United States Patent [19]

Shaw

[11] **3,856,149**

[45] **Dec. 24, 1974**

[54] **MOBILE LOAD HANDLING MACHINES**

[75] Inventor: **Donald George Shaw,** Albrighton, England

[73] Assignee: **Shaw, Trew & Smith Limited,** Shifnal, England

[22] Filed: **June 6, 1973**

[21] Appl. No.: **367,373**

[52] **U.S. Cl.** ..... **212/38,** 180/79.2 R, 212/59, 280/34 R

[51] **Int. Cl.** **B62d 5/06**

[58] **Field of Search** ..... 212/38, 17, 59, 124, 140, 212/145, 141, 6, 10; 214/75 H, 141, 131–138, 148, 672; 280/34 R; 180/79.2 R

[56] **References Cited**

UNITED STATES PATENTS

3,257,013	6/1966	Arnold	214/131
3,504,815	4/1970	De Bona	214/672
3,633,702	1/1972	Shaw	280/34 R
3,670,910	6/1972	Shaw	280/34 R

FOREIGN PATENTS OR APPLICATIONS

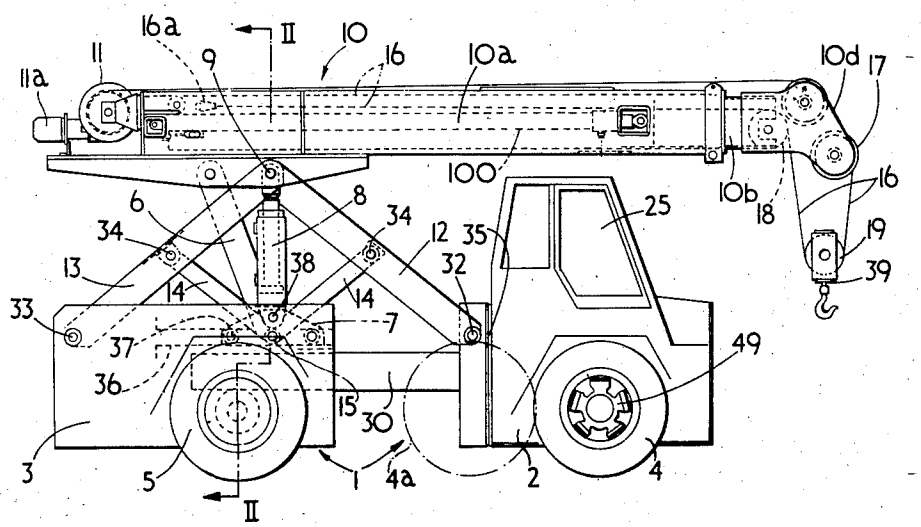
272,937	8/1964	Netherlands	212/33

Primary Examiner—Robert G. Sheridan
Assistant Examiner—Lawrence J. Oresky
Attorney, Agent, or Firm—Watson, Cole, Grindle and Watson

[57] **ABSTRACT**

A mobile load handling machine primarily in the form of a crane is provided in which a jib is pivotally mounted from the machine chassis on upstanding mutually inclined linkage which interconnects front and rear wheeled portions of the machine chassis, which chassis portions are movable relative to one another along the fore and aft axis of the machine while ram means and tie linkage are pivotally connected between a mounting member movable in a fore and aft direction on one of the chassis portions and the jib whereby on extension and retraction of the ram means it operates in conjunction with the tie linkage to effect raising and lowering luffing movement of the jib and also operates in conjunction with the mutually inclined linkage to effect relative retraction of the chassis portions to reduce the wheel base of the machine on raising of the jib and vice versa.

7 Claims, 5 Drawing Figures



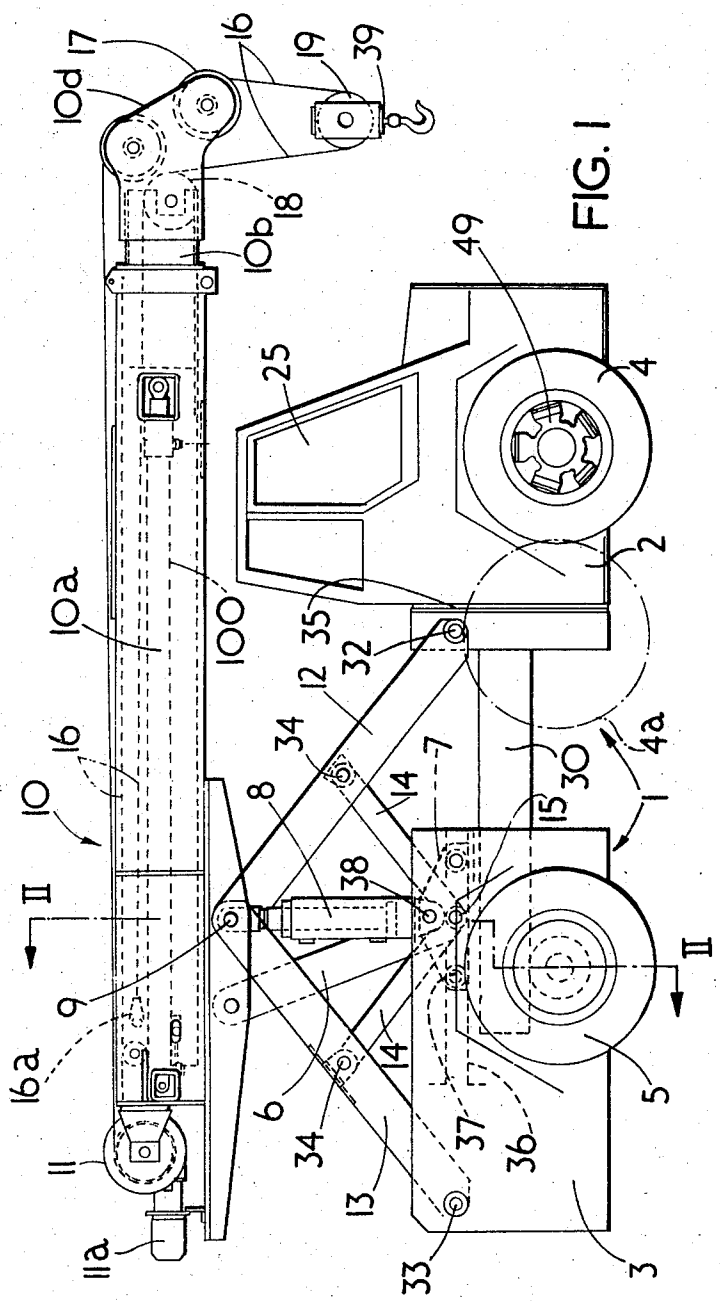

17
16
19
39
10d
18
10b
49
25
4
2
100
10a
35
32
12
34
7
4a
30
16
10
8
14
15
1
38
II
II
9
16a
14
6
34
37
36
5
11
13
11a
33
3

FIG. 1

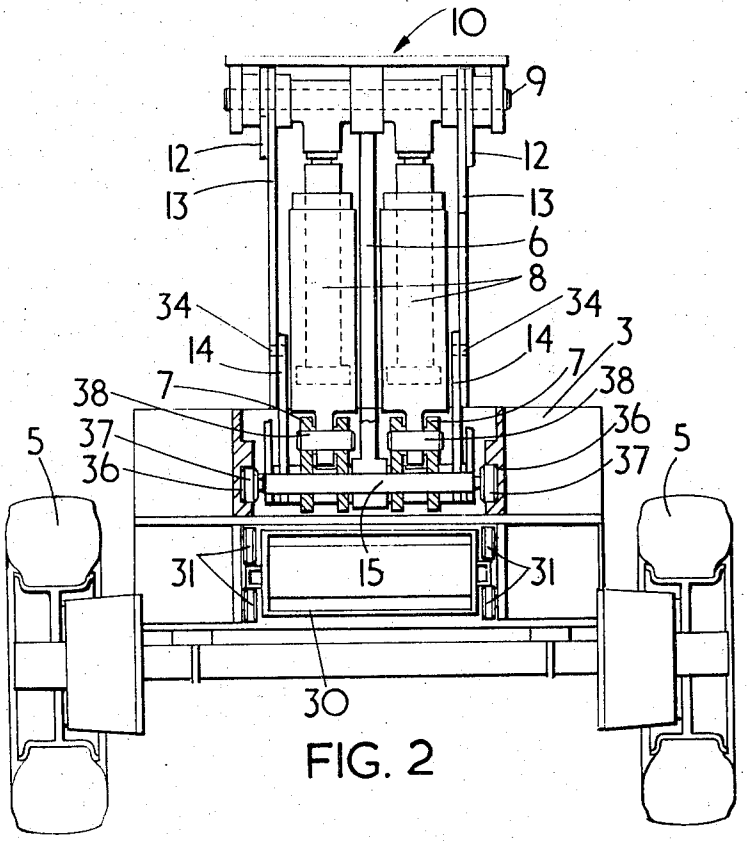

10
9
12
13
12
13
6
8
34
14
34
14
3
7
38
7
38
36
37
36
37
5
5
31
15
31
30

FIG. 2

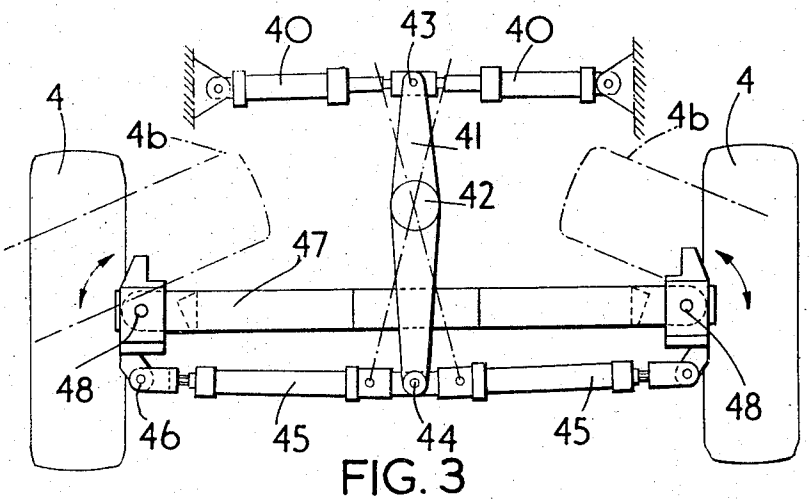

40
43
40
4
4b
41
42
4b
4
47
48
46
45
44
45
48

FIG. 3

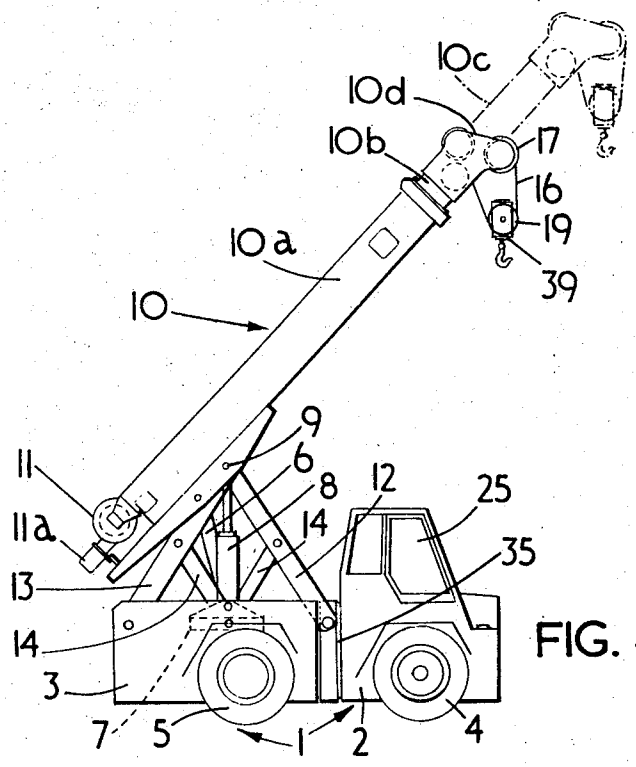

10c
10d
10b
17
16
19
39
10a
10
9
6
8
12
25
11
11a
14
35
13
14
3
7
5
1
2
4

FIG. 4

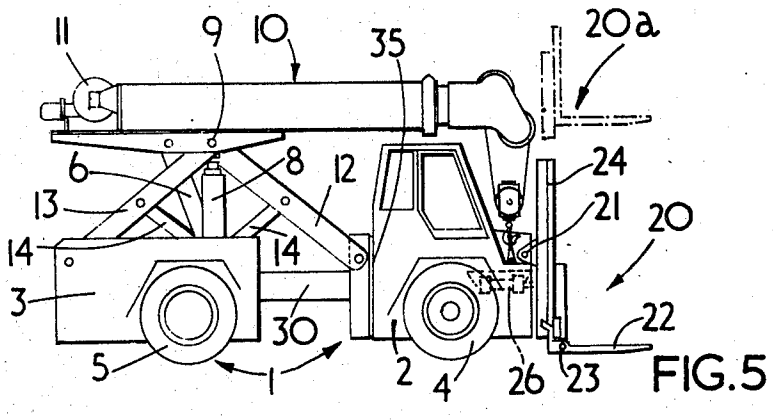

11
9
10
35
20a
6
8
12
24
13
21
20
14
14
3
30
22
5
1
2
4
26
23

FIG.5

MOBILE LOAD HANDLING MACHINES

The object of this invention is to provide an improved load handling machine primarily in the form of a crane for carrying out a variety of load handling operations. Practical advantages of the invention in this and various other respects and also constructional features will be apparent from the following disclosure.

In the accompanying drawings:

FIG. 1 is a side elevation of the machine or crane with the jib or boom lowered.

FIG. 2 is a cross section taken on the line II — II of FIG. 1

FIG. 3 is a detail plan view of the front wheel steering and inturning mechanism

FIG. 4 is a diagrammatic elevation showing the machine with the jib or boom raised and the chassis retracted and

FIG. 5 is a diagrammatic elevation showing the machine provided with a fork lift attachment.

The chassis **1** comprises forward and rearward portions **2, 3** respectively carrying the front and rear wheels **4, 5,** which portions **2, 3** are relatively movable or slidable in a fore and aft direction for obtaining variation in the distance apart or wheel base of the front and rear wheels **4, 5.** Thus a rearwardly extending member or beam **30** from the forward chassis portion **2** slidably engages the rearward portion **3** between guide rollers **31** in the latter (see FIG. **2**)

The beam **30** has a swivel mounting about the fore and aft axis at **35** with the forward chassis portion **2** to permit relative articulation or oscillation of the chassis portions **2, 3** about said axis when travelling over uneven ground.

A telescopic jib or boom **10** is pivotally connected by means of tie linkage **6** to a mounting member or carriage **7** longitudinally movable relative to the rearward chassis portion **3,** which carriage **7** also pivotally carries at **38** a pair of hydraulic rams **8** which in turn are pivotally connected at their upper ends to the jib **10** at **9.** In the retracted condition of the rams **8** the jib **10** assumes a substantially horizontal position as shown in FIG. **1** but on extension of the rams **8,** the jib **10** assumes an upwardly inclined position as indicated in FIG. **4** with intermediate luffing of the jib **10** obtainable between these positions by appropriate operation of the rams **8.**

Connected to the jib **10** at preferably the pivotal connection **9** of the rams **8** thereto are a pair of mutually inclined links **12, 13** which are pivotally connected at their lower ends at **32, 33** to respective chassis portions **2, 3.** Further mutually inclined links **14** are pivotally connected from mid points or thereabouts at **34** of the first mentioned links **12, 13** to a common pivotal connection **15** with the carriage **7** in order to stabilise the latter. Such linkage is duplicated at each side of the vehicle, (see FIG. **2**) and as shown in FIG. **1** the links **12, 13, 14** define a parallelogrammic link formation with the rams **8** acting substantially diagonally in relation to said formation.

The carriage **7** is shown movable by rollers **37** in guideways **36** in the rear chassis portion **3.**

On retraction of the rams **8** the action of the links **12, 13** is to thrust the chassis portions **2, 3** away from one another in order to increase the wheelbase of the front and rear wheels **4, 5** to the maximum condition shown, the fully retracted position of the front wheels being indicated at **4*a***. Conversely on extension of the rams **8** the links **12, 13** are moved towards one another and likewise the chassis portions **2, 3** for reducing the wheelbase i.e., as the jib **10** is raised or luffed to the inclined position.

In addition to such action of varying the wheelbase with jib movement in the interest of greater stability of the vehicle according to the attitude of the jib **10,** the linkage **12, 13, 14** supports the pivotally mounted jib **10** in relation to the chassis portions **2, 3.** Furthermore the upright arrangement of the rams **8** and tie linkage **6** results in rapid operation of the jib **10** being obtainable from the horizontal to the almost upright position and vice versa.

The main body **10*a*** of the jib **10** is shown provided with a winch **11** at its rear end which is preferably a hydraulic motor driven at **11*a*** rope **16** from the winch **11** passing forwardly to a pulley **17** at the head **10*d*** of the jib extension **10*b*** from where the rope **16** passes about the pulley **19** of a pulley block or hook **39** and then rearwardly about a further head pulley **18** to an anchorage **16*a*** at the rear end of the jib extension **10*b*.** The arrangement is such that as the jib **10** is extended or retracted, compensation of the effective length of the rope **16** is obtained so that the position of the pulley block **39** in relation to the jib head **10*d*** remains substantially unaltered during jib extension or retraction which thus does not effect the operation of the pulley block by the winch **11.** The ram **100** operates the jib **10** for extension as indicated at **10*c*.** (FIG. **4**).

For travelling movement of the vehicle, the front wheels **4** are shown driven by hydraulic wheel motors **49** and the front wheels **4** are in-turnable for obtaining swivelling movement of the vehicle for jib slewing about a turn table or other pivotal mounting at the rear wheels **5,** preferably by differential swivel mechanism as set forth in British Pat. No. 1,297,113, commonly owned herewith.

Referring to FIG. **3,** steering of the front wheels **4** for travelling purposes is shown effected by a pair of hydraulic rams **40** acting from fixed structure of the forward chassis portion **2** on one end **43** of a double armed lever **41** pivotally mounted at **42,** the other end of the lever **41** being pivotally connected at **44** to and between a pair of hydraulic rams **45** pivotally connected at **46** to swivel or king pin mounting **48** of the front wheel stub axles on the front axle beam **47.**

Appropriate operation of the rams **40** effects steering movement of the wheels **4,** the rams **45** remaining inoperative and serving as a track rod. However when inturning of the front wheels **4** is required as at **4*b***, the rams **40** remain inoperative to lock the lever **41** from which the rams **45** extend to effect in-turning of the wheels **4** about the king pin mounting **48.**

An internal combustion engine (not shown) is conveniently carried by the forward chassis portion **2** for driving one or more pumps in supplying hydraulic fluid under pressure to the wheel motors **49** and the various rams of the machine. The forward chassis portion also carries the driving and control position indicated by the cab **25.**

When the jib or boom **10** is in the horizontal positon and is telescopically fully retracted, the arrangement can be such that it enables unhindered operation of a fork lift unit **20** (FIG. **5**) to be effected at the forward end of the vehicle in the manner indicated at **20*a***, the unit **20** being pivotally carried at **21** at the front end of

the forward chassis portion **2** for back and forth angular movement by ram operation **26** in engaging the forks **22** with a load and lifting the latter. Conversely when the fork lift attachment is retracted to its minimum height unhindered operation of the jib **10** is possible including forward telescopic extension in the horizontal position During operation of the jib **10** the forks **22** may be swung back to an inoperative position about transverse pivotal mounting **23** against the column **24** of the attachment. The fork lift unit **20** may be operated in any known or suitable manner.

With the jib **10** in the horizontal position shown the chassis **1** is fully extended for maximum wheelbase and stability of the vehicle for operation of the fork lift unit **20.**

As will be appreciated from the foregoing the machine as shown in FIG. **5** is capable of carrying out a wide variety of load handling operations by appropriate operation of the crane jib **10** and/or the fork lift unit **20** either separately or in conjunction with one another.

I claim:

1. A mobile load handling machine, comprising: a chassis having front and rear wheeled portions movable relative to one another along the fore and aft axis of the machine; upstanding mutually inclined linkage pivotally interconnecting said chassis portions; a jib supported by said linkage from the chassis portions; a mounting member movable in a fore and aft direction on one of the chassis portions; tie linkage pivotally connected between said mounting member and the jib; and ram means pivotally connected between the mounting member and the jib whereby, on extension and retraction of the ram means, said ram means operates in conjunction with the tie linkage to effect raising and lowering luffing movement of the jib and also operates in conjunction with the mutually inclined linkage to effect relative retraction of the chassis portions to reduce the wheel base of the machine on raising of the jib and vice versa.

2. A mobile load handling machine according to claim **1** wherein the ram means and mutually inclined linkage are pivotally connected to the jib about a common axis.

3. A mobile load handling machine according to claim **1** wherein the mutually inclined linkage is linked to the mounting member in order to stabilise the latter and the ram means and tie linkage in relation to the mutually inclined linkage.

4. A mobile load handling machine according to claim **3** wherein the mutually inclined linkage and the linking thereof to the mounting member define a parallelogrammic link formation with the ram means acting substantially diagonally in relation to said formation.

5. A mobile load handling machine according to claim **1** wherein one of the said chassis portions is provided with a longitudinal member slidably engaging the other chassis portion, said member having a swivel connection with the first mentioned chassis portion about the fore and aft axis of the machine to permit relative oscillation of the chassis portions about said axis.

6. A mobile load handling machine according to claim **1** wherein there is provided in combination with the machine fork lift means mounted at the front of the front chassis portion and operable separately or in conjunction with the jib.

7. A mobile load handling machine according to claim **6** wherein forks of the fork lift means are pivotally mounted from the latter whereby they may be swung back to an inoperative position especially for the purpose of operation of the jib.

* * * * *