July 10, 1962 A. R. WIRKKALA 3,043,442

LOADING MECHANISM

Filed Oct. 19, 1959

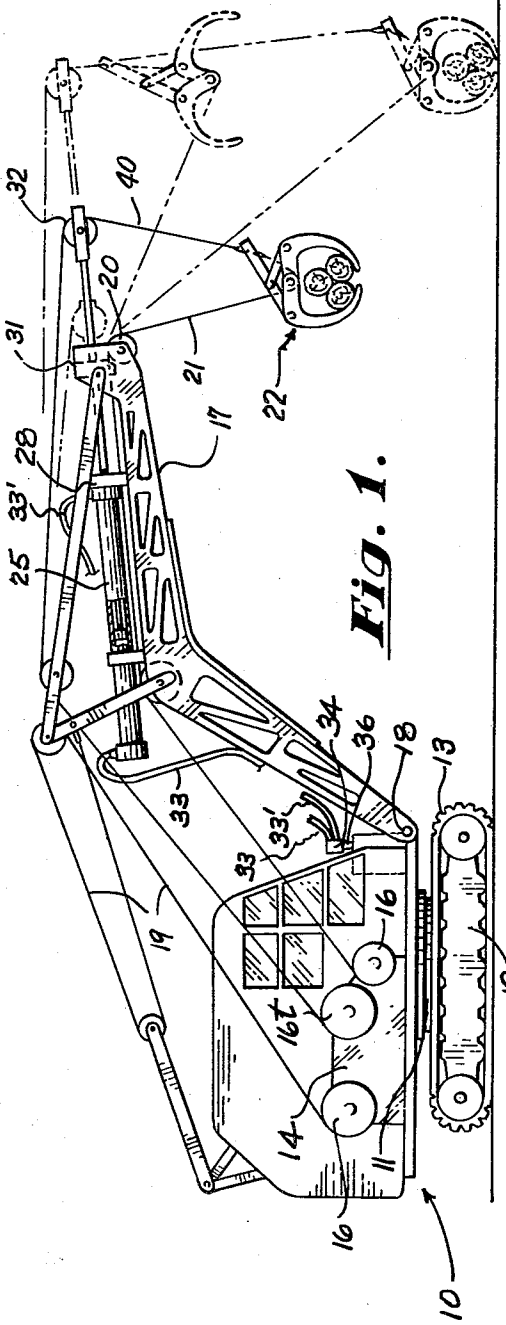


Fig. 1.

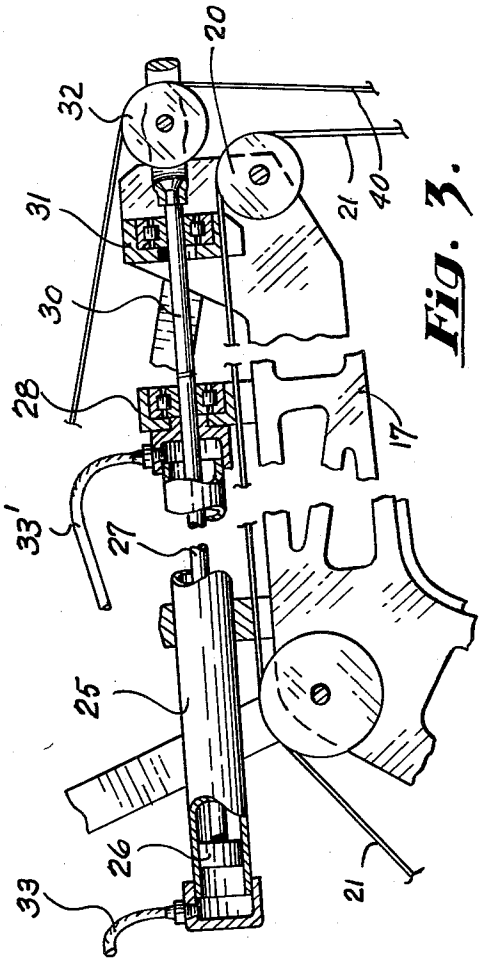


Fig. 3.

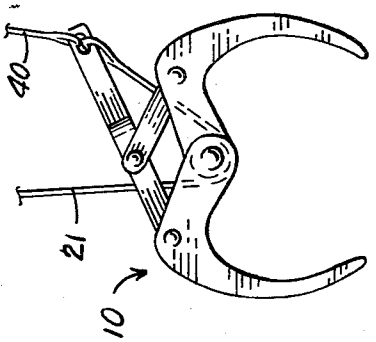


Fig. 2.

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LOADING MECHANISM

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1 Claim. (Cl. 212—7)

This invention relates to improvements in loading machines or devices of those kinds and types which utilize a boom from which a load gripping or holding means, such as a grapple, bucket, tongs or the like, is suspended by a cable extended from a cable winding drum, along the boom and finally through a fairleader at the outer end of the boom to the gripping or load holding means. The present invention is in the nature of an improvement upon the loading mechanism which has been described and illustrated in my U.S. patent, issued on March 24, 1959, under Number 2,878,946.

In my U.S. patent, above referred to, the loading machine is shown to have its boom equipped with an extendable and retractable arm formed with an eyelet at its outer end. This arm, which in use serves as an extension for the boom, has the main load lifting cable or line passed through the eyelet thereof and thence to the gripping or load holding means. With this cable wound in, the extending of the arm causes the eyelet portion thereof to engage against the load gripping means thus to push or carry it well beyond the normal reach of the boom. In this way the operating radius of the boom is increased by the extended arm.

It is the principal object of the present invention to provide a loading machine for the general type of that of my above identified patent, for use in conjunction with tongs, grapple, bucket or the like that is adapted to be released or opened for application to a load and also to be released from the load, by the pull of a trip line extended thereto. Furthermore, a device wherein the main line, or load lifting cable, extends through a fairleader at the end of the boom, and directly to the tongs, grapple or bucket, and the trip line, instead of the main line, extends through the eyelet or fairleader end of the extendable and retractable arm, thus to provide that the trip line connection is employed to carry the load gripping means beyond the boom end and also to serve as an automatic opening means for the tongs, grapple, or the like.

It is a further object of the present invention to provide practical, and effective means for controlling the extension and retractive movements of the outreaching arm as used in the combination of parts herein disclosed.

Further objects and advantages of the invention reside in the details of construction and combination of parts embodied by the present invention, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is a side view of a loading machine embodying the improvements of the present invention therein; showing the machine as equipped with a grapple for log loading.

FIG. 2 is a view of the load lifting grapple and cable connections.

FIG. 3 is an enlarged sectional detail of the outer end portion of the boom as equipped with extendable arm; parts being broken away to shorten the view.

Referring more in detail to the drawings:

In the present drawing, the machine illustrated is typical of those now in general use for log loading operations. However, the boom portion thereof might vary in its details of construction and shape to considerable extent without departing from the invention. Also, while the log lifting means suspended by the cable from the boom is

shown to be a grapple, this might alternatively be any one of a great number of load holding means such as paired tongs, a clam shell bucket, and the like, which are caused to be opened and closed by the pull of a trip line. The boom and loading means here shown is readily adaptable to mobilized vehicles of various kinds and sizes.

In FIG. 1, **10** designates in its entirety, a mobile machine to which the present improvements have been applied. It is of the conventional shovel type in that it comprises a turntable **11** mounted on a base structure **12** that is equipped with crawler type tracks **13**. Mounted on the turntable is an engine **14** which is operable, through various clutches and other controls, not shown, for the selective driving of various cable winding drums **16**. The turntable **11** also mounts an angle boom **17**, generally designated as a "log heeling boom"; this being hinged at its lower end to the turntable **11** as at **18**, for its raising and lowering as may be effected by the usual or any suitable cable connection such as, for example, that designated at **19** in FIG. 1.

At its outer end, the boom is equipped with a fairleader **20** through which a logging or loading cable, designated generally as the main line **21**, is passed. This cable is wound on and extends from one of the engine driven drums **16**, along the boom, through the fairleader **20** and, at its end, is attached to the grapple designated by reference numeral **22**. This cable is the means through which the grapple, or load holding means is pulled in lifted and carried to loading position. In using a machine of this type that is not equipped with the present invention, for log loading, the usual procedure is to first swing the boom to a position directed toward the load that is to be moved. Then the grapple or whatever load gripping means is employed, is lowered to a position at which it may be caused to grasp the load. If not already in open position, the two jaws of the grapple are then opened and applied to the load. Then the main line is wound in to lift the load and, as it lifts, the boom is swung to unloading position. The boom may or may not be lowered for unloading and the load released from the grapple by pull on a grapple trip line. After release of the load, the boom is then swung back to "pick-up" position.

Normally the area of pick-up is limited by the length or reach of the boom, but it has been a practice of some operators to swing the boom back to load pick-up position with sufficient rapidity as to centrifugally throw the pick-up tongs or grapple somewhat beyond the boom. However, in use of heavy grapples or the like, this is not practical or advisable. In my above mentioned patent, I have disclosed the use of an extendable arm to carry the main line and tongs out well beyond the fairleader at the end of the boom. The present invention is an adaptation of that principle except that the extendable arm acts directly on the grapple trip line to carry the grapple out beyond the boom but in doing this, it also operates to open the grapple ready for pick-up of a load as will now be explained.

In the present machine, an elongated air cylinder **25** is rigidly and fixedly mounted by any suitable means on the top side and outer end portion of the boom, lengthwise thereof. Contained in the cylinder is a piston **26** from which the usual piston rod **27** extends forwardly from the cylinder through a supporting guide **28** at the cylinder end. At its outer end the piston rod is attached to a continuing arm or shaft **30** that is mounted for endwise movement through a guide bearing **31** at the end of the boom and this arm is equipped at its outer end with a fairleader sheave **32** over which the grapple trip line **40** extends. The trip line extends rearwardly along the boom over suitable guides and then to a cable winding drum, here designated as **16***t*, operable by the engine under control of the operator.

For the operation of the air cylinder 25 air conduits 33 and 33' lead to its rearward and forward ends, respectively, from an air control valve 34 that may be located in a position readily accessible to the engine operator. The control valve has a pipe connection 36 with a source of air under pressure designated at 37. By proper manipulation of the valve 34 operating air can be applied to the inner end of the cylinder and exhausted from its outer end, thus to drive the piston outwardly. This application of air extends the piston rod 27 and extension arm 30 and the latter carries the trip line cable outwardly from the boom end and by maintaining proper control of the trip line cable as extended from its winding drum, 16, the arm can be caused to carry the grapple out with it well beyond the boom end, thus to increase the loading radius of the machine accordingly. This pull applied by the trip line cable in carrying the grapple to extended position, drags the main line with it, and therefore, not only acts as a slack puller and can be employed to open the grapple jaws ready for their application to the load to be picked up.

After the grapple has been thus carried out and lowered, and the load secured therein, the load is pulled in or lifted by winding in the main line on its drum 16 and as it is wound in, the extended arm is caused to be retracted accordingly to its inner position. When the load has been placed in position for release, the arm 30 is extended to an extent sufficient to place releasing tension on the trip line.

Various types of means, other than illustrated, may be employed for extending or retracting the arm 30 such as, for example, any one of those alternative means shown in my prior patent for extending the arm. The novelty of this invention resides in utilizing the extendable arm 30 for the extending of the working radius of the machine and boom; as a grapple trip line operating means and as a main line slack puller.

It is not the intent of this invention to limit its use in

connection with machines of any particular kind. However, it is believed well to mention the fact that the fairleader at the end of the boom may be of the type shown in U.S. Patent 2,362,531, and the grapple might be like that shown in my U.S. patent application filed under Serial No. 709,884.

What I claim as new is:

In a loading machine of the character described comprising a loading boom, a fairleader block at the outer end of said boom, a load lifting cable winding drum on the machine, a load lifting cable extending from said drum along the boom and through said fairleader block, a load carrying grapple operatively attached to the outer end of said load lifting cable, an outreaching arm mounted by and extending along the boom, a fairleader at the outer end of said outreaching arm, power means operable to cause said outreaching arm to be moved endwise between a retracted position to position extended well beyond the reach of the boom, a trip line winding drum on the machine, a trip line extending from the trip line winding drum over the fairleader at the outer end of the outreaching arm and operatively connected at its end with said grapple for holding it in suspension in open position and to permit it to close when the trip line is slack; said load lifting cable drum and said trip line winding drum being selectively operable for the controlled winding in or paying out of their respective cables and said power means being operable to effect the extending or retracting of the outreaching arm in conjunction with the cable movement to control the opening and closing of the grapple.

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