United States Patent [19]

Frisbee et al.

[11] **3,926,263**

[45] **Dec. 16, 1975**

[54] **POWER TILT DOZER AND REEL CARRIER**

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[21] Appl. No.: **477,120**

[52] **U.S. Cl.** **172/801;** 172/438; 37/117.5; 61/72.6

[51] **Int. Cl.**[2] **E02F 3/76**

[58] **Field of Search** 172/801, 803, 809, 466, 172/438; 61/72.6; 37/117.5, 2; 214/DIG. 4; 254/166

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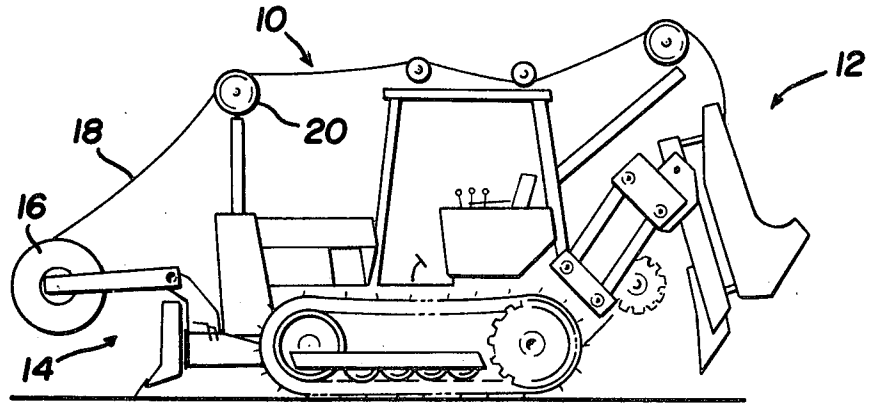
Primary Examiner—Stephen C. Pellegrino
Attorney, Agent, or Firm—Cullen, Settle, Sloman & Cantor

[57] **ABSTRACT**

A reel carrier support assembly is mounted on the push beams of a bulldozer to enable simultaneous reel dispensing and bulldozing. The support assembly includes a rotatable beam located above the bulldozing blade and having a pair of spaced arms projecting forwardly of the blade to support a cable reel. The rotatable beam is supported by a pair of support arms, which in a first preferred embodiment are rigidly mounted to the push beams and in a second preferred embodiment are pivotally mounted to the push beams. In the first embodiment, the support arms are spaced from the blade sufficiently to avoid interfering with blade tilting movement. In the second embodiment the pivotal connection accomodates upward pivotal movement of the reel carrier during blade tilting movement. A further preferred embodiment includes a hydraulic piston and cylinder for manipulating the rotatable beam.

14 Claims, 10 Drawing Figures



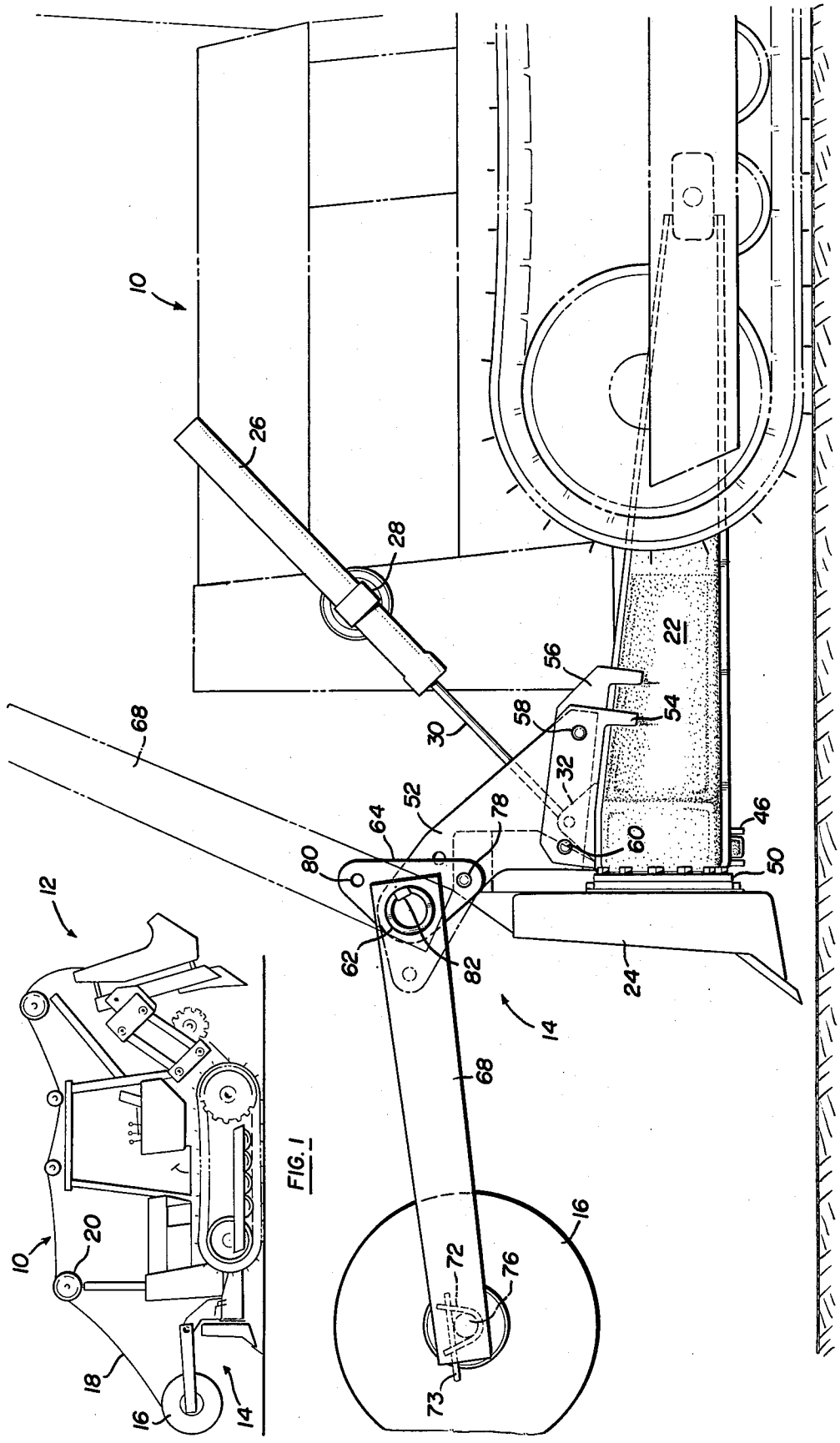

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FIG. 2

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FIG. 1

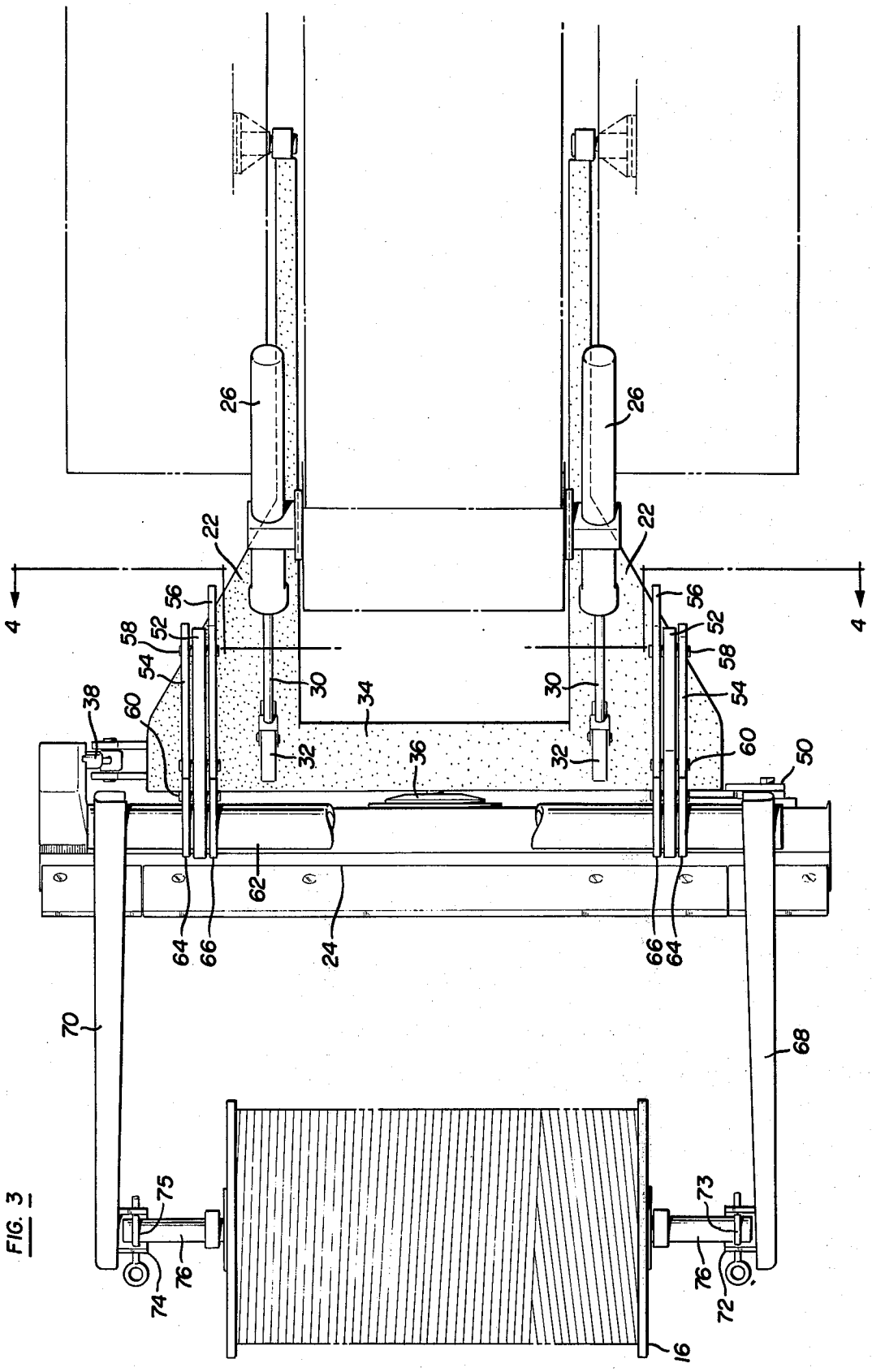
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FIG. 3

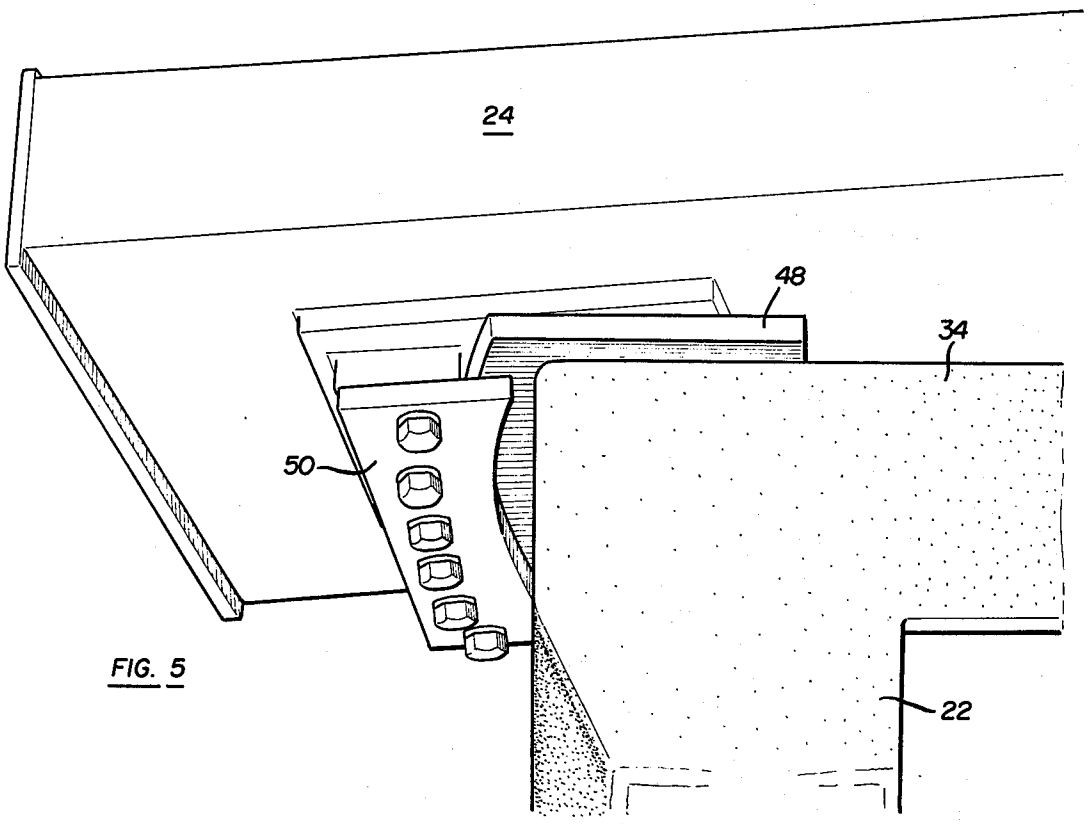
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FIG. 5

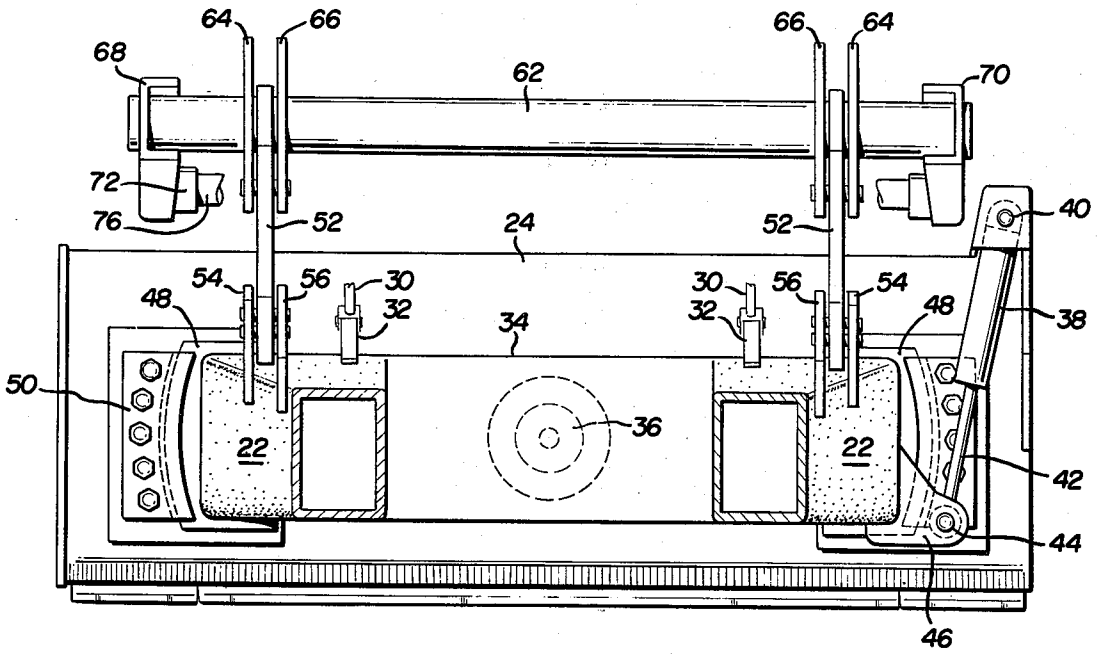
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FIG. 4

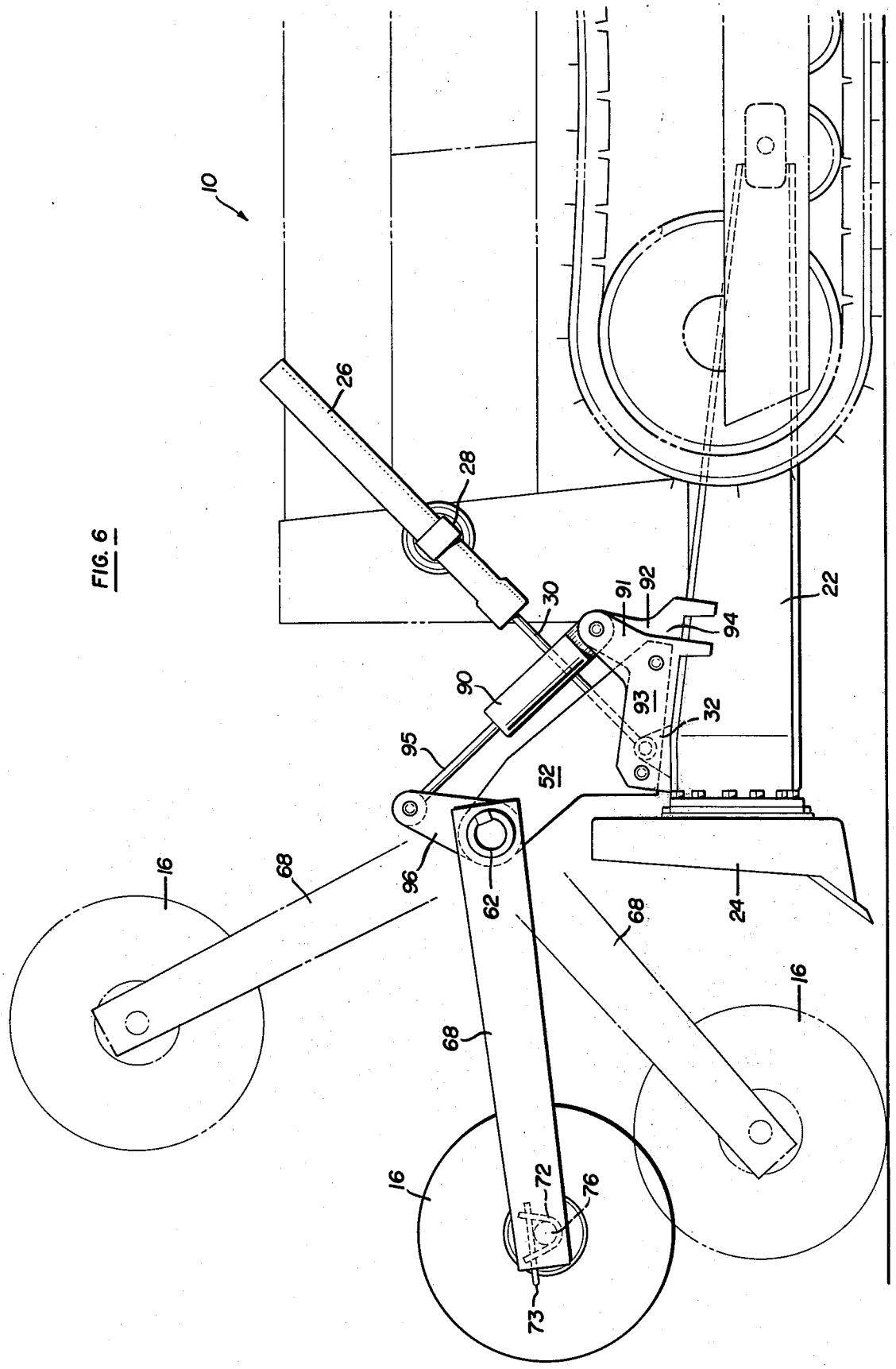

FIG. 6

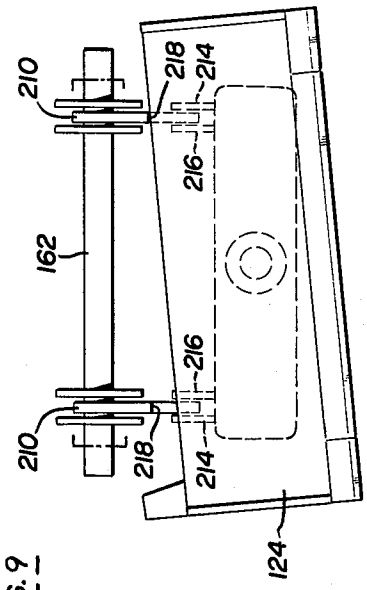

FIG. 9

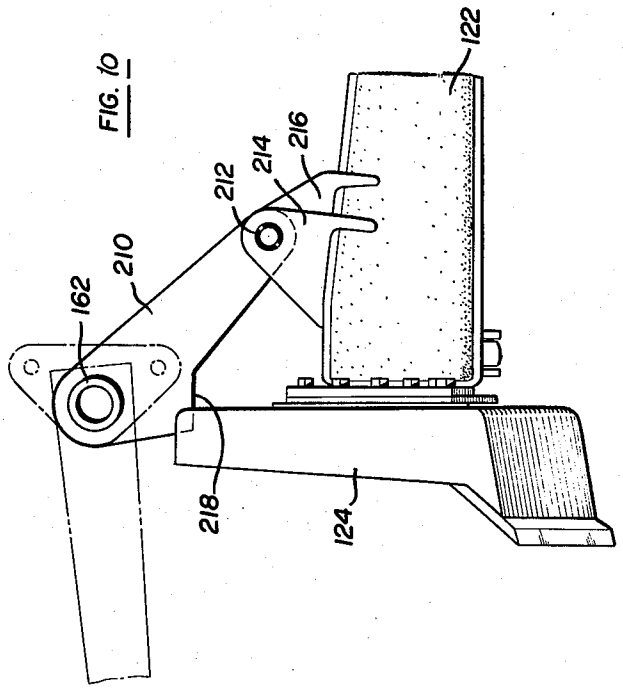

FIG. 10

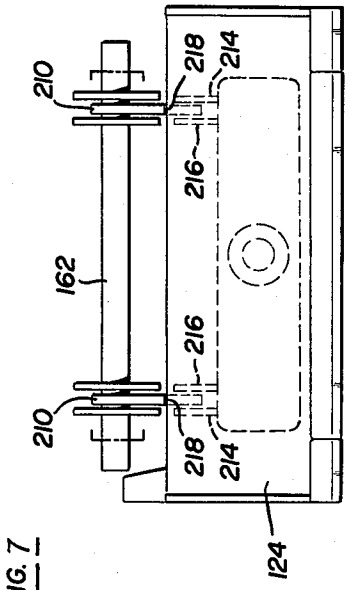

FIG. 7

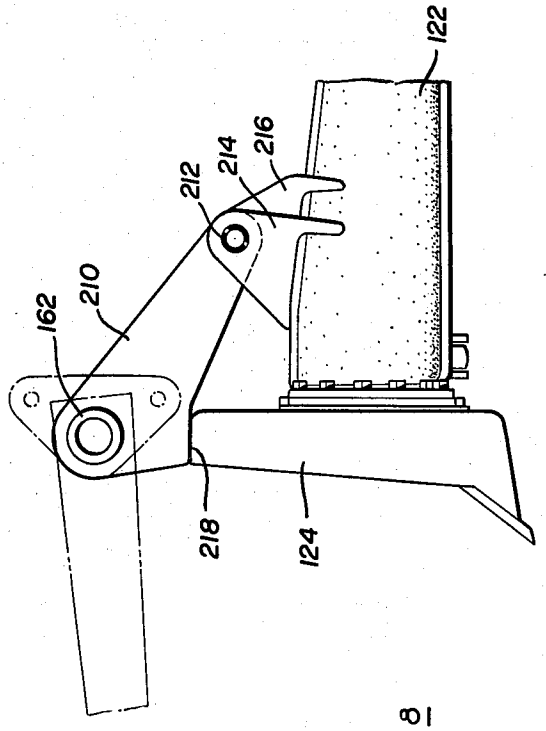

FIG. 8

POWER TILT DOZER AND REEL CARRIER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a prime mover, such as a crawler tractor, having a bulldozing implement and a reel carrier assembly. More particulary, the present invention relates to a reel carrier assembly mounted on the push beams of the crawler tractor to enable simultaneous operation of the bulldozing and reel carrier assemblies.

2. The Prior Art

Reel carrier support assemblies have been mounted on crawler tractors for bulldozers in the prior art in such a manner as to preclude simultaneous operation of the bulldozing implement and the reel carrier assembly. For example, in some prior art devices, as illustrated by U.S. Pat. No. 3,421,329 to Kinnan, the bulldozing blade must be removed so the reel carrier support assembly can be mounted on the front of the push beams. As illustrated by U.S. Pat. No. 3,173,272, other reel carrier support assemblies have been mounted directly to the face of the bulldozer blade. In this arrangement, the hydraulic lift mechanism for the dozer blade must support the cable reel during cable laying and the reel carrier must be removed prior to utilizing the blade for a dozing operation. As disclosed in U.S. Pat. No. 3,780,813 to Davis et al, which is assigned to the assignee of the present application, a reel carrier assembly may be pivotally mounted to the crawler tractor.

Prior to the present invention, there was no satisfactory reel carrier support assembly for enabling simultaneous operation of the bulldozing implement and the reel carrier dispenser.

SUMMARY OF THE INVENTION

The present invention proposes mounting a pair of parallel support arms on the laterally opposed push beams of a crawler tractor. The support arms project upwardly and forwardly from the push beams to rotationally support a tubular support beam generally above a bulldozing blade mounted across the front of the push beams. A pair of spaced, parallel reel support arms are rigidly connected to the tubular support beam for rotation between a first cable dispensing position and a second retracted position. A reel axle is mounted between the distal ends of the reel support arms to support a reel or drum of cable which is dispensed during a cable laying operation.

In a first embodiment of the reel support assembly, the support arms are rigidly connected to the push beams. In this embodiment the upper ends of the support arms are sufficiently spaced from the bulldozing blade in order to avoid interference with the blade tilting motion. In a second embodiment, the support arms are pivotally mounted to the push beams and include support surfaces vertically above the bulldozer blade. Both the support surfaces rest on the blade when it is in a truely horizontal position. If the blade is tilted out of the horizontal position, only one of the support surfaces will be resting on the blades and the two support arms will be pivoted about their connection with the push beams.

In both embodiments, the bulldozing implement may be utilized regardless of whether the reel carrier assembly is in a cable dispensing position or a retracted position. Further, both embodiments may optionally inclulde one or more hydraulic actuators for rotationally manipulating the tubular support beam.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of the reel carrier assembly in the environment of a crawler tractor.

FIG. **2** is a detailed view of a first preferred embodiment of the reel carrier assembly forming the present invention.

FIG. **3** is a top plan view of the push beam assembly and the first preferred embodiment.

FIG. **4** is a sectional view along line **4—4** of FIG. **3**, illustrating the tilt position for the bulldozer blade.

FIG. **5** is a perspective view of the pivoting guide on the push beams for the bulldozing blade.

FIG. **6** is a side view of an alternative embodiment of the reel carrier assembly, wherein hydraulic actuators are utilized to rotate the reel supporting structure.

FIGS. **7** and **8** are front and side views, respectively, of the second preferred embodiment illustrating the bulldozing blade in a horizontal position.

FIGS. **9** and **10** are front and side views, respectively, illustrating the second preferred embodiment with the bulldozing blade in a tilted position.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates a prime mover **10**, such as crawler tractor or "bulldozer", having a cable laying plow **12** and reel carrier assembly **14** mounted at its opposed ends. A cable reel **16** is supported by the reel carrier assembly to dispense cable **18** through a series of rollers **20** to the cable laying plow **12**. An example of cable laying plow suitable for use in conjunction with the present invention is disclosed by U.S. Pat. No. 3,363,423, to Davis which is incorporated by reference.

FIG. **2** illustrates a first preferred embodiment of the present invention. Reel carrier assembly **14** is conveniently mounted on push beams **22** which are conventionally mounted to the opposed lateral sides of prime mover **10**. A bulldozing blade **24** is mounted across the front of push beams **22** and is capable of simultaneously being operated with the cable dispensing assembly. Lift cylinders **26** are conventionally mounted on the opposed lateral sides of the prime mover by trunion mountings **28**. Lift rods **30** project from the cylinders **26** and are pivotally connected to the push beams by mounting brackets **32**.

As illustrated in FIGS. **3** and **4**, blade **24** is pivotally connected to cross beam **34** by a universal connection **36**, or the like. A hydraulic cylinder **38** is pivotally connected to blade **24** by pin **40** and piston rod **42** is pivotally connected at **44** to an arm **46** on one of the push beams. Energizing piston rod **42** and cylinder **38** effects the tilting motion of blade **24** about the axis of universal connection **36**.

FIG. **5** illustrates the guide connection between bulldozing blade **24** and the push beams. A guide plate **48** is mounted on the forward end of the push beams and is interposed between blade **24** and a back plate **50** mounted on the blade. The significance of the tilting action relative to the reel carrier assembly will become apparent from the following discussion.

The first preferred embodiment of the present invention is illustrated in FIGS. **2** and **3** and includes a pair of parallel support arms **52**. These support arms are rigidly mounted on opposed push beams by plates **54** and **56**, which are suitably secured to the push beams, for

example by welding. The rigid connection is maintained by a pair of pins **58** and **60** which are inserted through aligned holes in plates **54** and **56** and support arm **52.** These pins may be releasably secured within the holes, for example, by snap rings which are not illustrated. It can be seen from FIG. **2** that the support arms **52** project upwardly and forwardly away from the push beams to extend generally above the bulldozing blade **24** to avoid interference with blade tilting movement.

A tubular support beam **62** is rotationally mounted above the blade within suitable holes in the upper ends of the support arms. A pair of triangular shaped support collars **64** and **66** are rigidly connected to the support beam **62** on each side of the support arms **52.** A pair of parallel reel support arms **68** and **70** are rigidly connected to the tubular support beam **62** for rotation. Support cups **72** and **74** are mounted on the outer ends of reel support arms **68** and **70** to support a reel axle **76** upon which cable reel **16** is mounted. Retainer pins **73** and **75** are provided on the support cups for preventing axle **76** from becoming inadvertently displaced.

As illustrated in FIG. **2,** the rotational support tube and reel support arms are in cable dispensing position. The retracted position is illustrated by the phantom lines showing the reel support arms being generally vertically disposed. To maintain the rotatable beam and arm support assembly in the desired position, a pin is inserted through either hole **78** or **80** in the support collar and into a mating hole in the support arm **52.**

When the reel carrier is not being utilized to dispense cable to the cable laying plow, axle **76** may be stored within tubular support beam **62.** The end of support beam **62** which can be seen in FIG. **2** includes a retention plate **82** to prevent an axle which is being stored within the tubular support from being inadvertently displaced when the crawler tractor is working on a sloping surface. The other end of the tubular support can be completely closed by an end cap.

As illustrated in FIG. **2,** the overall arrangement of the reel carrier support assembly for the first preferred embodiment enables the bulldozing blade to be utilized at all times, regardless of whether the reel carrier is being used to dispense cable. This highly advantageous result is accomplished by positioning the support arms on the bulldozer push beams in such a manner that this assembly does not have to be removed during a dozing operation. When cable is being dispensed, arms **62** project forwardly from the prime mover **10** and support arms **52** and do not hamper the maneuverability of the bulldozing blade whatsoever. If the cable laying plow is not being utilized, arms **68** may be rotated clockwise (as viewed in FIG. **2**) to the position shown in phantom. This is accomplished by simply removing the pin from hole **78** in the collar and manually rotating the arms and tubular support beam so that hole **80** in the support collar will mate with an appropriate hole in support arm **52.** Pin **78** is then reinserted to lock the reel arms and tubular support in the inoperative, retracted position.

It can also be seen from FIG. **2** that the upper ends of support arms **52** are spaced from the blade **24.** As a result, the bulldozing blade can be tilted by hydraulic cylinder **38** and piston **42** to take full advantage of the bulldozing capabilities of the blade.

FIG. **6** illustrates an alternative embodiment which includes a hydraulic actuator for rotating the tubular support beam and thereby pivoting the reel support arms. The general arrangement of the various components in the embodiment of FIG. **6** is the same as the embodiment of FIG. **2,** with the primary exception of the hydraulic actuator and ancillary structure; therefore, the elements which are identified in the first embodiment of FIGS. **1–3** and in the alternative embodiment of FIG. **6** are represented by the same reference numerals.

The actuator of FIG. **6** comprises a hydraulic cylinder **90** pivotally interconnected between projections **91** and **92** on respective plates **93** and **94.** The plates **93** and **94** are rigidly connected to the push beam **22,** for example by welding and are identical to plates **54** and **56** in FIG. **2,** but for the addition of the projections. Hydraulic lines (not shown) interconnect the hydraulic cylinder **90** to a hydraulic power source on the prime mover **10.**

A piston rod **95** reciprocates within the hydraulic cylinder **90** and is pivotally connected at its distal end to a collar **96** that is rigidly mounted on tubular support beam **62** in the same manner as support collar **64.** Support arm **52** and collar **96** may optionally include properly positioned holes (not shown) to receive locking pins for locking the carrier arms **68** in desired position to thereby relieve the pressure on the hydraulic cylinder.

The preferred embodiment for this hydraulic actuator system includes an identical hydraulic cylinder, piston and auxiliary structure, as described above, on each of the opposed lateral sides of the prime mover to assure proper manipulation of the reel carrier structure.

Actuation of the hydraulic cylinder **90** by pressurized fluid causes the piston rod **95** to be extended or withdrawn as desired to manipulate the reel support arms **68** to a variety of positions, as illustrated in phantom in FIG. **6.** This results in a number of highly desireable advantages. First, the reel support arms may be pivoted to any position without requiring the operator to dismount the prime mover and solicit assistance in pivoting the support arms and installing locking pins. Second, the support arms may be easily manipulated to accomodate different sized cable reels or to pivot upwardly when the prime mover is crossing a ditch. Further, the hydraulic actuator provides the added dimension of lift capability to the reel carrier for unloading reels from trucks.

FIGS. **7–10** illustrate a further preferred embodiment of the present invention. The elements of this embodiment which are identical to the elements of the first embodiment are indicated by reference numerals which are increased by a factor of one hundred.

In this further embodiment parallel support arms **210** are pivotally mounted to push beams **122** by pivotal connections **212** on plates **214** and **216.** A tubular support beam **162** is rotationally mounted between the support arms **210** in the same manner as described in the first embodiment. The other components of this embodiment are identical with purposes of clarity. It is further to be understood that this embodiment may optionally include a hydraulic actuation system similar to that illustrated in FIG. **6.** In this further embodiment, however, the hydraulic cylinders would be pivotally connected to the support arms **210,** rather than to the plates **214** and **216,** due to the pivotal movement of the arms relative to the plates.

The pivotal connection of this embodiment between support arms **210** and plates **214** and **216** places the reel carrier support assembly in a "free floating" condi-

tion, such that support surfaces **218** on support arms **210** rest on the top surface of blade **124.** If the bulldozer blade is in a horizontal position, as illustrated in FIGS. **7** and **8,** both support surfaces **218** engage the bulldozer blade to support the reel carrier assembly. If the bulldozer blade is tilted, as illustrated in FIGS. **9** and **10,** only the support surface at the highest end of the blade will be engaging the blade. Any blade tilting movement causes the support assembly to pivot about connection **212** to a raised position relative to when the blade is in a horizontal. Arms **210** are maintained in a parallel relationship during the blade tilting movement because of their connections with the tubular support beam **162.** Accordingly, the blade is fully operable when the support assembly is mounted on the push beams.

The previously discussed embodiments are exemplary of the present invention and are not intended to be limiting in any manner.

Having fully and completely described our invention, we claim:

1. A bulldozing and reel carrier assembly for a bulldozer, or the like, said bulldozer having a bulldozing blade mounted across the front of a U-shaped push frame assembly, means for tilting said blade about an axis parallel to the longitudinal axis of said bulldozer and means for raising and lowering said frame, wherein the improvement comprises:

a pair of parallel, spaced support arms mounted on said push frame adjacent the blade, said arms projecting upwardly and forwardly from said push frame to overly the blade;

a support beam mounted between the pair of support arms vertically above said bulldozing blade; and

a pair of spaced parallel reel support arms rigidly connected to said support beam and extending forwardly from said bulldozing blade to support a cable reel, or the like, ahead of and above said blade to enable simultaneous bulldozing and cable dispensing.

2. The combination as defined in claim **1,** characterized by said support beam being rotationally mounted between the pair of support arms, said assembly further including a hydraulic actuator operably connected to said support beam for rotating the beam to pivotally manipulate the reel support arms.

3. The combination as defined in claim **2,** characterized by said hydaulic actuator including a piston and cylinder interconnected between said support beams and the push frame assembly.

4. A bulldozing and reel carrier assembly for a bulldozer, or the like, said bulldozer having a bulldozing blade mounted across the front of a U-shaped push frame assembly, means for tilting said blade about an axis parallel to the longitudinal axis of said bulldozer, and means for raising and lowering said frame, wherein the improvement comprises:

spaced support means mounted on said push frame for pivotal movement relative thereto, said support means engaging the top of said blade;

a support beam carried by said support means generally overlying said blade, said support means maintaining said beam horizontal despite blade tilting movement; and

a pair of spaced, parallel reel support arms rigidly connected to said support beam and extending forwardly of said bulldozing blade to support a cable reel ahead and above said blade to enable simultaneous bulldozing and cable dispensing.

5. A bulldozing and reel carrier assembly for a bulldozer, or the like, said bulldozer having a bulldozing blade mounted across the front of a U-shaped push frame assembly, means for tilting said blade about an axis parallel to the longitudinal axis of said bulldozer and means for raising and lowering said frame, wherein the improvement comprises:

a pair of parallel, spaced support arms rigid with said push frame adjacent the blade, said support arms projecting upwardly and forwardly from the push frame to overly the blade a sufficient distance to accomodate blade tilting movement;

a support beam mounted between the pair of support arms and generally overlying said bulldozing blade; and

a pair of spaced, parallel reel support arms rigidly connected to said support beam and extending forwardly of said bulldozing blade to support a cable reel ahead of and above said blade to enable simultaneous bulldozing and cable dispensing.

6. A bulldozing and reel carrier assembly for a bulldozer, or the like, said bulldozer having a pair of push beams operably mounted to its opposed lateral sides, a bulldozing blade mounted across the front of the push beams for tilting, wherein the improvement comprises:

a support arm mounted on each of said push beams adjacent the bulldozing blade, said support arms projecting upwardly and forwardly from said push beams to extend over said blade;

a support beam rotatably mounted between said pair of support arms about an axis generally perpendicular to the longitudinal axis of said bulldozer;

a pair of spaced, parallel reel arms rigidly mounted to said support beam for rotation therewith, said reel arms extending generally radially from said beam; and

a reel support axle removeably mounted between the distal ends of said reel arms.

7. The assembly defined in claim **6,** characterized by said support arms being rigidly connected to said push beams and being spaced from the bulldozing blade to enable said blade to tilt.

8. The assembly as defined in claim **7,** further including a hydraulic actuator means for rotating the support beam and thereby pivoting the reel arms.

9. The assembly defined in claim **6,** characterized by both of said support arms being pivotally connected to said push beams and including said support surface vertically above said bulldozing blade, at least one of said support surfaces contacting said bulldozer blade at all times, said support arm pivotal connection enabling the blade to tilt.

10. The assembly defined in claim **5,** chracterized by said rotatable support beam being hollow, said reel axle capable of being stored within said support beam, and means preventing a stored axle from being inadvertently displaced from within said hollow support beam when said reel arms are in said second position.

11. The assembly defined in claim **6,** characterized by said rotatable support beam including a locking collar rigidly attached thereto adjacent one of said support arms, said locking collar having a pair of spaced holes alternately aligned with a hole in the support arm, a pin insertable through the hole in said support arm and through one of the holes in said locking collar to main-

tain said support beam and reel arms in desired position.

12. A bulldozing and reel carrier assembly for a bulldozer, or the like, said bulldozer having a pair of push beams operably mounted to its opposed lateral sides and a bulldozing blade mounted across the forward ends of said push beams, means for tilting said blade about an axis parallel to the longitudinal axis of said bulldozer, wherein the improvement comprises:

a support arm pivotally mounted on each of said push beams adjacent the blade and projecting upwardly and forwardly from said push beams to extend vertically above said blade;

a support beam rotationally mounted between the support arms, the rotational axis of said beam being generally perpendicular to the longitudinal axis of said bulldozer, means for locating said beam in a plurality of rotational positions;

each support arm including an engagement surface vertically above said blade, at least one of said engagement surfaces contacting the blade at all times during tilting maneuvers, said support beam maintaining said arms in a parallel relationship;

a pair of spaced, parallel reel support arms rigidly connected to said support beam for rotation therewith, said support arms projecting radially from said beam; and

a reel axle releaseably mounted between the distal ends of said reel support arms for supporting a cable reel;

said bulldozing blade being fully operable during utilization of the reel support assembly.

13. A reel carrier assembly for use on a bulldozer, comprising:

a pair of parallel support arms having a surface for mounting said assembly on the push beams of a bulldozer, said support arms projecting generally upwardly from said mounting surface to extend above a bulldozing blade on a bulldozer, means for pivotally mounting said pair of parallel support arms on push beams of a bulldozer, said support arms having engagement surfaces for contacting the top of a bulldozing blade;

a support beam rotationally mounted between said pair of support arms including means for locking said beam in a plurality of rotational positions;

a pair of spaced, parallel reel arms rigidly attached to said support beam for rotation therewith, said reel arms projecting radially from said beam; and

a reel axle releaseably mounted between said pair of reel arms.

14. A reel carrier assembly for use on a bulldozer, comprising:

a pair of parallel support arms having a surface for mounting said assembly on the push beams of a bulldozer, said support arms projecting generally upwardly from said mounting surface to extend above a bulldozing blade on a bulldozer, means for rigidly mounting said support arms on push beams of a bulldozer;

a support beam rotationally mounted between said pair of support amrs and including means for locking said beam in a plurality of rotational positions;

a pair of spaced, parallel reel arms rigidly attached to said support beam for rotation therewith, said reel arms projecting radially from said beam; and

a reel axle releaseably mounted between said pair of reel arms.

* * * * *