May 2, 1967 J. H. WILMOTH ETAL 3,316,664

REEL-TYPE EARTH MOVING SCRAPER

Filed Dec. 21, 1964 3 Sheets-Sheet 1

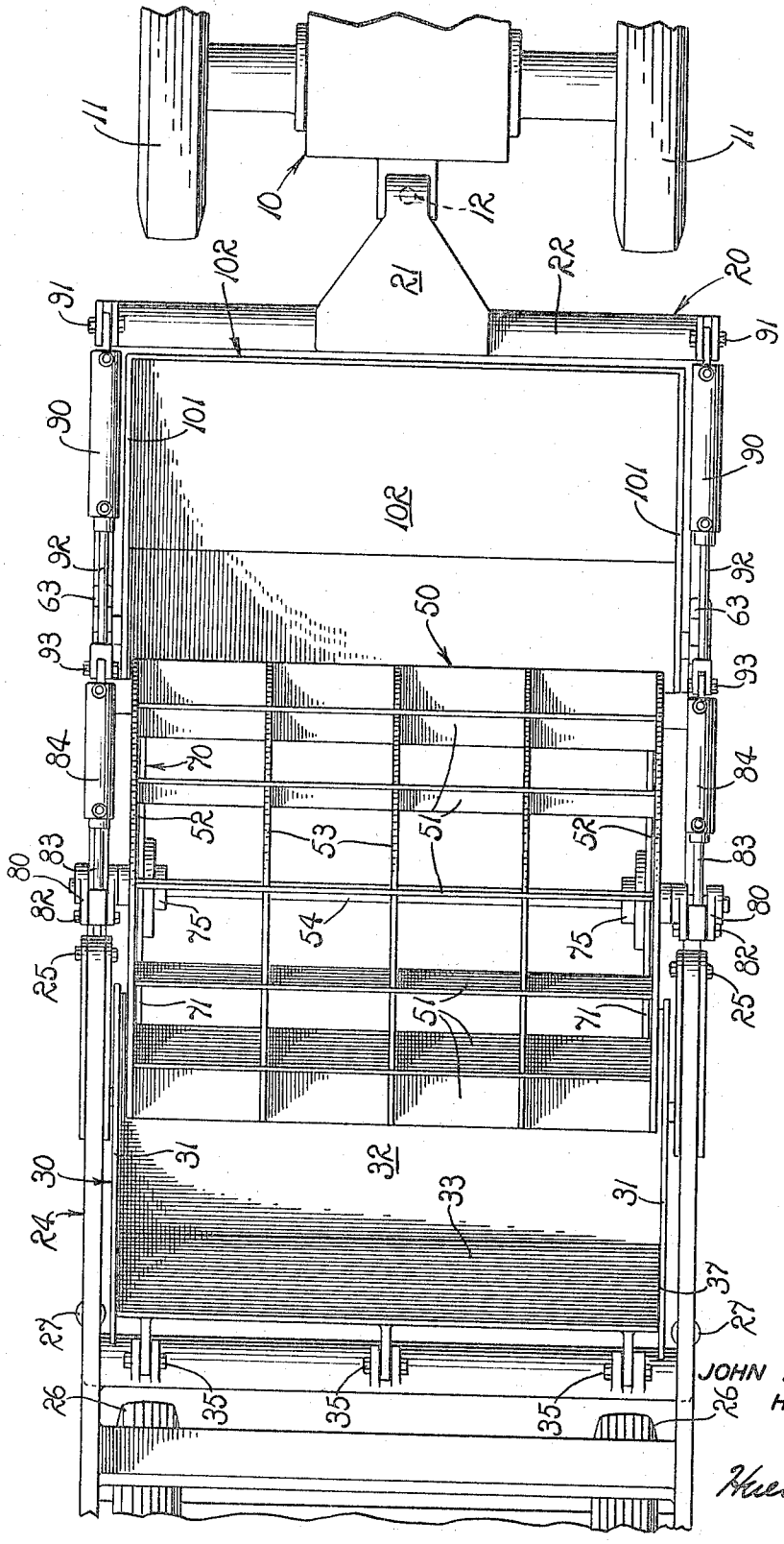


FIG. 1.

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REEL-TYPE EARTH MOVING SCRAPER

Filed Dec. 21, 1964 3 Sheets-Sheet 2

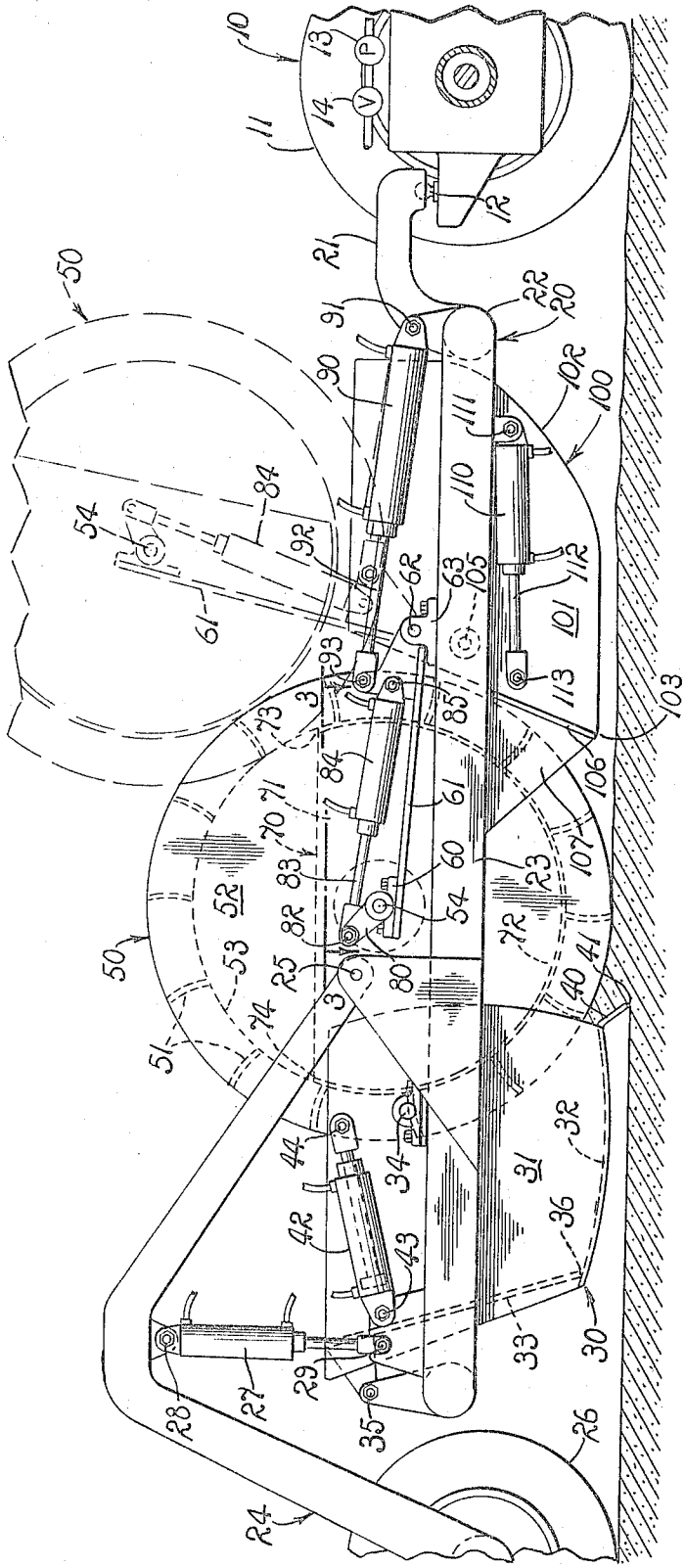


FIG. 2.

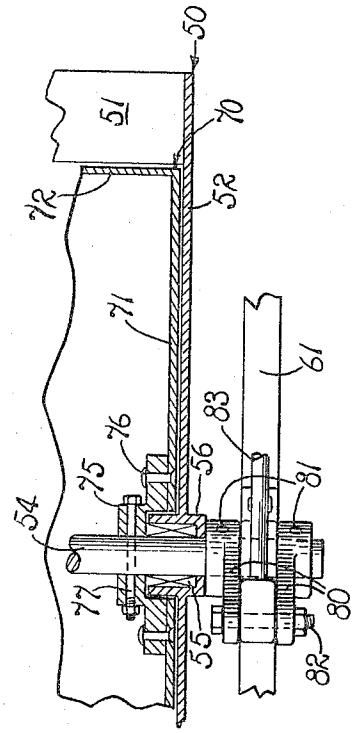


FIG. 3.

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REEL-TYPE EARTH MOVING SCRAPER

Filed Dec. 21, 1964 3 Sheets-Sheet 3

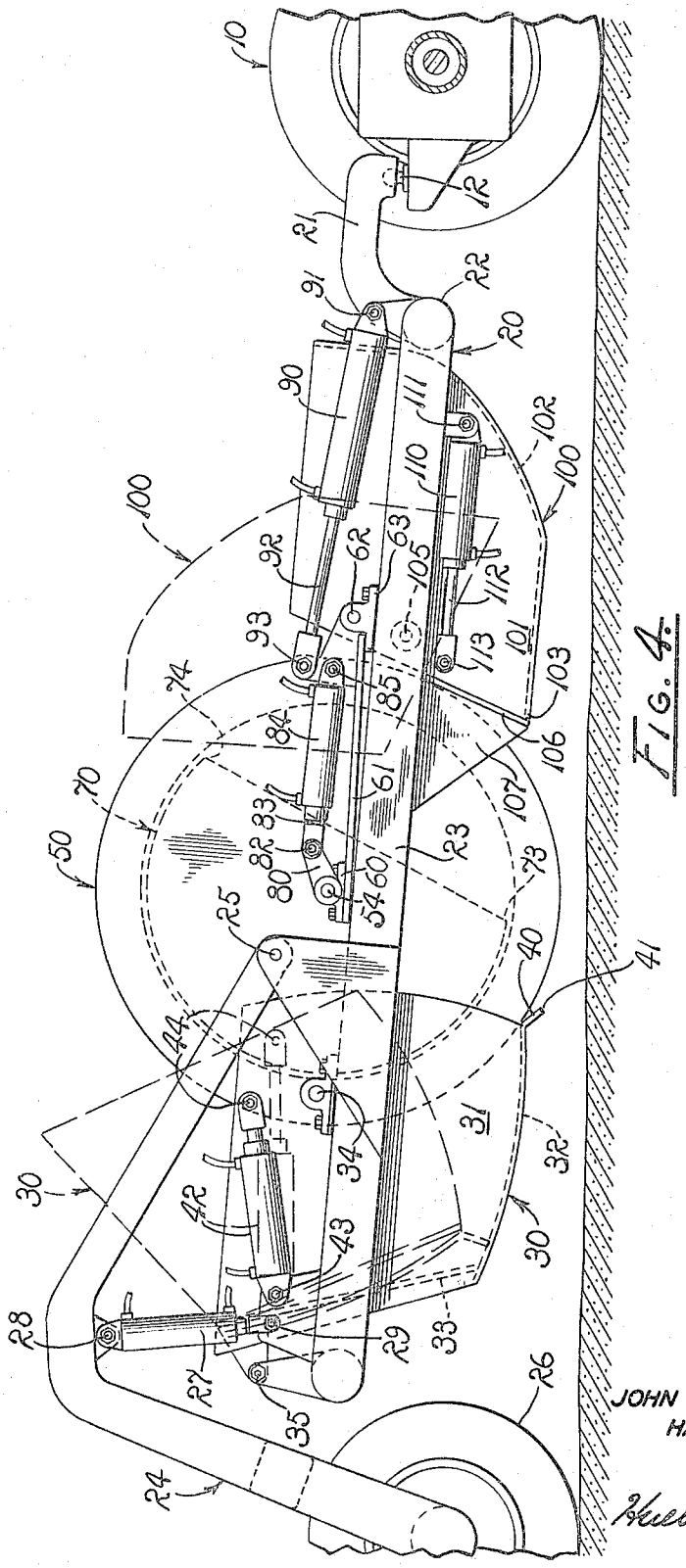


FIG. 4.

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REEL-TYPE EARTH MOVING SCRAPER

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10 Claims. (Cl. 37—9)

The present invention relates to an improved reel-type earth moving scraper and more particularly to such a scraper provided with a plurality of transporting bowls and mechanism to transfer earth between certain of such bowls.

An increase in volumetric capacity of individual bowls in certain forms of scrapers, such as the open-bowl and apron type, has been required to maintain an efficient rate of moving earth and other construction material. In the open-bowl and apron type of earth moving scraper, the loading rate and efficiency is adversely affected when the capacity is increased above an optimum level. This decreased loading rate and efficiency is due to the loading characteristics inherent in the design of such scrapers.

An undesirable loading characteristic of larger capacity open-bowl and apron type scrapers is the pattern of movement of earth into the bowl during loading wherein the initially loaded portion is deposited within the bowl in such a location so that all subsequently loaded earth must be forced over, or through, the initial portion. Consequently, the power requirements of the prime mover for such a scraper are higher than that necessary for a scraper with loading characteristics avoiding movement of subsequent loaded portions through or over the initial portion. During the loading cycle of a conventional open-bowl and apron type scraper, the power requirements for each volumetric unit of load increases progressively as the scraper is loaded. This is due to the previously stated loading characteristic of forcing the latter portion of the load through the initially loaded portion. Therefore, the loading rate is usually non-uniform, and the power requirements required for the terminal portion of the load markedly decreases the overall efficiency of such scrapers.

A desirable design objective in earth moving scrapers is to increase the total volumetric capacity of the scraper, while maintaining the dimensions of the bowls or other carrying receptacles for optimum loading characteristics. For such a design approach to be successful, the number of individual bowls or receptacles must be increased, if the dimensions of the individual bowls are to remain within reasonable limits. When the number of the bowls is increased, additional loading facilities must be provided for the added bowls. However, if certain of the bowls are not so provided, some mechanism must be incorporated to transfer earth to those bowls during the loading cycle. The present invention results from the recognition that the latter design approach permits optimum utilization of the tractive effort of the prime mover of the scraper and increases the total efficiency of the machine as an earth moving tool.

Accordingly, it is an object of the present invention to provide an improved reel-type earth moving scraper having a plurality of earth receiving bowls.

Another object is to provide an earth moving scraper having increased capacity and provides a loading rate equal to scrapers of less capacity.

Another object is to provide an earth moving scraper of increased capacity having a substantially uniform loading rate throughout its total capacity range.

Another object is to provide a large capacity earth moving scraper having a wide range of discharge rates for earth transported by the scraper.

A further object is to provide an improved large capacity earth moving scraper having a dumping mechanism insuring fast and complete discharge of the earth loaded.

These, together with other objects, will become more fully apparent upon reference to the following description and accompanying drawings.

In the drawings:

FIG. 1 is a top plan view of an improved reel-type earth moving scraper embodying the principles of the present invention, portions of the scraper and draft vehicle being shown fragmentarily.

FIG. 2 is a view in side elevation of the scraper of FIG. 1, with the reel and bowl being shown in an elevated, earth transferring position in dashed lines.

FIG. 3 is an enlarged fragmentary view in longitudinal horizontal section taken on line 3—3 of FIG. 2.

FIG. 4 is a view in side elevation similar to FIG. 2, but showing the front and rear hoppers in respective dumping positions in dashed lines, with the internal bowl of the reel shown in full lines in a dumping position.

As illustrated in FIGS. 1, 2 and 4 of the drawings, a draft vehicle **10** is fragmentarily shown as a prime mover for use with the scraper of the present invention. The draft vehicle includes a pair of laterally opposed drive wheels **11** and is provided with a suitable draft connection **12** to impart earth traversing movement to the scraper. A source of pressure fluid, such as a pump **13**, is mounted on the draft vehicle and suitable pressure fluid flow control mechanism, such as the valve **14**, is provided for selective operation of the pressure fluid actuated elements of the scraper which will be subsequently described.

The scraper includes a forward frame, generally indicated at, and provides a forward extending gooseneck **21** adapted for selective connection to the draft element **12** of the vehicle **10**. The gooseneck **21** is integrally joined to a transversely extended draft tube **22**. A pair of laterally opposed side members **23** are rearwardly extended from the draft tube and joined at their rearward ends to complete the forward frame **20**. A trailing frame portion, generally indicated at **24**, is pivotally connected by pins **25** to the forward frame and is thereby adapted for relative pivotal movement. A pair of laterally opposed ground engaging wheels **26** supports the trailing frame portion **24**. A pair of pressure fluid operated rams **27** is pivotally connected to the trailing frame **24** by pins **28** and to the forward frame by pins **29**. Suitable fluid conducting lines, not shown, are connected between the rams **27** and the pump **13** for selective control of pressure fluid through valve **14** for appropriate extension and retraction to effect pivotal movement between the forward and trailing frame portions.

A primary earth receiving hopper **30** is formed by a pair of laterally opposed side walls **31** integrally interconnected to a bottom wall **32**. The bottom wall is slightly concave in longitudinal reference so as to provide an inner earth engaging surface which is arcuately inwardly curved. A rear wall **33** is pivotally supported on the forward frame **20** by a plurality of pins **35** for rocking movement about an axis transversely of the frame. The rear wall **33** is provided with a suitable lower edge **36** and sides **37** so as to insure effective substantially sealing engagement respectively with the bottom wall **32** and the side walls **31** during relative pivotal movement. During loading and

transport operations, with the primary hopper **30** in the position shown in FIG. 2 and in FIG. 4 in full lines, the rear wall is gravitationally maintained in a rearward position, as shown, so that the hopper affords a forwardly facing opening to receive earth.

A scraping blade **40** is provided with a cutting edge **41** and secured to the bottom wall **32** of the primary hopper **30**. Consequently, appropriate changes in the effective length of rams **27** causes pivotal movement between the trailing frame **24** and the forward frame **20** and effects raising and lowering of the cutting edge **41**. The scraping blade **40** is adapted for scraping of the surface of the earth upon lowering of the hopper **30** into earth engagement at a level selected by the effective length of rams **27**.

Pivotal movement of the hopper **30** about its transverse axis afforded by the pivots **34** is selectively effected by a pair of laterally opposed pressure fluid rams **42** pivotally interconnecting the frame and the hopper at opposite ends of each ram by means of respective pins **43** and **44**. The rams **42** are operatively connected to the pump **13** and valve **14** by suitable flexible conduits, not shown. Extension of the rams **42** causes rocking of the primary hopper **30** in a clockwise direction, as viewed in FIGS. 2 and 4, to move the hopper to a dumping position, shown in dashed lines in FIG. 4. It should be noted that the radius of curvature of the bottom wall **32** is greater than the radius of pivotal movement of the bottom wall about the transverse axis afforded by the pivots **34**. This proportioning is selected to insure positive gravitational biasing of the lower edge **36** of the rear wall **33** for scraping contact with the inner surface of the bottom wall **32** during movement from the loading position, shown in full lines in FIG. 4, to the dumping position shown in dashed lines.

As can be seen more clearly in FIG. 1, an annular reel **50** is provided with a plurality of transversely extended circumferentially spaced vanes **51** integrally joined to laterally opposed end walls **52** of circular form. A plurality of axially spaced annular ribs **53** enhance the longitudinal rigidity of the vanes **51**, and provide the reel with a periphery adapted for rolling engagement with the earth and to effect elevation of earth excavated by the scraping blade **40**. As shown in FIG. 3, the reel is supported for rotation in the frame about a transverse axis by means of a transversely extended shaft **54**. Laterally spaced bearings **55** are carried in respective hubs **56** secured to the end walls **52** of the reel and permit rotation of the reel about the axis provided by the shaft **54**.

The outer ends of the shaft **54** are supported in respective pillow blocks **60** secured to the rearward ends of floating draft arms **61**. The forward ends of the draft arms are pivotally secured to the side members **23** by suitable pins **62** carried in respective hinge bases **63**.

A bowl **70** is mounted internally of the reel **50** and includes a pair of laterally spaced end walls **71** in close proximity to a respective one of the end walls **52** of the reel. Sufficient clearance is provided between the respective end walls of the internal bowl **70** and the reel **50** for free rotation of the reel, as well as rocking of the bowl at times when the reel is elevated and is in a non-rotative condition. A peripheral wall **72** is in the form of a fractional cylinder and provides a forward edge **73**, which is so designated in relation to the direction of intended travel of the scraper, which is left to right, as viewed in the drawings. The peripheral wall **72** also provides a rearward edge **74** at an elevation sufficient to maintain earth within the bowl **70** and also provide an opening between the forward and rearward edges to admit earth elevated by the reel. The bowl **70** is non-rotatably mounted on the shaft **54** by means of a pair of laterally opposed hubs **75** secured to the bowl end walls **71**, as by rivets **76**. A pin **77** received through suitable apertures respectively provided in the shaft **54** and each of the hubs **75** insures appropriate rocking movement of the bowl **70** incident to rotation of the shaft **54**.

For selective movement of the bowl **70** between an earth receiving position, shown in FIG. 2, and an earth discharging position, shown in FIG. 4, a pair of control arms **80** are rigidly secured to each end of the shaft **51** as by pins **81**. Each pair of control arms **80** is provided with suitable bores in their distal ends for the reception of pivot pins **82** to secure each of the control arms to the piston rod **83** of a respective one of a pair of primary reel bowl dump rams **84**. The rams **84** are also selectively extended and retracted under the influence of pressure fluid received from the pump **13** under the control of valve **14** through suitable flexible conduits, not shown. The cylinder end of each of the rams **84** is pivotally connected to a respective one of the floating arms **61** by means of a pin **85**.

A pair of laterally opposed secondary reel bowl dump rams **90** are each pivotally connected to the forward frame **23** by a pin **91**, and each includes a piston rod **92** pivotally connected to the draft arm **61** by pin **93**. It will be observed that the pivotal connection **93** is so located to provide a suitable lever arm for the rams **90** for rocking movement of the draft arms **61** about their respective pivots **62**. As will readily occur to those skilled in the art, the length of the lever arm will be selected to accommodate the effective force available from the rams **90**, the capacity of the reel bowl **70**, and the longitudinal rigidity and ultimate strength of the floating arms **61**.

A forward auxiliary hopper **100** is provided with an upwardly facing opening formed by laterally opposed side walls **101** and a continuous forward and bottom wall **102** terminating in a rearward edge **103**. The term rearward is in relation to the direction of movement of the scraper, as indicated above. Laterally opposed aligned pivotal supports **105** in the frame member **23** afford a transverse pivotal axis for the front hopper for rocking movement between an earth receiving position, shown in full lines in FIG. 4, and an earth discharging or dumping position, shown in dashed lines. A closing apron **106** is rigidly secured to and depends from the forward frame **20** to close the rearward part of the front hopper, while permitting disposition of the rearward edge **103** relative to the pivotal axis so as to provide desirable dumping characteristics and to insure clearance above the ground by the edge **103** throughout the full range of movement of the hopper. To provide structural rigidity to the apron **106**, a pair of laterally opposed struts **107** are secured between the apron and the side members **23**.

A laterally opposed pair of control rams **110** are provided for rocking movement of the front hopper **100** between earth receiving and dumping positions. The cylinder end of each ram is pivotally connected to a respective one of the frame members **23** by a pin **111** and each piston rod **112** is pivotally connected to the hopper by a suitable pin **113**. Suitable flexible conduits, not shown, are connected between the control rams **110** and the pump **13** for selective control of pressure fluid under the influence of valve **14**. Accordingly, appropriate retraction of the control rams **110** moves the front hopper to a dumping position, shown in dashed lines in FIG. 4, and extension of the rams effects a corresponding return to an earth receiving position.

Operation

The operation of the described embodiment of the subject invention is believed to be readily apparent and is briefly summarized at this point. During movement of the scraper to an excavation zone, the rams **27** are retracted to raise the cutting edge **41** of the scraper blade from engagement with the earth. Sufficient elevation of the side members **23** upon retraction of the rams **27** also causes contact with the floating draft arms **61** so as to effect elevation of the reel **50** and permit unencumbered movement of the scraper in such a transport condition.

Upon reaching the excavation zone, the rams **27** are extended by appropriate movement of the valve **14** so

as to permit selective elevation of the scraper blade **40** in engagement with the earth surface. Earth traversing movement of the scraper with the blade in such engagement causes the surface of the earth to be excavated by the scraping blade. Concurrently, the reel **50** is gravitationally biased into contact with the earth surface by reason of the pivotal mountings **62** of the floating draft arms **61**. Consequently, the periphery of the reel is disposed in engagement with the surface of the earth for rolling travel thereover incident to ground traversing movement of the scraper. The pivotal mounting of the floating draft arm **61** permits relative elevational movement between the reel **50** and the scraper frame so as to accommodate for irregularities encountered in the earth surface. In addition, the secondary reel bowl dump rams **90** also permit down pressure to be exerted on the reel to insure a more positive rolling engagement between the reel periphery and the surface of the earth. Since rotation of the reel in this form of the invention is dependent upon resistance encountered by the surface of the earth, certain soils are of insufficient cohesiveness to insure adequate rotation of the reel. Accordingly, down pressure of the reel exerted by the rams **90** provides positive rotation under all types of soils encountered.

During movement of the scraper from left to right, as viewed in the drawings, with the primary hopper **30** in the position shown in FIG. 2, earth excavated by the scraping blade is scraped rearwardly over the blade by the transverse vanes **51** of the reel and deposited in the rear hopper. Upon the rear hopper being filled to a level where no further earth can be deposited therein, the earth receiving compartments formed by the circumferentially spaced vanes and transversely spaced ribs in conjunction with the fractionally cylindrical wall **71** of the reel bowl **70** receive earth excavated by the blade **40** and maintain the excavated earth in such compartments by reason of the quantity of earth in the rear hopper **30**. Continued rotation of the reel **50** effects elevation of the earth and a subsequent discharge of such elevated earth through the upwardly facing opening of the reel bowl **70**, when in an earth receiving position shown in FIG. 2.

Loading operation of the scraper is continued until the internal reel bowl **70** is filled to a level above the forward and rearward edges **73**. As soon as this quantity has accumulated in the reel bowl, the secondary dump rams **90** are retracted to cause a rocking of the draft arms **61** about the transverse axis afforded by the aligned pins **62**. Such retraction moves the reel bowl **70**, along with the reel **50**, to an earth transferring position shown in dashed lines in FIG. 2, wherein the forward edge **73** is in a position to permit all of the earth previously loaded in the bowl **70** to be transferred to the forward auxiliary hopper **100**. The rams **90** are subsequently extended to return the reel **50** and bowl **70** to a loading position shown in full lines in FIG. 2. Depending upon the relative capacities of the reel bowl **70** and the auxiliary forward hopper **100**, such earth transfer is continued until the hopper **100** is filled.

Upon filling of the hopper **100** and return of the reel and bowl **70** to a loading position, loading operations are continued until the reel bowl **70** has again been filled with excavated earth. At this time, all of the receptacles of the scraper, such as the primary and secondary hoppers **30**, **100**, and the reel bowl **70** are filled to capacity. The rams **27** are then retracted to raise the rear hopper to a transport position, and concurrently raise the reel and bowl by reason of the side members **23** contacting the floating draft arms **61**. As will also occur to those skilled in the hydraulic art, the control valve **14** will be suitably designed to permit raising of the reel and bowl by retraction of the rams **27**, which causes a slight retraction of the piston rod **92** of ram **90**. Such slight retraction is readily accommodated by provision of a "float position" in the valve, which is well known in the hydraulic art.

With the primary hopper **30** and the reel bowl **70** raised to a transport position, the scraper is drawn to the discharge, or fill, zone of the construction site. Upon reaching the fill zone, each of the earth receptacles is moved to a respective dumping position, as shown in FIG. 4, under the influence of their respective pressure fluid rams. It will be noted that independent power means are provided for each of the receptacles so that selective independently controlled dumping is permitted, as well as concurrent dumping of all receptacles. Consequently, the scraper can accommodate a wide range of materials, as well as dumping requirements.

Both the front hopper and the reel bowl are gravitationally emptied, and the curved lower wall of each receptacle insures complete dumping of the earth contained therein. The rear hopper has a configuration generally in the form of an open box with a slightly curved bottom wall. To insure positive emptying of the earth contained in the rear hopper, the rear wall **33** is provided with a lower edge **36** and side edges **37** respectively in contact with the bottom wall **32** and the side walls **31** of the rear hopper. In addition, the rear wall is formed on a radius greater than the pivotal radius of the hopper provided by the pivot pins **34**. Consequently, the lower edge **36** of the rear wall is at all times gravitationally biased into engagement with the bottom wall, while the bottom wall exerts an upward force against the lower edge **36** by reason of the differences in the pivotal radius and the radius of curvature. Consequently, positive ejection of the excavated earth is attained by the pivoted rear wall **33** in conjunction with the configuration and pivotal arrangement of the rear hopper **30**.

Accordingly, the present invention provides an improved reel-type earth moving scraper having increased capacity while maintaining a uniform loading rate throughout the complete range of load accommodated by the scraper. At no time do the loading characteristics of the scraper require increased power output from the draft vehicle as in previously available scrapers. In addition, the scraper permits a flexibility of operation throughout a wide range of materials, and at all times insures rotation of the reel for effective loading, transfer of excavated earth, and positive dumping of transported materials.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An earth moving scraper comprising a mobile frame having a predetermined direction of travel; an earth engaging scraper blade mounted transversely in the frame; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling travel thereover during travel of the frame and to elevate said earth; a hopper mounted in the frame rearwardly of the blade to receive a predetermined quantity of earth scraped thereover by the reel; means carried by reel to receive earth in excess of said predetermined quantity scraped rearwardly over the blade and elevated by said reel; an auxiliary hopper carried by the frame; and means to transfer earth from said earth receiving means of the reel to said auxiliary hopper.

2. An earth transporting scraper comprising a mobile frame having a predetermined direction of travel; a primary hopper mounted in the frame for pivotal movement about an axis disposed transversely of the frame between a first earth receiving position and a second predetermined earth discharging position, said hopper having an

open forward side and a lower edge; an earth engaging scraper blade mounted transversely of the frame on the lower edge of the hopper; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling engagement therewith during travel of the frame and adjacent to the blade when the hopper is in receiving position to scrape earth over the blade into the hopper and to elevate earth from the hopper when earth has accumulated therein; a bowl having an opening; means mounting the bowl on the frame and within the reel for rocking movement between an earth receiving position with the opening upwardly disposed to receive earth from the reel and a dumping position with the opening downwardly disposed; an auxiliary hopper carried by the frame and disposed in a position longitudinally thereof spaced from said reel bowl; and means to transfer earth from said reel bowl to said auxiliary hopper.

3. An earth moving scraper comprising a mobile frame having a predetermined direction of travel; an earth engaging scraper blade mounted transversely in the frame; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling travel thereover and adjacent to the blade to scrape earth rearwardly thereover during travel of the frame and to elevate said earth; a hopper mounted in the frame rearwardly of the blade to receive a predetermined quantity of earth scraped thereover by the reel and being movable between a loading position and a dumping position; means carried by the reel to receive earth in excess of said predetermined quantity scraped rearwardly over the blade and elevated by said reel, said means being movable between predetermined loading and dumping position; an auxiliary hopper carried by the frame and mounted for movement between a loading and a dumping position; means to transfer earth from said earth receiving means of the reel to said auxiliary hopper; and power means individually connecting the frame to each of said hoppers and said reel earth receiving means for individual selective movement thereof between said loading and dumping positions.

4. An earth transporting scraper comprising a mobile frame having a predetermined direction of travel; a primary hopper mounted in the frame for pivotal movement about an axis disposed transversely of the frame between a first earth receiving position and a second earth discharging position, said hopper having an open forward side and a lower edge; an earth engaging scraper blade mounted transversely of the frame on the lower edge of the hopper; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling engagement therewith during travel of the frame and adjacent to the blade when the hopper is in a receiving position to scrape earth over the blade into the hopper and to elevate earth from the hopper when earth has accumulated therein; a bowl having an opening; means mounting the bowl on the frame and within the reel for rocking movement between an earth receiving position with the opening upwardly disposed to receive earth from the reel and a dumping position with the opening downwardly disposed; an auxiliary hopper carried by the frame and disposed in a position longitudinally thereof spaced from said reel bowl, said auxiliary hopper being mounted for rocking movement between a loading position and a dumping position; means to transfer earth from said reel bowl to said auxiliary hopper; and power means individually connecting said hoppers and said reel bowl to the frame for individual selective dumping thereof.

5. An earth moving scraper comprising a mobile frame intended for travel in a predetermined direction; an earth engaging scraper blade; means operatively interconnecting the blade and the frame for selective elevational movement of the blade for scraping earth engagement; an earth elevating reel; means mounting the reel for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling travel thereover and adjacent to the blade to scrape earth rearwardly thereover during travel of the frame and to elevate said earth; a hopper mounted in the frame rearwardly of the blade to receive a predetermined quantity of earth scraped thereover by the reel and being movable between a loading position and a dumping position; means carried by the reel to receive earth in excess of said predetermined quantity scraped rearwardly over the blade and elevated by said reel, said means being movable between predetermined loading and dumping position; an auxiliary hopper carried by the frame and mounted for movement between a loading and a dumping position; means to transfer earth from said earth receiving means of the reel to said auxiliary hopper; and power means individually connecting the frame to each of said hoppers and said reel earth receiving means for individual selective movement thereof between said loading and dumping positions.

6. A self-loading earth transporting scraper comprising a mobile frame having a predetermined direction of travel; a primary hopper mounted in the frame for pivotal movement about an axis transversely of the frame between a first earth receiving position and a second earth discharging position, said hopper having an open forward side and a lower edge; an earth engaging scraper blade mounted transversely of the frame on the lower edge of the hopper; means interconnecting the primary hopper and the frame for selective elevational movement of said lower edge to effect engagement of the earth by said scraper blade; an earth elevating reel having a periphery adapted for earth engagement; means mounting the reel for rotation about an axis transversely of the frame and including means permitting floating elevational movement of the reel in the frame with the periphery in rolling engagement with the earth surface during travel of the frame and disposed adjacent to the blade when the primary hopper is in a receiving position to scrape earth over the blade into the hopper and to elevate earth from the hopper when earth has accumulated therein; a bowl having an opening; means mounting the bowl on the frame and within the reel for rocking movement between an earth reeciving position and a dumping position with the opening downwardly disposed; an auxiliary hopper carried by the frame and disposed in a position longitudinally thereof spaced from said reel bowl; means mounting said auxiliary hopper for rocking movement between a loading position and a dumping position; power means to move said reel bowl to a dumping position superposed said auxiliary hopper to transfer earth thereto from said reel bowl; and power means individually connecting said hoppers and said reel bowl to the frame for individual selective dumping thereof.

7. An earth moving scraper comprising a mobile frame having a predetermined direction of travel; an earth engaging scraper blade mounted transversely in the frame; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling travel thereover and adjacent to the blade to scrape earth rearwardly thereover during travel of the frame and to elevate said earth; a hopper mounted in the frame rearwardly of the blade for pivotal movement about an axis parallel thereto and being adapted to receive a predetermined quantity of earth scraped thereover by the reel, the hopper having laterally opposed side walls and an arcuately inwardly curved bottom wall integral therewith, the bottom wall affording a leading edge for mounting of said scraper blade, and a rear wall mounted in the frame for pivotal movement about an axis parallel to the pivot axis of the hopper, said rear wall providing a lower edge adapted to

contact the inner surface of said bottom wall in substantially closing engagement therewith; and power means pivotally interconnecting the frame and the hopper to rock said hopper about its respective pivotal axis for movement between a loading and a dumping position, said pivotal attachment of the power means and the hopper, the pivotal axis of the hopper and the pivotal mounting of said rear wall being arranged and constructed so that pivotal movement of the hopper to a dumping position insures scraping contact of the lower edge of the rear wall with the bottom wall and effects self-cleaning of the hopper during movement to a dumping position.

8. An earth moving scraper comprising a mobile frame having a predetermined direction of travel; an earth engaging scraper blade mounted transversely in the frame; a rotary earth elevating reel mounted for rotation in the frame about an axis transversely of the frame above and forwardly of the blade, said reel having a periphery disposed adjacent to the ground for rolling travel thereover and adjacent to the blade to scrape earth rearwardly thereover during travel of the frame and to elevate said earth; a hopper mounted in the frame rearwardly of the blade for pivotal movement about an axis parallel thereto and being adapted to receive a predetermined quantity of earth scraped thereover by the reel, the hopper having laterally opposed side walls and an arcuately inwardly curved bottom wall integral therewith, the bottom wall affording a leading edge for mounting of said scraper blade, and a rear wall mounted in the frame for pivotal movement about an axis parallel to the pivot axis of the hopper, said rear wall providing a lower edge adapted to contact the inner surface of said bottom wall in substantially closing engagement therewith; power means pivotally interconnecting the frame and the hopper to rock said hopper about its respective pivotal axis for movement between a loading and a dumping position, said pivotal attachment of the power means and the hopper, the pivotal axis of the hopper and the pivotal mounting of said rear wall being arranged and constructed so that pivotal movement of the hopper to a dumping position insures scraping contact of the lower edge of the rear wall with the bottom wall and effects self-cleaning of the hopper during movement to a dumping position; means carried by the reel to receive earth in excess of said predetermined quantity scraped rearwardly over the blade and elevated by said reel; an auxiliary hopper carried by the frame; and means to transfer earth from said earth receiving means of the reel to said auxiliary hopper.

9. An earth transporting scraper comprising a mobile frame adapted for movement in a predetermined direction of travel; a primary hopper; means mounting the hopper in the frame rearwardly thereof for pivotal movement about an axis disposed transversely of the frame between a first earth receiving position and a second earth discharging position, the hopper having an open forward side and a lower edge; an earth engaging scraper blade mounted transversely of the frame on the lower edge of the hopper; a rotary earth elevating reel; a pair of laterally opposed floating draft arms pivotally secured to the frame at one end for rocking movement about a transverse axis and at their opposite ends supporting the reel for rotation in the frame about an axis transversely thereof above and forwardly of the blade so that elevational movement of the reel independently of the frame is permitted within a predetermined range; a plurality of transversely extended vanes carried by the reel to provide a periphery adapted for rolling engagement with the ground during travel of the frame, the periphery so engaging the ground being disposed adjacent to and forwardly of the blade when the hopper is in a receiving position to scrape earth over the blade into the hopper and to elevate earth from the hopper when earth has accumulated therein; a bowl having a fractionally cylindrical wall disposed internally of the reel and providing an opening; means mounting the bowl within the reel on the opposite ends of said floating draft arms for rocking movement between a normal earth receiving position with the opening upwardly disposed to receive earth from the reel and a first dumping position with the opening downwardly disposed; an auxiliary hopper carried by the frame forwardly of the reel; means mounting the auxiliary hopper for rocking movement about a transverse axis between a loading position and a dumping position; primary reel bowl dump rams operatively connected between the reel bowl and the floating draft arms; secondary reel bowl dump rams pivotally interconnecting the frame and the floating draft arms for rocking movement of the reel and the bowl about the axis provided by the pivotal connection between the draft arms and the frame to move the reel to an earth transferring dumping position superposed the auxiliary hopper to transfer earth from the reel bowl to the auxiliary hopper; and power means individually respectively connecting said primary and auxiliary hoppers with the frame for individual selective movement thereof between their respective loading and dumping positions.

10. An earth transporting scraper comprising a mobile frame adapted for movement in a predetermined direction of travel; a primary hopper having laterally opposed side walls and a bottom wall integral therewith and providing a longitudinal arcuately inwardly curved inner surface at a predetermined radius of curvature; means mounting the hopper in the frame rearwardly thereof for pivotal movement about an axis disposed transversely of the frame between a first earth receiving position and a second earth discharging position, the hopper having an open forward side and a lower edge; an earth engaging scraper blade mounted transversely of the frame on the lower edge of the hopper; a rotary earth elevating reel; a pair of laterally opposed floating draft arms pivotally secured to the frame at one end for rocking movement about a transverse axis and at their opposite ends supporting the reel for rotation in the frame about an axis transversely thereof above and forwardly of the blade so that elevational movement of the reel independently of the frame is permitted within a predetermined range; a plurality of transversely extended vanes carried by the reel to provide a periphery adapted for rolling engagement with the ground during travel of the frame, the periphery so engaging the ground being disposed adjacent to and forwardly of the blade when the hopper is in a receiving position to scrape earth over the blade into the hopper and to elevate earth from the hopper when earth has accumulated therein; a bowl having a fractionally cylindrical wall disposed internally of the reel and providing an opening; means mounting the bowl within the reel on the opposite ends of said floating draft arms for rocking movement between a normal earth receiving position with the opening upwardly disposed to receive earth from the reel and a first dumping position with the opening downwardly disposed; an auxiliary hopper carried by the frame forwardly of the reel and providing an opening for earth reception and discharge; means mounting the auxiliary hopper for rocking movement about a transverse axis between a loading position and a dumping position; means on the frame normally closing a portion of the opening of said auxiliary hopper when in said loading position; primary reel bowl dump rams operatively connected between the reel bowl and the floating draft arms for selective movement of the reel bowl between earth receiving and dumping positions; secondary reel bowl dump rams pivotally interconnecting the frame and the floating draft arms for rocking movement of the reel and the bowl about the axis provided by the pivotal connection between the draft arms and the frame to move the reel to an earth transferring dumping position superposed the auxiliary hopper to transfer earth from the reel bowl to the auxiliary hopper; power means individually respectively connecting said primary and auxiliary hoppers with the frame for individual selective

movement thereof between their respective loading and dumping positions; a rear wall pivotally mounted in the frame for rocking movement about a transverse axis substantially parallel to and rearwardly of said lower edge of the primary hopper and providing edges in substantially sealing engagement respectively with the opposed side walls and the curved inner surface of the bottom wall, the pivotal radius of the hopper being less than the radius of curvature of said bottom wall so that rocking movement of the primary hopper to a dumping position exerts an upward force on said rear wall to insure positive wiping engagement therebetween and facilities ejecting earth during dumping.

No references cited.

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