July 12, 1966 R. MOREIRA 3,260,179

SCRAPER ATTACHMENT

Filed Sept. 3, 1963 2 Sheets-Sheet 1

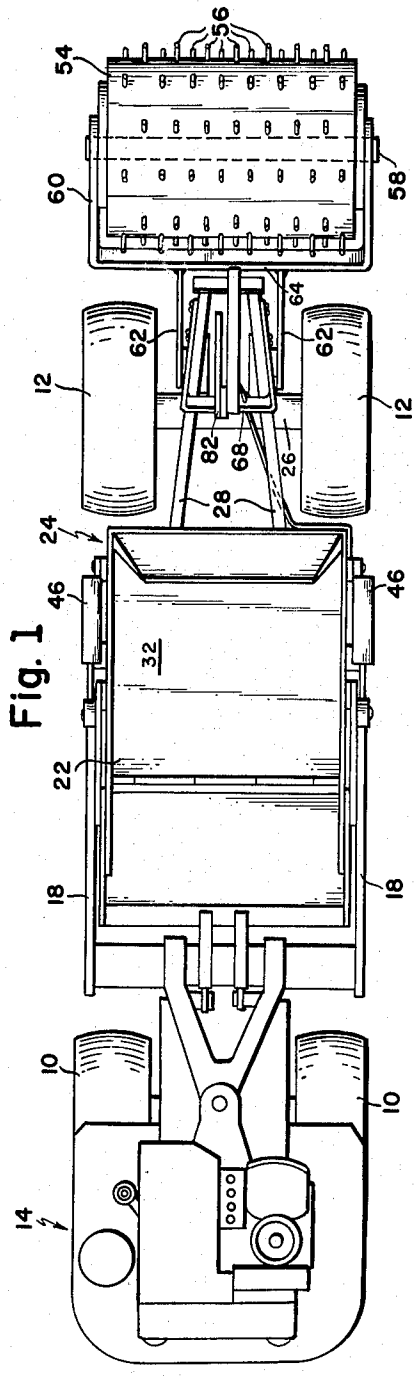


Fig. 1

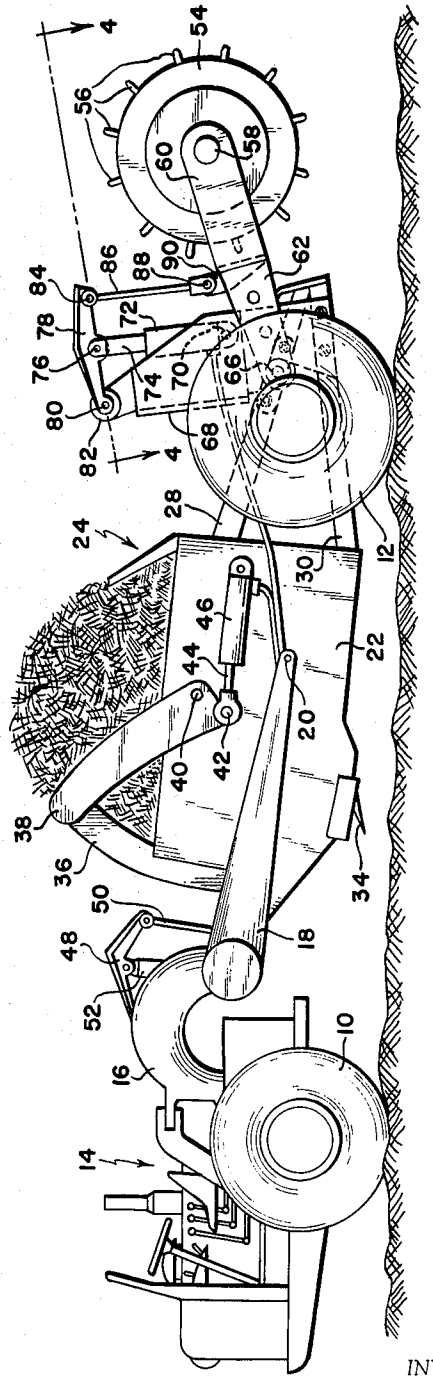


Fig. 2

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Fig. 3

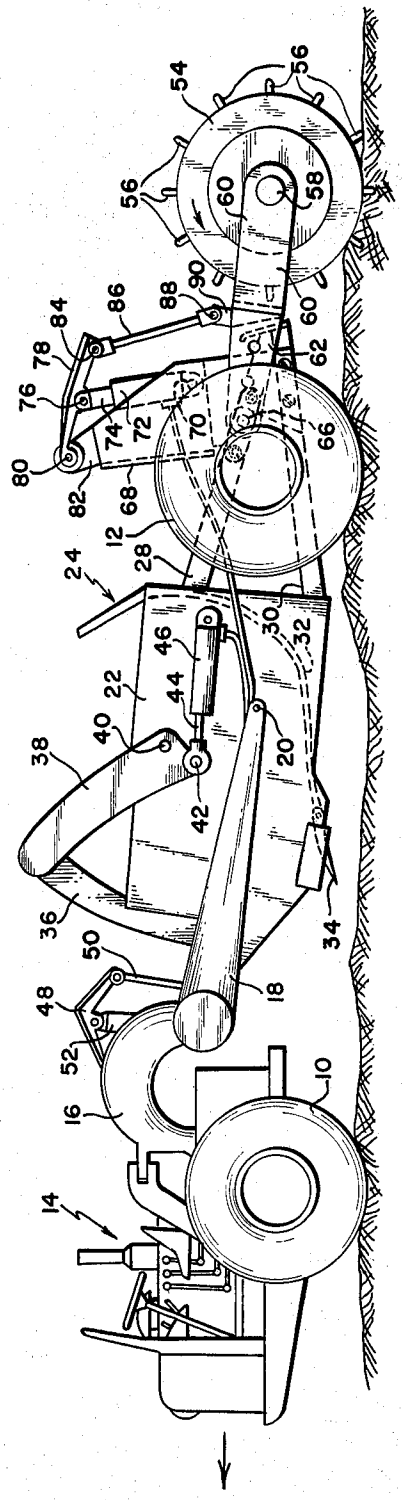
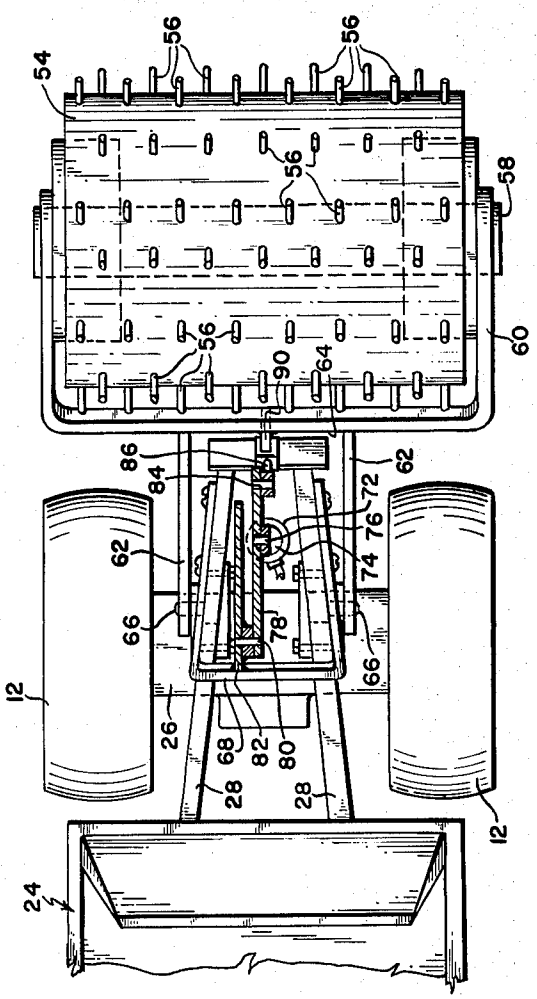


Fig. 4



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SCRAPER ATTACHMENT

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This invention relates to earth-moving vehicles, of the type technically known as "scrapers," and in particular, to a ground-compacting unit which forms part of the scraper structure, in intimate, functional association with the normal operations thereof.

Scrapers are employed to pickup, transport, and dump earth, as where filling is required in the construction of a orad bed, approach ramp, or the like. This constitutes a cyclic operation, with a series of round trips between the pick-up site and the dumping sight. During dumping, the earth is spread in a rough levelling process by the scraper, but is in such loose condition as to require compacting. Customarily, such compacing is accomplished by a roller with radially projecting pins or spikes, known as a "sheepsfoot' roller, and this may either be employed after departure of the scraper for refill or after a certain area of fill has been covered by the deposit. In either case, the compacting roller is a separate piece of equipment, with separate power means, and therefore costly in investment, labor operation and maintenance, storage and transportation, and inventory, among other things.

It is, therefore, a general object of the invention to reduce the cost of compacting deposits of fill dirt. More particularly, it is an object to eleminate the compacting roller, as a separate piece of equipment. In still greater particularity, it is an object to lessen the cost of compacting, in respect to capital investment, operation and maintenance, labor, and storage and transportation, among other things.

Yet another object is to lessen the time between dumping and compacting, and between successive compacting passes.

A still further object is to utilize the usually non-profitable, "dead head" return trips of the scaper in useful extensions of the compacting operation.

Another object, related to the foregoing, is to provide a compactor, in tandem, which also serves as a counterweight to the load compartment of a scraper.

These and other ends, which will be apparent, are attained by the present invention which may be briefly characterized as comprising a system wherein a sheepsfoot roller is swing-mounted on the framework of a scraper, and provided with power means for raising it to inactive, or idle position, and lowering it to a selected, working position.

For a more detailed description of the invention, reference is made to the following specification, as illustrated in the drawings in which:

FIG. 1 is a top plan view of a scraper, with portions omitted for purposes of clarity and with sheepsfoot roller attached in tandem, in accordance with the principles of the invention;

FIG. 2 is a side elevational view of the vehicle of FIG. 1, showing the sheepsfoot roller in raised, idle position, and the scraper loaded, prior to dumping;

FIG. 3 is a view similar to FIG. 2, after dumping and with the compacting roller lowered; and

FIG. 4 is a fragmental, top plan view, in partial section, taken on the plane of the line 4—4 of FIG. 2.

Referring to the drawings by characters of reference, there is shown a conventional scraper, carried on a pair of front wheels **10**, and a pair of rear wheels **12**. As understood in the art, the scraper comprises a pair of jack-knifing sections, articulated on a transverse, horizontal axis, comprising a front section **14**, with a rigid, frame member, extending rearwardly, and comprising a gooseneck **16**, and a fork **18**, the latter pivoted by pins **20** to the bowl **22** of the rear section **24**, the bowl being secured to axle housing **26** of the rear wheels by pairs of upper and lower struts **28**, **30**, respectively. The receiving bed **32**, for the load in the bowl, carries a lower, scraper **34**, for pick up, and for levelling, and the bed may be arranged to tilt, for quick ejection of the contents; the bed **32** and scraper **34** can be conveniently described as a scoop unit. An arcuate, closing apron **36** is movable into and out of covering relation to the front end of bowl **22**, by virtue of a bell crank arm **38**, pivoted at **40** on the bowl **22** and pivotally connected at **42** to the piston rod **44** of a hydraulic cylinder **46**. Swing of bowl **22** about pivot **20** is occasioned by a swingably mounted arm **48**, pivoted to a pull rod **50** suitably connected to the front of bowl **22**, and operation is accomplished by actuation of a hydraulic cylinder **52**.

The sheepsfoot roller **54**, with radial spikes **56**, is mounted on the rear unit **24** of the scraper, for swinging movement about a transverse, horizontal axis, and this may be accomplished in any convenient manner consistent with the enumerated objects of the invention, and other aims and purposes within the scope thereof. In the simplified mounting shown, the roller **54** is journalled on an axle **58**, carried by a fork **60**, having a pair of parallel arms **62** extending from its flat, intermediate portion **64**, and which are pivoted at their forward ends on pins **66**, carried by upper struts **28**, rearwardly of axle housing **26**.

The lift means for the roller is constructed as follows:

A vertically disposed, channel-form bracket **68**, carried by struts **28** and **30** near their meeting point, at their rear ends, carries a horizontal pin **70**, which pivotally anchors the lower end of a hydraulic cylinder **72**, the piston rod **74** of which is pivoted by a pin **76**, medially of a lever arm **78**, the forward end of which is pivotally anchored on a pin **80**, carried by a vertical plate **82**, fixed, as by welding, to channel bracket **68**, and the rearward end of the lever arm is pivoted by a pin **84** to a pull rod **86**, the lower end of which is pivoted by a pin **88** to a bracket **90**, carried by the intermediate portion **64** of the roller fork, or draft bridle **60**.

By this swinging lift arrangement, the sheepshead roller may be lifted off the ground, dwell on the ground under the influence of its weight only, or contact the ground under a determined pressure, induced through the hydraulic cylinder. Thus, during transport to the pick-up site, the roller **54** will be in raised, or idle position for the most part, and will be raised, somewhat more when the bowl **22** is inclined, for pick-up. This will, incidentally, provide clearance for a pusher tractor, if such is employed. In addition to the features of the tandem roller in respect to compacting or tamping operations, which represent the main objective, it should also be noted that in the jack-knifing operation of the scraper, the more or less unfavorable system of leverages is considerably aided by the counterbalancing effect of the uplifted roller, and this advantage is manifest not only in the lift of the loaded bowl, but also during transportation, wherein shocks on the load-bearing points of the articulated system are minimized by the counterbalancing effect.

At the time of dumping at the fill site, the roller **54** is lowered, so that immediately after deposit and rough spreading of the material, the compacting is effected. As an addition, advantageous feature, the roller may be again towed over the newly deposited material on the return trip for the next pick-up, and this repeated compacting may be applied to all of the newly deposited material, laid in successive cycles, which may exist in the path of the round trip of the scraper, both in going and coming. Thus,

a portion of the cycle which would ordinarily be written off as "dead-heading," becomes attended with useful and productive results.

The novel combination can be utilized in several ways, such, for instance, as a tractor, a scraper, or a scraper-compacter. Additionally, it will find very useful employment as a variable-weight, compacting roller, by loading dead weight, or ballast into the bowl, in a suitable amount for the particular job contemplated. All of these benefits are available to the using contractor, or other operator, in what amounts to a single machine or vehicle, and obviates the need for purchase, use, maintenance, transportation and storage, for instance, of a separate, single-purpose machine.

In summary, certain of the outstanding advantages may be listed as follows:

Reduction of initial investment, as well as operating and maintenance costs.

Reduction of man hours of labor.

Reduction of storage and transportation costs.

Immediate first-pass compaction per each dumped layer.

Immediate second-pass compaction per each dumped layer.

Better control and uniformity of compaction density per dumped layer.

Productive action on return trip of scraper.

Elimination of roller as a separate machine.

In another feature, the invention may be practiced by the use of attachment kits, or adapters, by means of which standard, existing equipment may be converted to the tandem system of scraper and compacter.

Although the lift mechanism for the roller has been shown in highly simplified form, for clarity of illustration, it will be understood that the possible variations of structure in this regard are manifold. Also, whereas the fixation of the roller, as shown, in any working or idle position is accomplished by the hydraulic cylinder, it is within the contemplation of the invention to provide positive, mechanical stop means, such as stop pins, receivable in apertures, or other equivalent latching means, and these will be employed not only to hold the roller in raised positions, but also to determine its ground penetration, or compacting effect.

While a certain, preferred embodiment has been shown and described, various modifications will be apparent, in the light of this disclosure, and the invention should not, therefore, be deemed as limited, except insofar as shall appear from the spirit and scope of the appended claims.

I claim:

1. In combination, an earth moving apparatus having front and rear sections, means pivotally connecting said front and rear sections for relative, vertical-articulated movement, a scoop unit on said rear section, wheel means supported on said rear section rearwardly of said scoop unit, first power means connected between said front and rear sections for moving said scoop unit between an elevated, transport position to a lower, ground scraping position about the axis of rotation of said wheels, a member mounted for vertical, pivotal movement on said rear unit rearwardly of said wheel means, ground-compaction roller means journaled on said member, and second power means on said rear section and operatively connected to said member for pivoting said roller means from a ground engaging position to an elevated counterbalancing and transport position.

2. A device as in claim 1, said member comprising a fork member.

3. A device as in claim 1, said power means comprising a lever pivoted to said rear section, a link pivoted to said member and said lever, and a hydraulic cylinder carried by said rear section, and operatively connected to said lever to raise and lower said member relative to said rear section.

4. An earth moving and scraping machine comprising first and second sections, means pivotally connecting said second section relative to said first section, said second section including scoop means disposed in one direction toward said first section and including a frame portion extending in a direction opposite that which said scoop means extends, wheel means journaled on said frame portion having an axis of rotation about which said second section is movable relative to said first section, a support member vertically, pivotally mounted on said frame portion and extending in trailing relation to said wheel means and disposed in counter-balancing relation to said scoop means, at least one ground roller journaled on said member and movable therewith to various positions above ground disengagement, and actuating means operatively connected between said frame portion and said member for pivoting said member and roller through an arc from ground engagement through various counterbalance and ground disengagement positions, said actuating means including pressure-applying portions for varying the compaction force applied by said roller during ground engagement.

5. The structure as claimed in claim 4 in which said actuating means comprises a fluid-operated motor and said pressure applying means comprises a piston rod, and force-transmitting elements operatively connected to said frame portion, member, fluid-operated motor and piston rod.

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