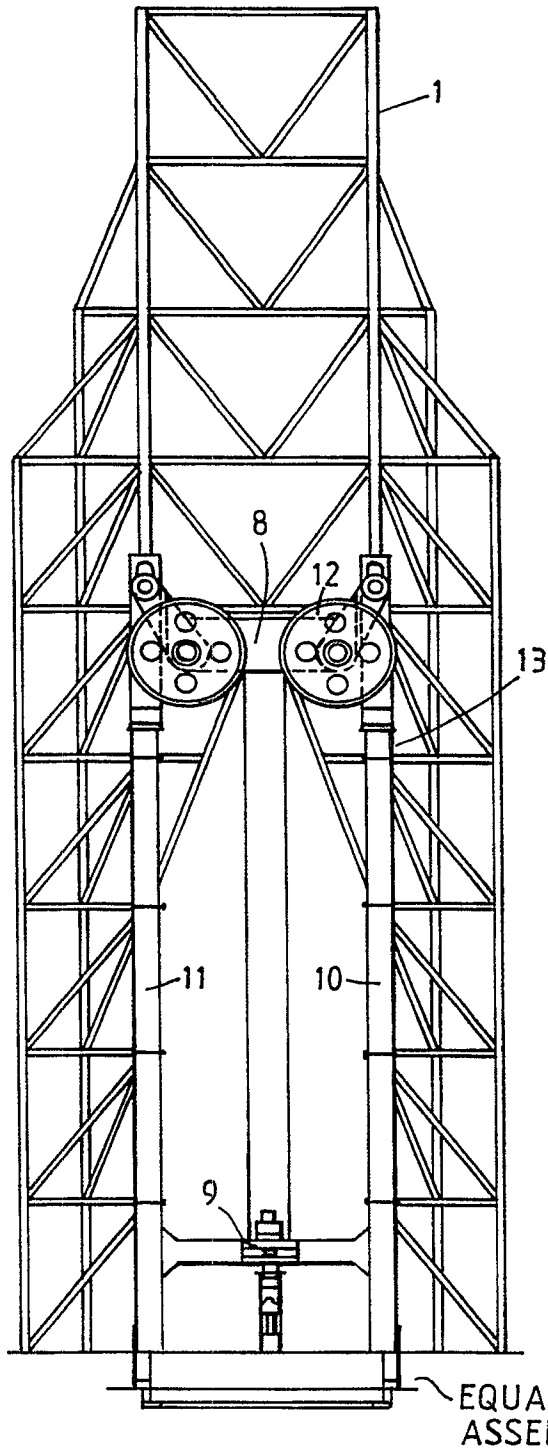


Fig.4.

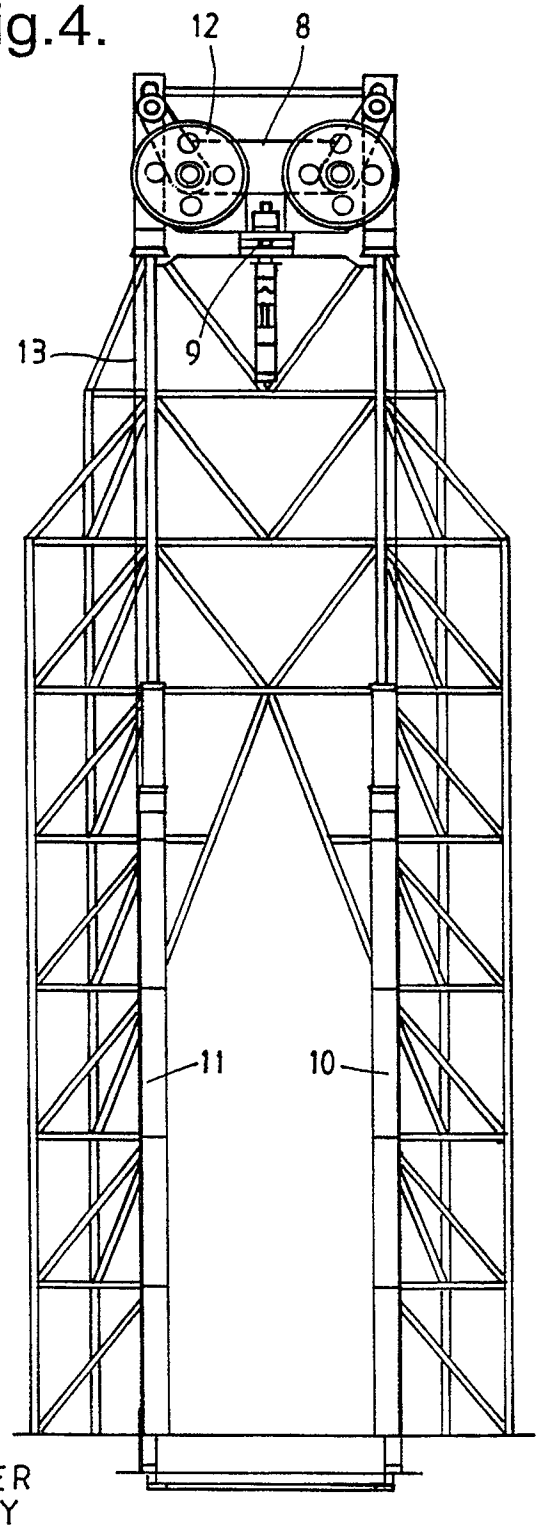


Fig.5.

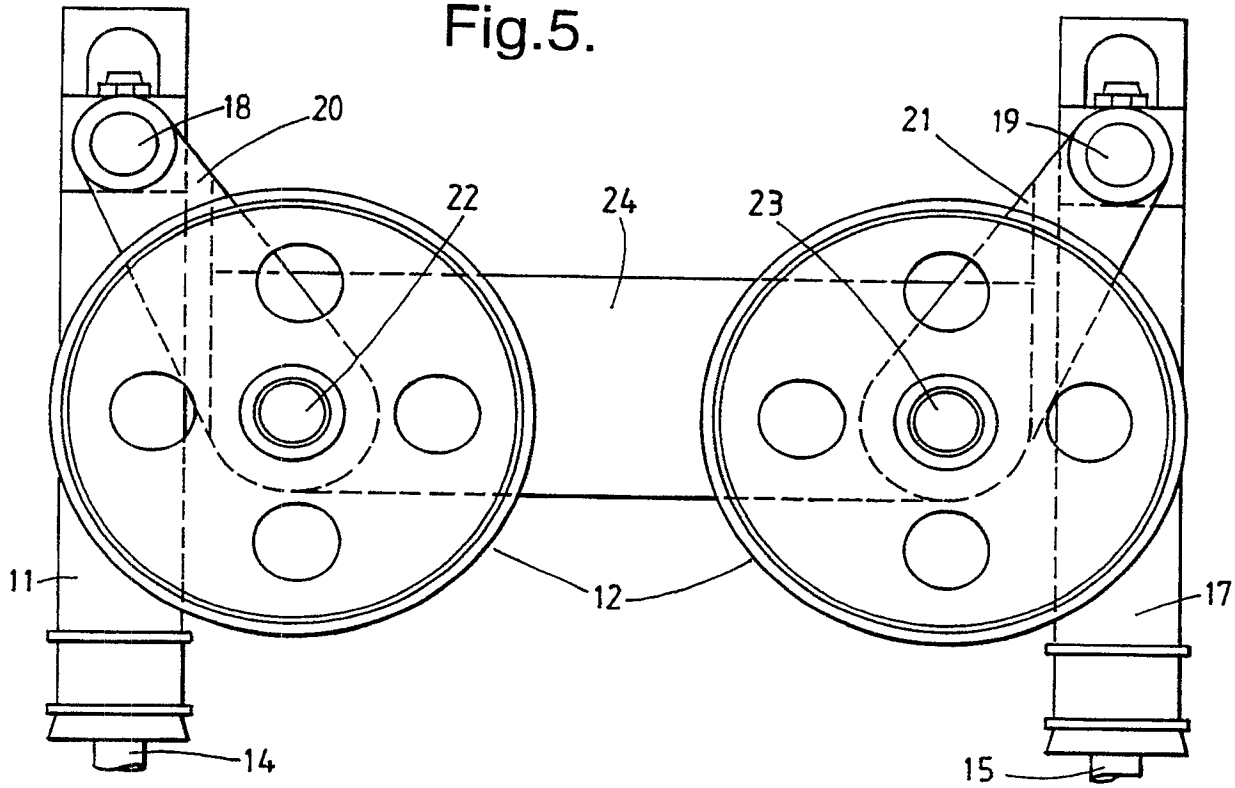
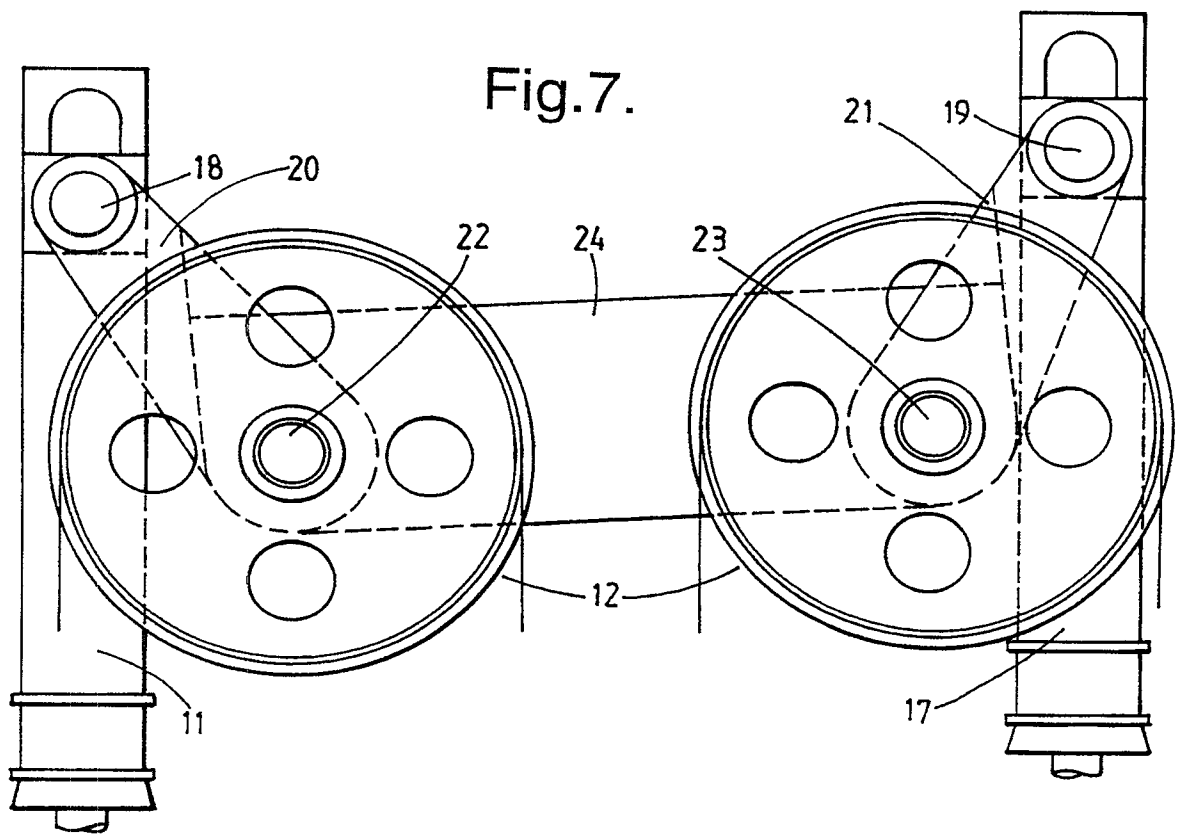
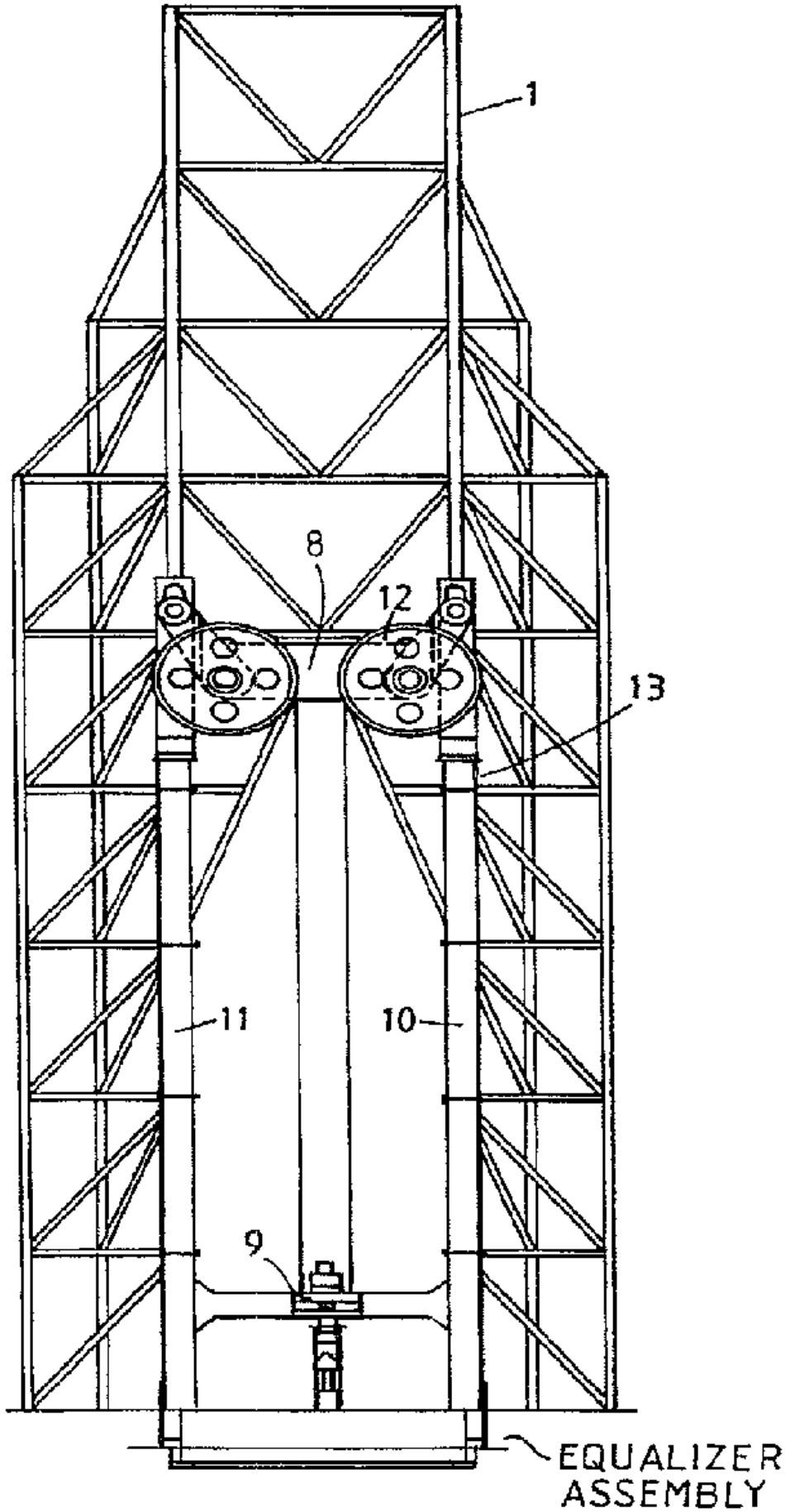


Fig.7.




1
8
12
13
11
10
9
EQUALIZER
ASSEMBLY