Oct. 7, 1958 A. E. R. ARNOT 2,855,071

INDUSTRIAL TRUCKS

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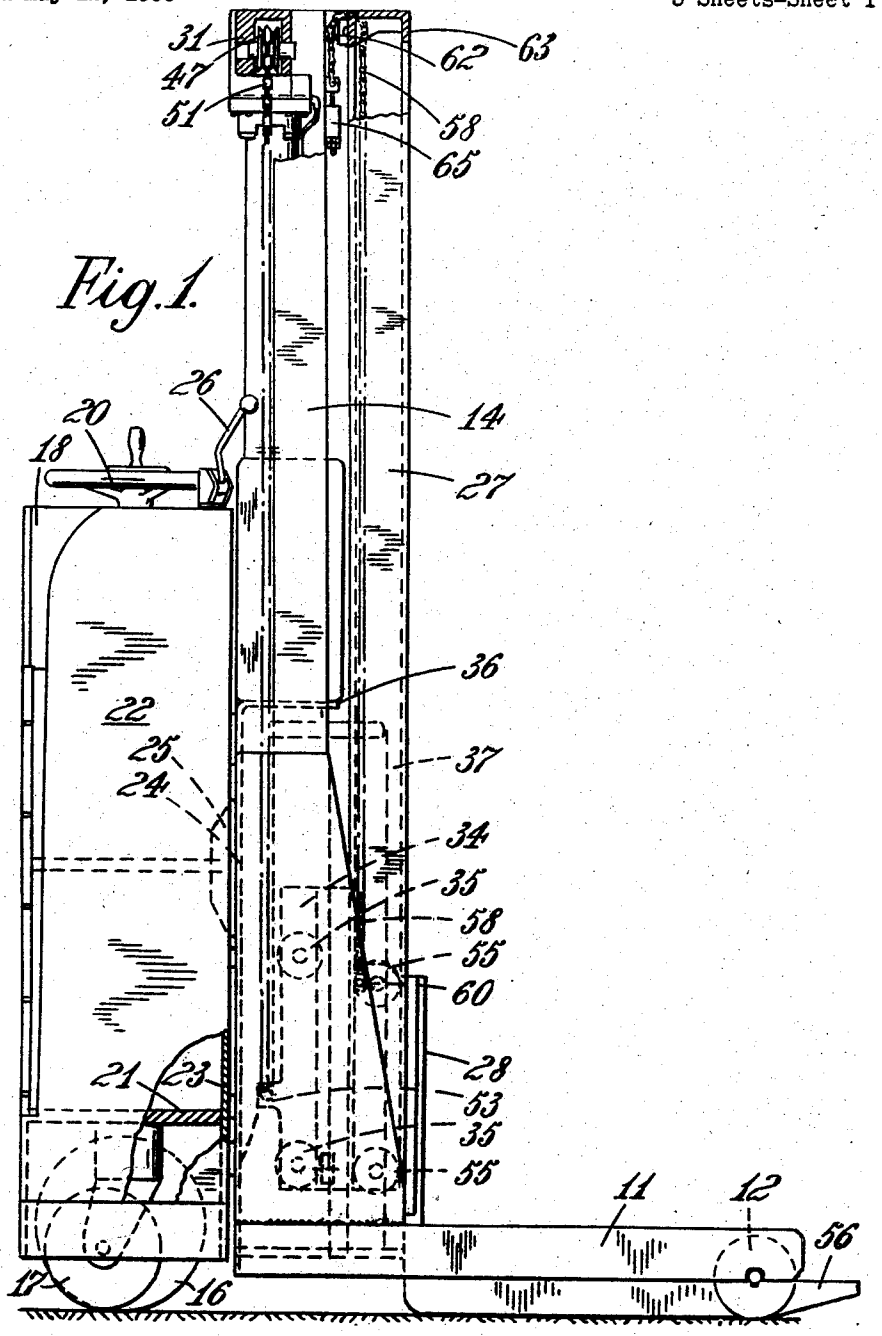

Fig. 1.

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Fig. 2.

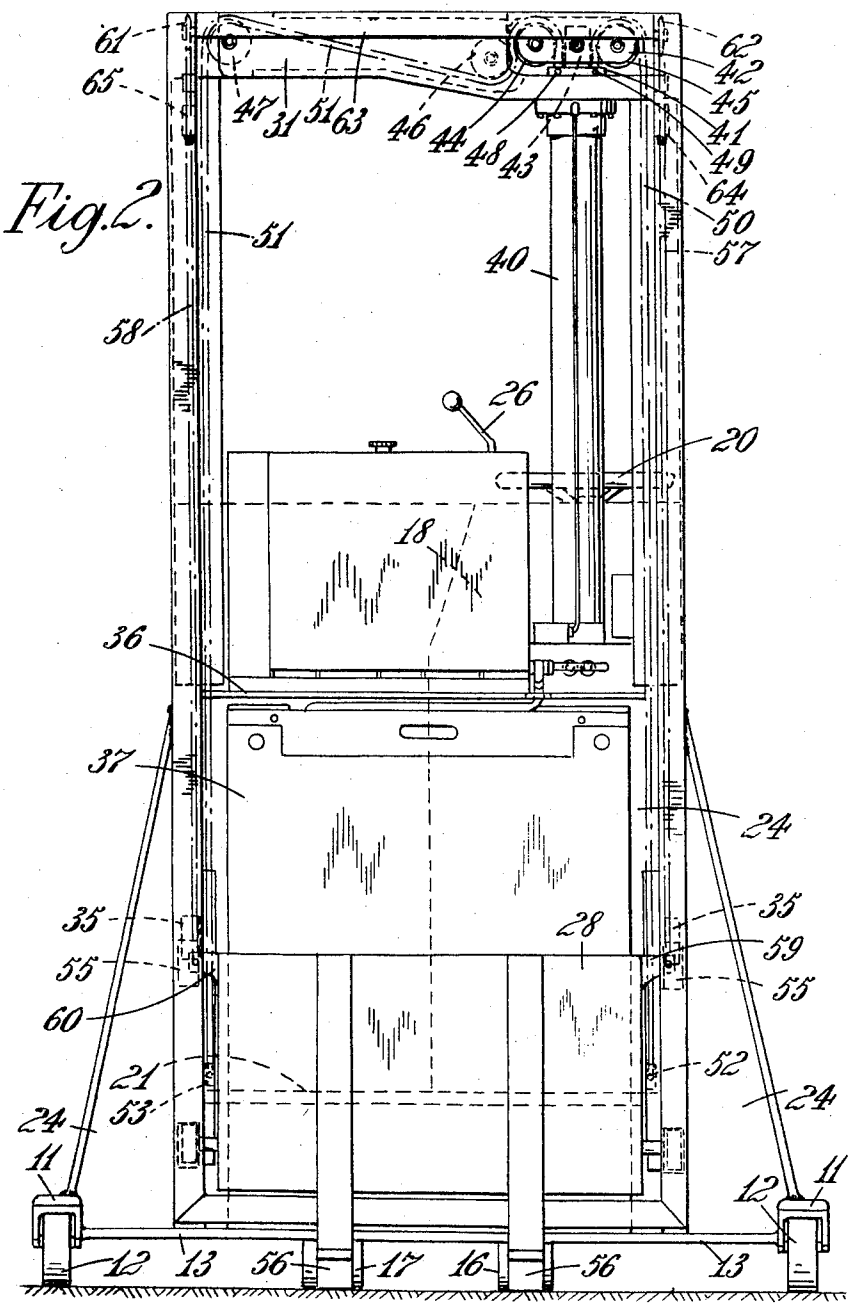

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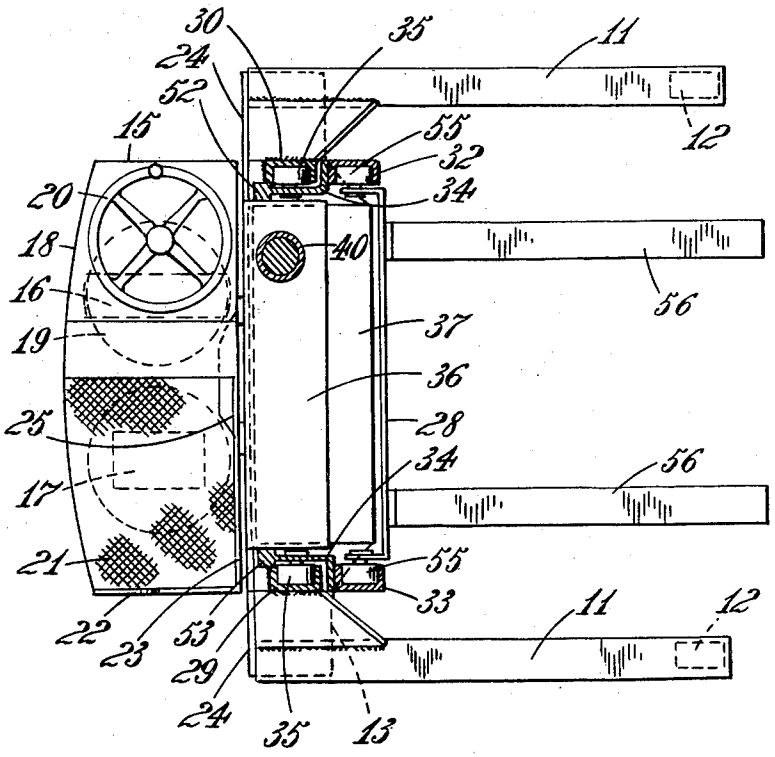
Fig. 3.



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INDUSTRIAL TRUCKS

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Claims priority, application Great Britain May 14, 1954

3 Claims. (Cl. 187—9)

The present invention comprises improvements in or relating to industrial trucks of the type which have a mast comprising two transversely spaced mast side-members united by a cross-piece, a carriage mounted on the mast for up and down movement, which carriage may carry fork-arms or other work engaging members or, in the case of a telescopic mast a mast extensible section.

One of the principal obstructions to the view between the sides of the mast is the lifting gear for the carriage on the mast, which, as it must lift both sides of the cradle or carriage equally is placed symmetrically and usually comprises a vertical hydraulic cylinder and ram and chains therefrom running over pulleys on the mast to the cradle.

The present invention provides a construction in which the lifting parts are displaced to one side of the mast to afford a clear view and yet are capable of lifting both sides equally without imposing any bending or lateral stresses on the ram or associated parts.

According to the present invention a carriage lifting system for a truck of the type described comprises a substantially upright fluid-pressure cylinder disposed unsymmetrically so as to be close to one side-member of the mast, a lifting-ram within the cylinder and protruding above it crowned by a guide-carrying head, guides for chains, cables, or the like, transversely spaced apart on the head, and chains, cables or the like extending upwardly from a fixed retaining point or points over the said guides and then depending downwardly, one to an anchoring point on the carriage, and the other to a further guide under which it passes then over a final guide positioned adjacent the mast side-member furthest removed from the ram, to an anchoring point on the carriage.

In a preferred construction an extensible mast section is mounted on the said carriage, a work-engaging member carrying carriage being mounted for up-and-down movement on the extensible section and operated by chains which are attached at one end of the said carriage and extend upwardly therefrom over a glide on the extensible section to an anchoring point on the fixed mast. Preferably the guides comprise chain pulleys.

The following is a description by way of example of one embodiment of the invention as applied to fork lift trucks:

In the accompanying drawings,

Figure 1 is a side elevation of a truck in accordance with the invention;

Figure 2 is a front elevation of the same, and

Figure 3 is a plan.

The truck shown has a chassis which is made in two sections, a front section which consists of side straddle legs **11** having ground rollers **12** at their front ends and rigidly united to a cross-member **13** which supports a fixed mast **14**; to this front section there is secured a rear section **15** of the truck which rests on wheels **16**, **17**, and comprises a casing **18** containing a power-driven steerable turntable mounting **19** for the wheel **16**, which is operated by a steering wheel **20**. The casing **18** and its contents are located to one side of the rear section **15** of the truck and beside it is a platform **21** above the wheel **17** (which is a castor wheel and therefore follows the movements of the power-driven steering wheel **20**) upon which the operator can stand. The platform **21** is enclosed at the outer side by a plate **22** and the front part of the rear section **15** of the truck is formed by a front-plate **23** which extends between the platform and the front part of the truck chassis in a vertical plane and forms the front part of the casing **18**. The back of the front part of the truck is formed by a plate **24** which is welded across the back of the mast **14** and stands up close in front of the plate **23**. The plates **23**, **24**, are united together by a large central pivot bearing **25** (Figure 3) which enables all the four wheels **12**, **12**, **16**, **17**, to rest equally upon the ground. The operator standing on the platform **21** is to one side of the centre line of the truck and is able to steer it by the wheel **20** and to control the power-means and brake by a control handle **26**.

In front of the fixed mast **14** is a rising section of the mast **27**, and on the rising section is a fork-carriage **28**.

The fixed mast has a transverse shelf **36** which extends between its side-members, and below the shelf is a space for a battery box **37** resting on the bottom cross-member **13** already referred to.

The fixed mast **14** comprises two upright inwardly directed channel-section side-members **29**, **30** (seen in section in Figure 3) united at the top by a transverse cross-member **31**. The rising mast-section **27** is of similar form with side channels **32**, **33** and is mounted in front of the fixed mast with carriage-members **34**, provided with rollers **35** which run within the inwardly directed flanges of the fixed mast channel-section side members **29**, **30**.

Within and slightly behind the fixed mast near one of the side members **30** thereof is a hydraulic cylinder **40** resting on shelf **36**, which is strengthened for the purpose. A hydraulic lifting ram **41** operates within the cylinder and extends just clear of the upper end thereof as shown in Figure 2, when the ram is in its lowermost position. Mounted on top of the ram **41** is a transversely extending head or chain pulley carrier **42** which is made up of two transversely extending plates welded to a central spacing-member **43** which member is attached to the end of the ram **41**. Two pulleys **44**, **45** are mounted on bearings between the plates, one on either side of the ram, so as to be capable of freely rotating. The transversely extending cross-member **31** on the fixed mast is of hollow plate construction and has a pulley **46** mounted therein adjacent to and slightly below the ram head **42** (when the ram is in lowered position). Spaced from and at a higher level than this pulley, positioned within the said cross-member **31** at a point close to the side-member **29** remote from the hydraulic cylinder **40**, is a further pulley **47**. A pair of lifting chains **50**, **51**, are anchored at **48**, **49** to the top of the hydraulic cylinder **40** and pass upwardly on either side of the ram into the pulley carrying head **42** inside the pulleys **44**, **45** and outwardly over them. The chain **50** nearest the mast upright **30**, which is adjacent the hydraulic cylinder, then passes vertically downwardly close to that upright side member and is anchored to the carriage **34** at **52**. The other chain **51** passes downwardly beneath the first pulley **46** on the cross-member and then continues upwardly and transversely within the cross-member and over the pulley **47** furthest remote from the cylinder, and thereafter depends vertically downwardly to an anchoring point **53** on the carriage **34**. The carriage **34** is so shaped at its rear that it will not foul the hydraulic cylinder **40** or chains **50**, **51**.

Mounted on the rising section **27** of the mast is the second carriage **28** already referred to which similarly runs on rollers **55** within the mast extensible section and

which carries a pair of fork arms **56**. This carriage is lifted on two chains **57, 58**, one attached to each of the upper corners **59, 60** thereof. The chains extend upwardly within the extensible section of the mast and pass over pulleys **61, 62** mounted on the top **63** of the section at the rear thereof. The chains **57, 58** then extend downwardly behind the extensible section and are anchored to the fixed mast at **64, 65**.

In operation, fluid pressure is admitted to the hydraulic cylinder **40** thus lifting the ram **41** and with it the extensible mast **27** on its carriage **34**. The fork arm carrying carriage is lifted by its own chains **61, 62**, at twice the rate of the extensible mast. It is to be understood, of course, that the chains may be replaced by cables or the like or that the lifting ram **41** may be pneumatically operated. Also that the hollow cross-member **31** may be positioned at a point on the mast other than its top, the same effect still being achieved.

What I claim is:

1. In a goods handling truck, the combination of a wheeled chassis, a generally vertical mast comprising two parallel spaced apart side members mounted on said chassis and a fixed transverse member extending between said side members at the upper ends thereof, said transverse member having first guide means on one end thereof adjacent one of said masts and second guide means positioned between said masts, a load carrying member mounted on and extending between said mast side members for vertical movement therealong, lifting means for said load carrying member comprising relatively movable cylinder and ram means mounted closely adjacent the other of said parallel side members and having a movable cross-head, and flexible means interconnecting each end of said cross-head and a side of said load carrying member, said flexible means on the side of said cross-head adjacent said one mast extending downwardly around beneath said second guide, transversely therefrom to and upwardly around above said first guide and then downwardly along said one mast to one side of load carrying member, and on the side of said cross-head adjacent said other mast extending downwardly along said other mast to the other side of said load carrying member, said first and second guide means being positioned on said fixed transverse member providing parallel vertically extending flights of said flexible means.

2. A truck as claimed in claim 1, wherein the load-carrying member consists of a rising section of mast and a fork-carriage thereon.

3. A truck as claimed in claim 2, wherein the fork-carrage is slidable on the rising section of the mast and is supported on two flexible lifting members one end of each of which is anchored to a part secured to the fixed mast and which pass over guides on the upper end of the rising mast and thence downwardly to the fork-carriage, to which they are secured.

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