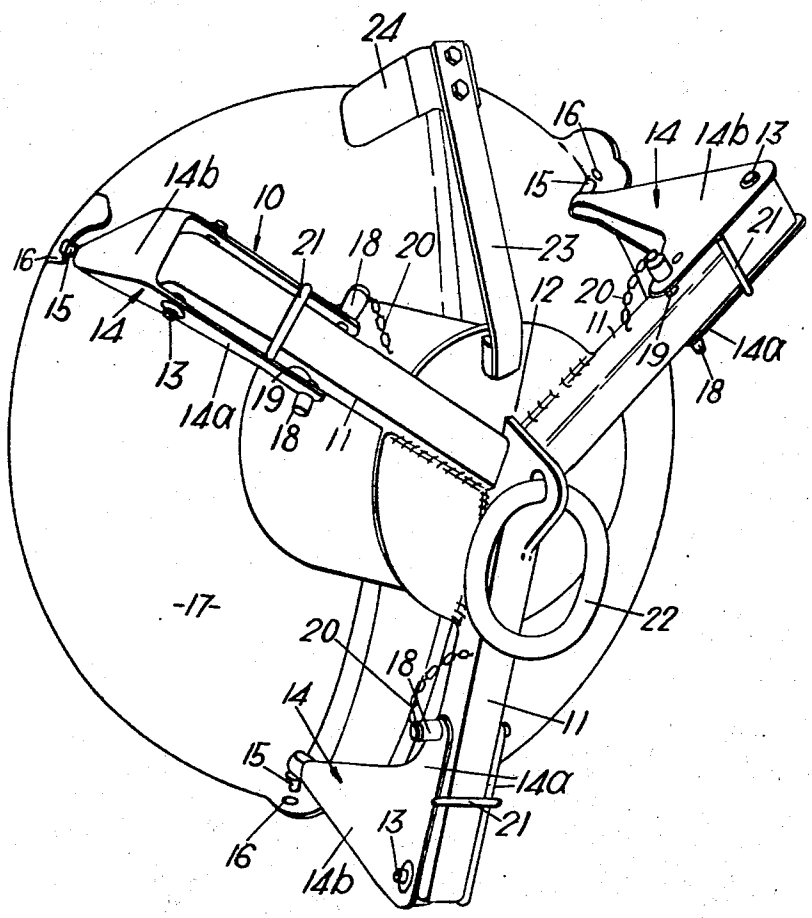
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HOISTING SLING

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HOISTING SLING

Leonard John Rodgers, Derby, England, assignor to Rolls-Royce Limited, Derby, England, a British company

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ABSTRACT OF THE DISCLOSURE

A hoisting frame has fixed radial arms which carry at each outer end a respective L-lever pivotable at the junction of its two arms in a radial plane. The inwardly extending lever arms are engageable by locking pins to lock the respective levers in positions where outwardly projecting elements carried thereby engage an article to be hoisted. Where the article is a lift jet engine the projecting elements may engage holes in the intake wall.

The present invention relates to a hoisting frame.

According to the present invention, there is provided a hoisting frame comprising a plurality of arms, each arm carrying a pivoted member provided with a respective projecting element, said members being movable between first positions in which the respective projecting elements can engage simultaneously in respective recesses provided in an article to be hoisted and respective second positions in which said projecting elements cannot so engage the article, locking means for locking each respective pivoted member as required in its said first position, and means for attaching a hoist to the frame.

Preferably, the projecting elements extend radially and are movable in a radial direction into and out of engagement with the said recesses.

Each arm preferably extends radially from a common central point, the respective pivoted members being provided at or adjacent the radially outer ends of the respective arms.

Stop means are preferably provided for limiting the range of angular movement of each pivoted member.

Said locking means preferably comprises a respective locking pin which engages in corresponding apertures in the lever and the respective arm to lock the lever in the said first position.

The pivot of each pivoted member is preferably, although not essentially, disposed radially outwardly of the said apertures engaged by the respective locking pin, the said projecting elements extending radially outwardly in said first positions to engage in respective recesses in an interior wall of the article to be hoisted. Said manner of use of a frame is described in copending U.S. application Ser. No. 521,682, filed Jan. 19, 1966, in the name of the present applicant.

According to one embodiment of the invention, said means for attaching a hoist to the frame comprises a hoist engaging member which is retained on but capable of movement with respect to the frame so that changes in the direction of the hoisting force applied to the frame may be accommodated by lateral movement of the hoist engaging member so that the hoisting force always acts through a predetermined point on the article to be hoisted. Said hoist engaging member may comprise a sliding or rolling element retained on an arcuate guide rail and adapted to move thereon. Preferably, the arcuate rail is arcuately curved with respect to a centre on the vertical axis of the article to be hoisted above the centre of gravity thereof, whereby to maintain the stability of the article while it is being hoisted.

The invention will be described, by way of example only, with reference to the accompanying drawing, which shows a hoisting frame in accordance with one embodiment of the invention.

The hoisting frame, generally indicated by **10**, comprises a member having three arms **11** extending radially at equal angular intervals from a central hub **12**. Adjacent the radially outer end of each arm **11** is a pivot **13** on which a member **14** having a lug **15** outwardly projecting therefrom is pivotally mounted. The lug **15** is received in appropriately formed recesses **16** in an article to be lifted, which in this instance, is a gas turbine engine, the intake duct **17** only of which is shown. The members **14** can each be locked relative to their respective arms **11** by a peg **18** which is received in registering apertures **19** in the members **14** and arms **11**. To prevent the pegs **18** becoming mislaid, they are fastened to the arms **11** by a wire or chain **20**.

Each pivoted member **14** is formed from the base of the U facing radially outwardly and the two limbs thereof being disposed either side of the respective arm **11**. Each pivoted member **14** comprises in effect an L-shaped lever having a portion **14***a* which extends radially inwardly from the pivot **13** and a depending portion **14***b* which carries the lug **15**. Each member **14** is prevented from pivoting too far by a stop bar **21** affixed to the respective arm **11** and lying in the path of pivoting movement of the portion **14***a*.

A hoisting ring **22** is attached to the hub **12** for attaching a hoist (not shown) to the frame **10**.

Disposed between two of the arms **11**, is a positioning arm **23**, carrying an inverted U piece **24**, which fits over a fixed projection on the engine intake **17**, thus providing rapid alignment of the lugs **15** with recesses **16**.

While the frame **10** has been shown with the apertures **19** disposed radially inwardly of pivots **13**, so as to be suitable for engaging an article by moving the lugs **15** radially outwardly from the interior of the article, it is to be understood that the invention also includes a frame **10** in which the pivots **13** are disposed radially inwardly of apertures **19** to permit the lugs **15** to be moved radially inwardly and engage an article from the exterior thereof.

In another embodiment of the invention, not shown, which is suitable for hoisting an article along a path which is not vertical, the ring **22** is replaced by a movable hoist engaging member, such as a slide, roller or ring which is retained on, but may move laterally with respect to, a guide rail extending across the normally uppermost side of the arms **11**, said hoist engaging member being in use attached to a hook or like lifting element of a hoist or crane. The guide rail is arcuately curved about a point on the vertical axis of the article to be lifted above the centre of gravity of the article to maintain the stability of the article while it is being hoisted. A method and apparatus for hoisting an engine in this way is described in said application Ser. No. 521,682, filed Jan. 19, 1966. There may be more than one rail, which would then intersect with the first named rail, to permit the article to be hoisted along a number of different non-vertical paths without upsetting the stability thereof.

I claim:

1. A hoisting frame comprising a hub, at least three fixed arms extending radially at equiangular intervals from the hub, a respective L-shaped double lever pivotally mounted at the radially outer end of each respective arm about an axis extending circumferentially with respect to the hub, each said lever having a first lever arm extending downwardly from the respective pivot axis and a second lever arm extending radially inwardly from said pivot axis, a respective radially outwardly projecting element provided on each respective first lever arm, a respec-

tive locking pin, and pin-receiving apertures at the radially inner end of each said second lever arm and in the respective fixed arm, said apertures being aligned and the pin being receivable in said apertures to lock the respective double lever relative to the fixed arm when the respective projecting element is in a position in which it is engageable with an article to be hoisted, the lever arms being movable independently when the locking pins are disengaged from said apertures to positions in which the article to be hoisted is not so engageable with said article, and means for attachment of a hoist to the frame.

2. A hoisting frame as claimed in claim 1 in which a stop member is provided on each fixed arm for limiting the range of angular movement of the respective L-shaped double lever.

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HUGO O. SCHULZ, *Primary Examiner.*

GERALD M. FORLENZA, *Examiner.*

G. F. ABRAHAM, *Assistant Examiner.*