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54 **Vehicle jacking device.**

57 A vehicle jack is intended for jacking up large vehicles positioned over a pit (10).

The jack (28) is powered by compressed air which drives a hydraulic pump (32). The air supply not only actuates the pump but signals the actuation of the pump and the direction of operation of the jack through a single control handle (35).

The apparatus includes a frame (13) on rollers (12) which engage rails (11) extending along the sides of the pit (10). Another frame (18) carries the jack (28) and is carried on the other frame (13). On the jack is carried a transverse beam (40) with extensible ends (42, 44) which engage the vehicle.

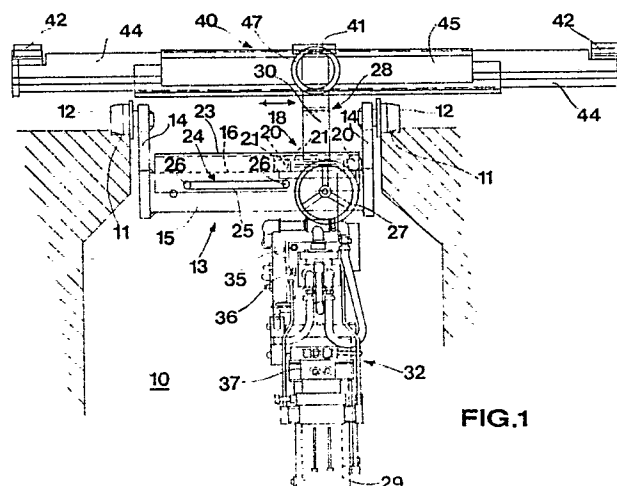


FIG.1

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Vehicle Jacking Device

This invention relates to a vehicle jacking device and in particular to a jacking device for lifting up vehicles, the device being locatable in a pit below the vehicle.

Jacking means has been proposed in which a jack assembly has been located movably on rails extending along a pit over which a vehicle to be lifted is located. The assembly includes a jack which is located in the desired position under the vehicle to effect the lifting operation. Such jacking means are of particular application in lifting large vehicles and are required to operate under arduous conditions, with safety.

An object of the invention is to provide a vehicle jacking device having improved operational characteristics.

In one aspect the device incorporates hydraulic jacking means powered by compressed air to drive a hydraulic pump and the compressed air supply is arranged to actuate the pump and to provide means for signalling both actuation of the pump and the direction of operation of the hydraulic jacking means, such signalling means including valve means actuated by a single control handle. The hydraulic supply and the air supply may be so arranged that in the event of either or both supplies failing or being interrupted the hydraulic jacking means will remain in its preselected position.

In another aspect the device includes a first frame mounted on rollers engageable with rails extending longitudinally of a pit which is located below the vehicle to be lifted, and a second frame carrying jacking means and movably mounted on the first frame for traversing the pit, the second frame carrying resilient rollers whereby when the jacking means is non-operative the second frame is movable relative to the first frame but when the jacking means is operational and bearing a load the rollers deform to cause the second frame to engage the first frame in a manner to prevent such relative movement.

The first and second frames may also be arranged such that the second frame is unable to tilt in either the longitudinal or transverse directions relative to the first frame.

The means for enabling the second frame to traverse the pit relative to the first frame may include a chain driven by drive means on the second frame and extending around sprockets on the first frame thereby allowing limited relative up and down movement between the frames.

In a further aspect the device includes a first frame mounted on rollers engageable with rails extending longitudinally of a pit which is located below the vehicle to be lifted, and a second frame

carrying jacking means, the jacking means carrying at its upper end a beam arranged to extend transverse to the longitudinal direction of the pit and engageable with the vehicle during lifting, the transverse beam having towards each of its outer ends a telescopically extendable portion, the beam including drive means for moving the extendable portions relative to its central portion, the drive means comprising a rack and pinion mechanism whereby upon operation of the drive means the outer portions are moved equally relative to the central portion. The drive means may be a manually-operated drive wheel, or a hydraulically operated piston and cylinder operatively connected between the central and outer portions. Power supply to the piston and cylinder may be from the pump also supplying the jacking means, the hydraulic fluid supply being led through the jacking means to the transverse beam and to the piston and cylinder thereby avoiding the use of external hydraulic hoses.

Various features of the invention will appear from the following description of a vehicle jacking device according to the invention, given with reference to the drawings, in which:

Fig. 1 is a front elevation of the device,

Fig. 2 is a side elevation of the device of Fig. 1,

Fig. 3 is a cross-section through manual drive means for a transverse support beam of the device of Figs. 1 and 2, and

Fig. 4 is a vertical cross section through hydraulic drive means for the transverse support beam.

Referring to the drawings and firstly to Figs. 1 and 2 part of a conventional vehicle pit 10 is shown which lies below a vehicle to be lifted by the jacking device. The pit extends longitudinally and converges towards its upper part. At the upper side edges of the pit 10 are located a pair of spaced rails 11 on which the device is mounted for movement in the longitudinal direction of the pit.

The device is mounted on the rails by sets of flanged rollers 12 to each side of the device and the rollers are carried on a first frame 13 of the device.

The first frame 13 includes downwardly depending side members 14 interconnected towards their lower ends by a pair of spaced cross beams 15 (only one of which is seen). The first frame 13 and hence the device is manually movable along the rails 11 to position the device in the longitudinal direction relative to a vehicle.

The cross beams 15 each define an upwardly-

directed surface 16 on which a second frame 18 of the device is supported for movement in the transverse direction of the pit. The second frame 18 carries two sets of resilient rollers 20 which engage the surfaces 16 of the beams 15 and, in the non-operational condition i.e. when the jacking device is not supporting any load, the rollers 20 can roll along the surface 16 to position the device in the transverse position relative to the pit 10.

The rollers 20 are carried on frame members 21 located over the surface 16 and the frame members 21 are secured to the second frame 18. The rollers 20 are each constructed to be resiliently deformable, preferably by locating a resilient bush (not shown) between a cylindrical outer rim defining the rolling surface 22 and an inner hub (not shown) whereby, when weight is applied to the hub, the hub is moved radially towards the lower side of the rim thereby reducing the height between said lower side and the axis of the roller 20. Thus the rollers 20 are deformed in this manner when the jacking means accepts a load on the second frame 18, as will be described, and this causes the frame members 21 to lower relative to the cross beams 15 of the first frame until the undersurface of the frame members 21 engage the surfaces 16 of the cross beam 15 of the first frame thereby preventing any movement between the first and second frame during operation of the jacking device. The resilience of the rollers 20 also enables a smooth transverse movement between the second and first frames when such movement is required during the non-lifting phase of the device.

Drive means for effecting the transverse movement of the second frame relative to the first frame includes a chain and sprocket mechanism 24 which consists of an endless chain 25 passing around a pair of sprockets 26 mounted on a cross beam 15 of the first frame. A manually operated drive wheel 27 is carried on the second frame and carries gear means (not shown) which engages with the chain 25 and upon rotation of the wheel the chain is driven around the sprockets 26 to cause relative transverse movement between the first and second frames. The provision of the chain and sprocket mechanism 24 allows for the limited relative vertical movement between the first and second frames, as previously described.

Each of the cross beams 15 of the first frame carry L-shaped members 23 which together with the surfaces 16 define channels in which the rollers 20 are located, the longitudinal openings of the channels being directed horizontally and towards one another. By this means the L-shaped members 23 serve to prevent the second frame from tilting about the rollers 20 should the second frame become unequally loaded and tend to pivot about a horizontal axis.

Mounted on the frame members 21 of the second frame is a hydraulically-operated piston and cylinder or jack 28 which extends vertically, the cylinder 29 being secured to the frame members 21 and the piston 30 extending upwardly for telescopic extension and retraction relative to the cylinder 29 upon operation of the jack which is double acting.

The jack 28 supports in the region below the first frame the drive and control means for the jack. Drive for the jack is supplied by a hydraulic pump 32 and the pump is driven by a compressed air supply, the source of compressed air being remote from the device and being supplied through a flexible hose (not shown). The air supply is also arranged to provide signalling means whereby the operator is able to signal that the hydraulic pump 32 is to operate and also to signal the desired direction of flow of hydraulic fluid from the pump to the jack 28.

This is achieved by providing an operating handle 35 which has three positions, a neutral, non-operating position towards which the handle is biased, an 'up' position in which the jack is caused to extend as in a lifting operation, and a 'down' position in which the jack is retracted, as in a lowering operation. The handle 35 is arranged to operate pneumatic valve means located in a housing 36 which detects the position of the handle and which transmits pneumatic signals to spool valves in housings 37 mounted on the pump 32. Thus the spool valves 37 are instructed by the pneumatic signals to operate to pass air to operate the hydraulic pump and simultaneously to direct the resulting fluid flow in the selected direction to the jack to raise or lower the jack. Thus the handle 35 is the only control means which needs to be operated to effect the two functions of controlling the air flow to the pump and the fluid flow from the pump. Moreover the provision of the spool valves 37 enables the pressure in the jack to be maintained even should the air flow to the device or the hydraulic supply from the pump be interrupted.

The valve means 36 and the spool valves 37 are of a kind already available as proprietary items and are thus of a kind already known to persons skilled in the art and they are not, therefore, described in detail.

The upper end of the piston 30 carries a support beam 40 which, in operation, extends transversely of the pit 10 and parallel to the first frame. The support beam 40 is arranged to engage and support the vehicle to be lifted and the beam 40 is also pivotable about the central axis of the piston and cylinder 28 when the device is non-operational so as to lie parallel to the longitudinal axis of the pit and within the confines of the sides of the pit. Thus, when the device is out of use, the jack 28 is

lowered with the beam in the longitudinal position so that it lies between the rails 11 and at the level of the rails 11 and the region at the sides of the pit are unobstructed by the beam 40.

The beam 40 provides a central support member 41 directly above the jack 28 and two outer support members 42 at opposite ends of the beam, the latter members 42 being required particularly for vehicles which have independent suspension. The outer support members 42 are carried on outer portions 44 of the beam which are telescopically extendable relative to a central portion 45 and which extend from opposite ends of the central portion.

Drive means is provided for moving the outer portions 44 in and out simultaneously relative to the central portion 45 and the drive means may take the form illustrated in Fig. 3 or Fig. 4.

The Fig. 3 arrangement is a manually-operated drive arrangement and in this case a handwheel 47 is carried on a shaft 47 which carries a gearwheel 48. The gearwheel 48 meshes with a larger diameter gearwheel 49 carried on a shaft 50 and the shaft 50 carries a further gearwheel 51. The gearwheel 51 engages a toothed rack 52 below the wheel 51 and attached to one of the portions 44 and a toothed rack (not shown) attached to the other of the portions 44 so that as the wheel 47 and the associated gearwheels 48, 49 and 51 are rotated the portions 44 move equally in opposite directions.

In a powered version of the Fig. 3 arrangement shown in Fig. 4 the handwheel is replaced by a hydraulically-operated ram 55 located in the beam 40 and having a piston 56 attached to an outer portion 44 and a cylinder 57 attached to the central portion 45. The racks 52 of the Fig. 3 embodiment are retained together with the gearwheel 51 so that as one outer portion 44 is moved the other outer portion 44 also is moved at the same rate but in the opposite direction.

Fluid for operation of the ram 55 is supplied from the hydraulic pump 32 which is passed up the central axis of the jack 28 through a conduit 59 leading to a bore 60 at the head of the piston 30 in which bore is located a valve 61. Fluid then passes to an annular distributor leading into the cylinder 57 of the ram 55. The ram 55 is single acting and the ram retracts under the action of a spring 63 acting between the central and outer members 45 and 44.

The hydraulic drive arrangement described avoids the use of external fluid hoses to the ram 55 which would be less satisfactory in the arduous conditions in which the device operates.

As an alternative to the single acting ram 55 described the ram may be doubleacting. As a further alternative the single ram may be replaced by two doubleacting rams, one to operate each of

the outer portions but with the rack and pinion arrangement described retained to obtain equal movement.

In order that the outer members 44 and 45 be retracted inwardly upon lowering of the piston 30 when the jack is not under load, i.e. when the jack is not supporting a vehicle, it may be provided that the valve 61 is unseated during such retraction. This may be achieved by providing an extension (not shown) in the bore 60 of predetermined length so as to unseat the valve 61 when retraction of the piston 30 exceeds a predetermined amount. However in order for retraction of the outer members 44 and 45 to be under hydraulic power hydraulic accumulators may be provided in the beam 40 to power such retraction, the hydraulic fluid passing from the ram 55 and along the bore 60 to a storage tank under the influence of the accumulators.

In order to prevent such retraction of the outer members 44 and 45 when the piston 30 is retracted with the beam 40 under load, the beam may be provided with pressure sensitive means to detect a vehicle on the beam. Such pressure sensitive means operates a valve (not shown) which locks the hydraulic fluid in the ram 55 to prevent retraction under these conditions.

Claims

1. Hydraulic jacking means powered by compressed air to drive a hydraulic pump (32) and the compressed air supply is arranged to actuate the pump and to provide means for signalling both actuation of the pump (32) and the direction of operation of the hydraulic jacking means (28), such signalling means including valve means (37) actuated by a single control handle (35).

2. Jacking means according to Claim 1 wherein the hydraulic supply and the air supply are arranged so that in the event of failure or interruption of one or both supplies, the jacking means (28) remains in its preselected position.

3. Jacking means according to Claim 1 or 2 wherein the valve means (37) comprises one or more spool valves for controlling the supply of compressed air.

4. Jacking means for vehicles including a first frame (13) mounted on rollers (12) engageable with rails (11) extending longitudinally of a pit (10) which is to be located below a vehicle to be lifted, and a second frame (18) carrying a jacking device (28), the jacking device having at its upper end a beam (40) arranged to extend in a direction transverse to the longitudinal direction of the pit (10) and arranged to be engageable with the vehicle during lifting, the transverse beam (40) having towards each of its outer ends a telescopically extendable

portion (42, 44) and the beam including drive means (47, 48, 49, 50, 51, 52; 55, 56, 57) for moving the extendable portions relative to a central portion of the beam, the drive means including a rack and pinion mechanism (51, 52) whereby upon operation of the drive means the outer portions are moved an equal amount relative to the central portion. 5

5. Jacking means according to Claim 4 wherein the drive means includes a manually-operated drive wheel (47). 10

6. Jacking means according to Claim 4 wherein the drive means includes a hydraulically operated piston and cylinder (55) operatively connected between the central and outer portions. 15

7. Jacking means according to Claim 6 wherein the power supply for the drive means includes a pump (32) which also supplies the jacking device (28), the hydraulic supply being led through the jacking device to the transverse beam (40) and to the piston and cylinder (55). 20

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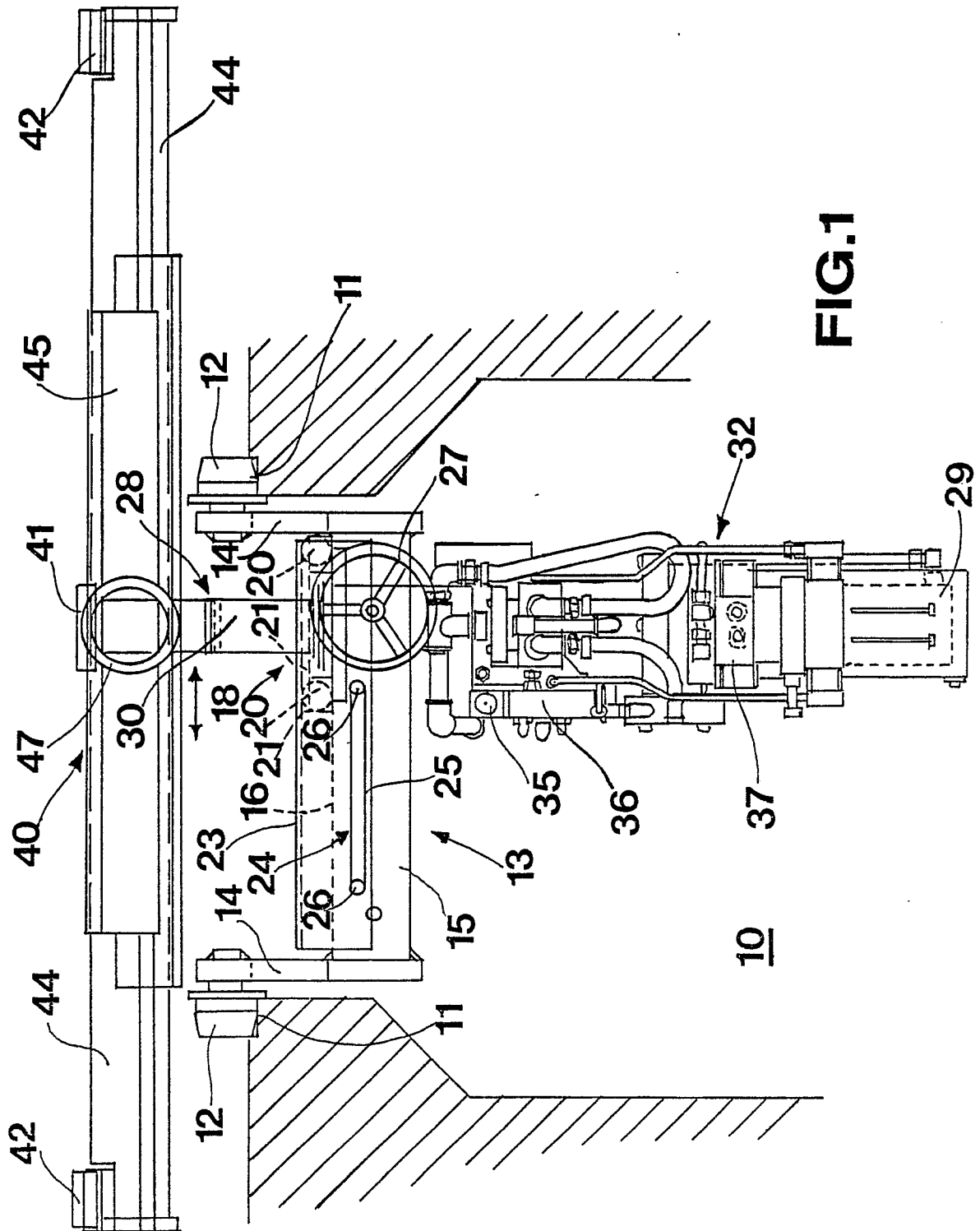
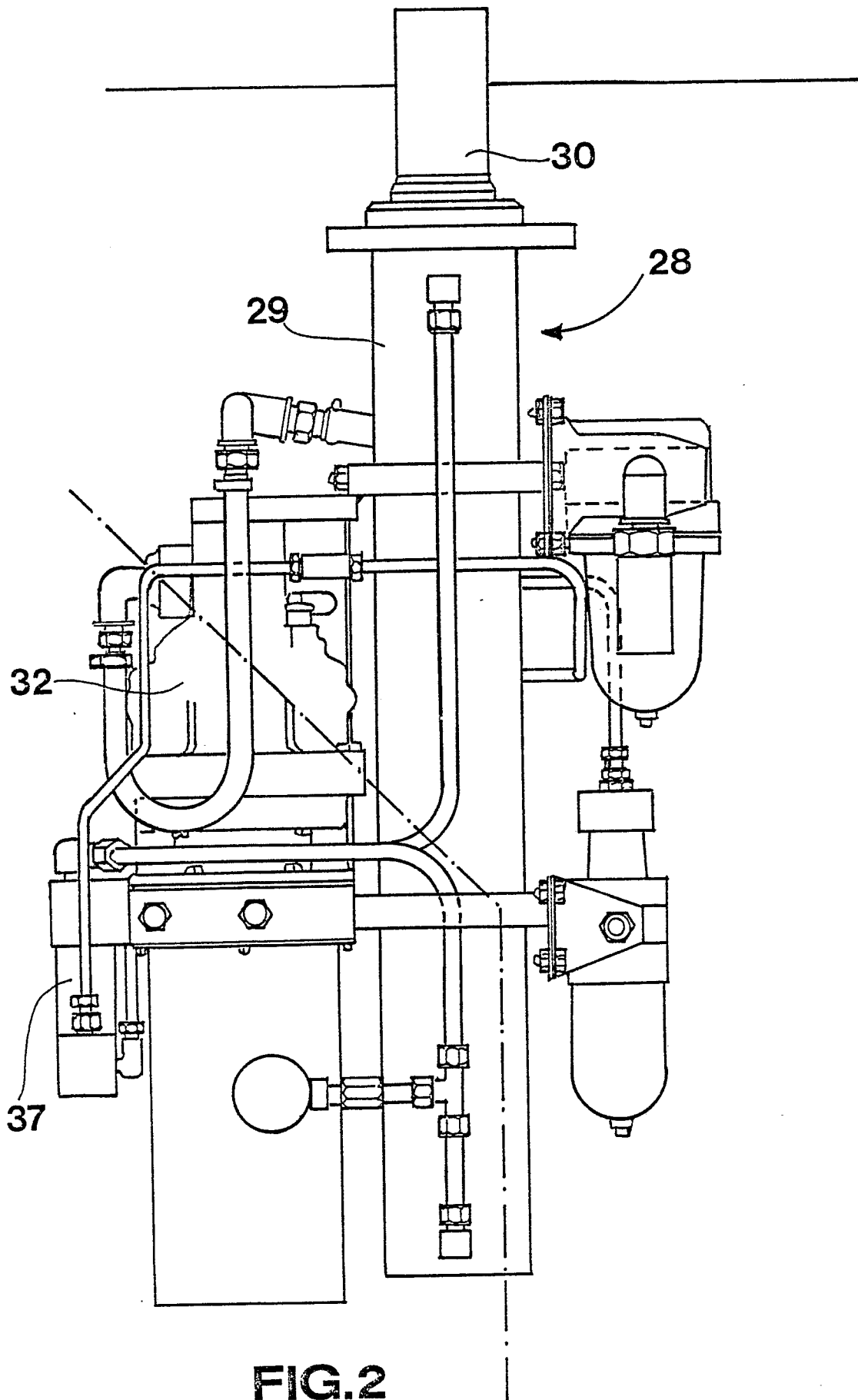


FIG.1



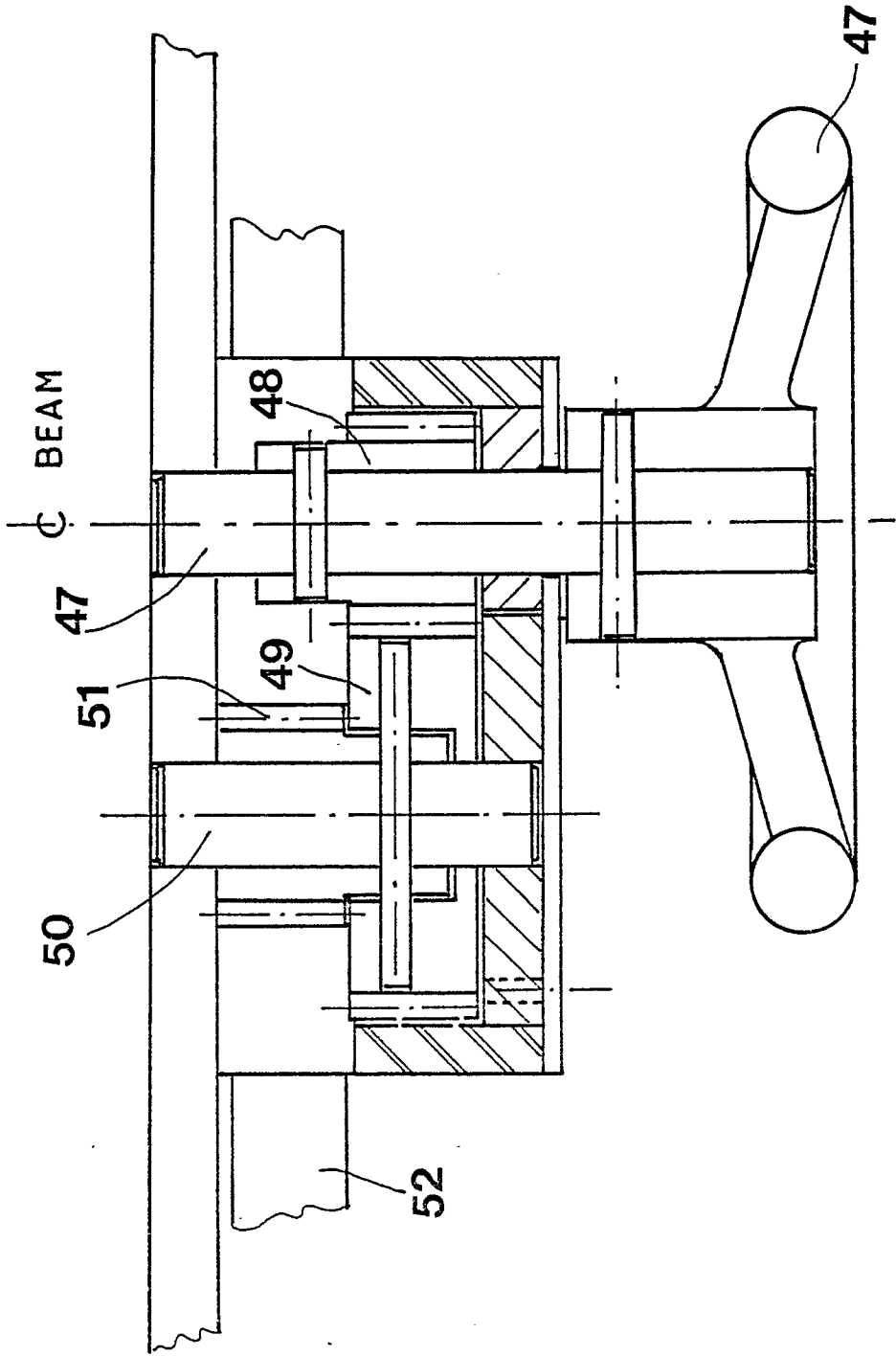


FIG.3

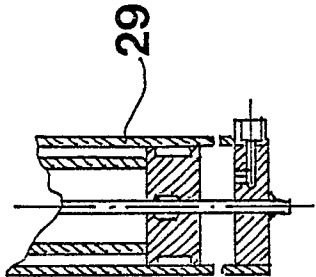
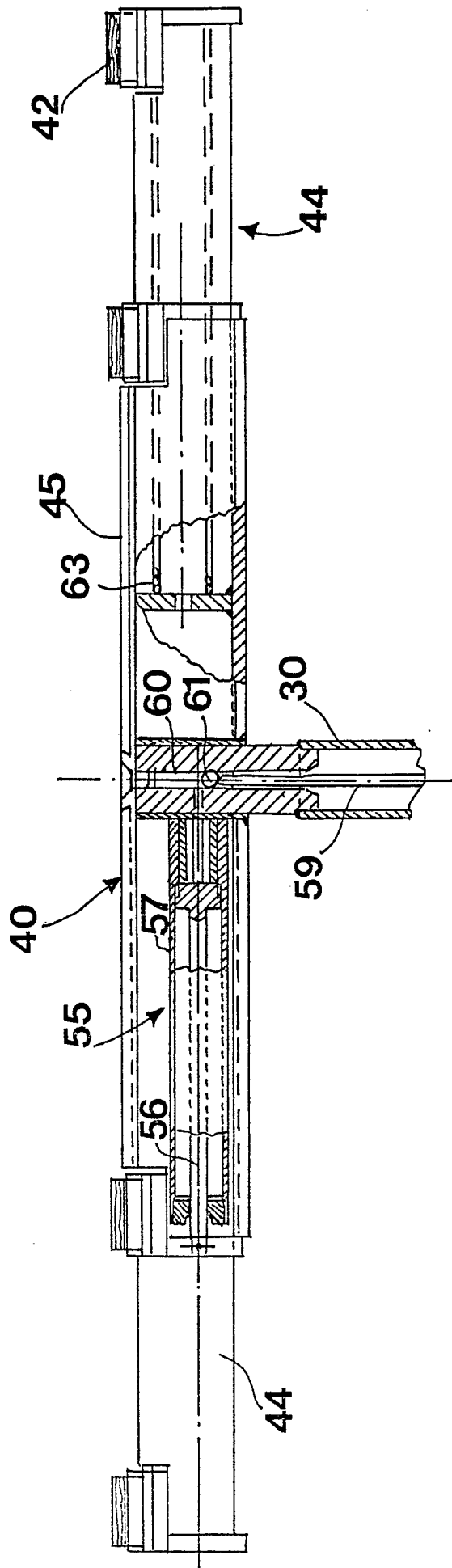


FIG.4