Dec. 27, 1960 J. T. MONK 2,965,988

SCRAPER.

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Fig. 1.

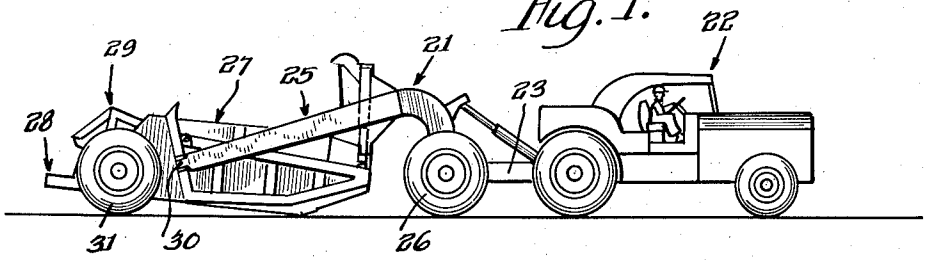


Fig. 2.

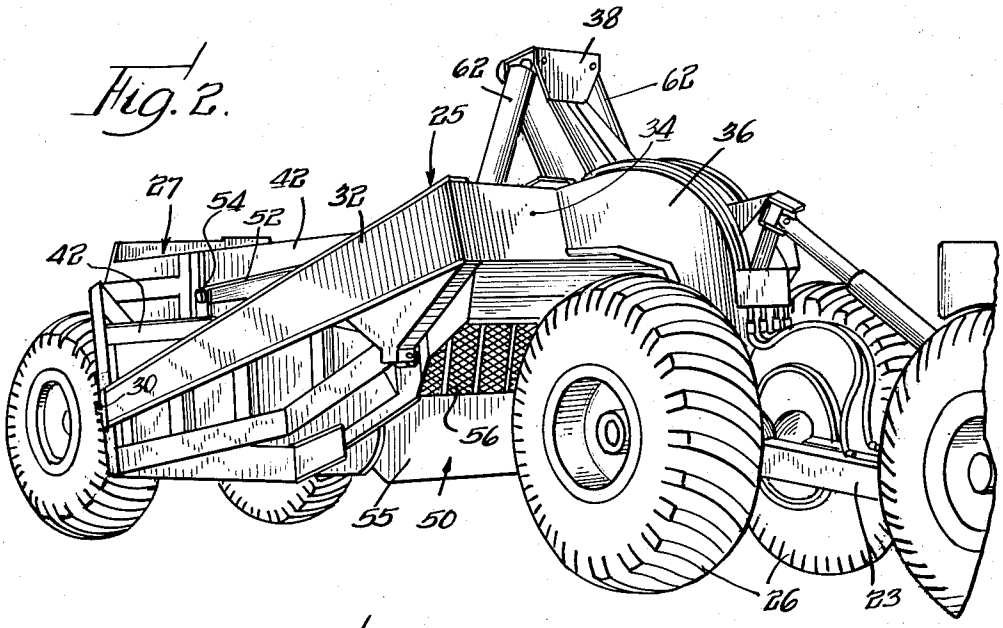
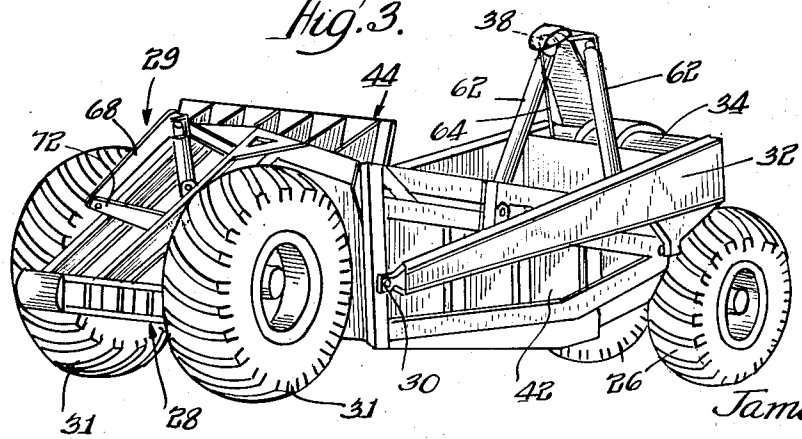


Fig. 3.



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Fig. 4.

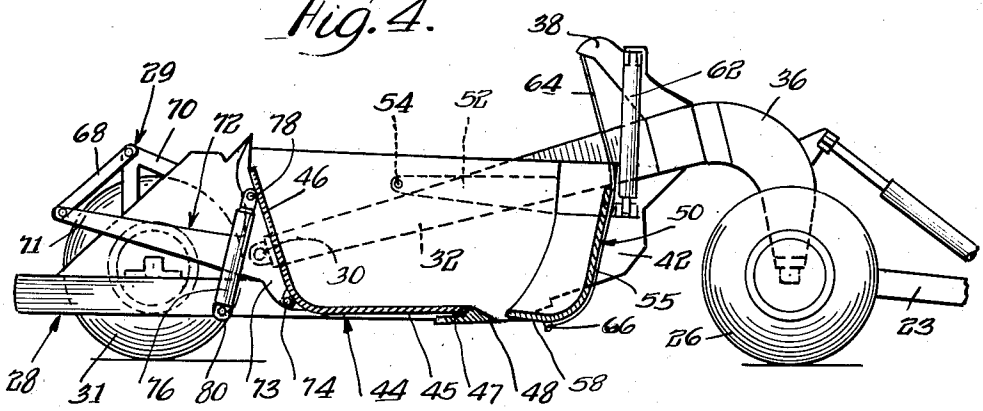


Fig. 5.

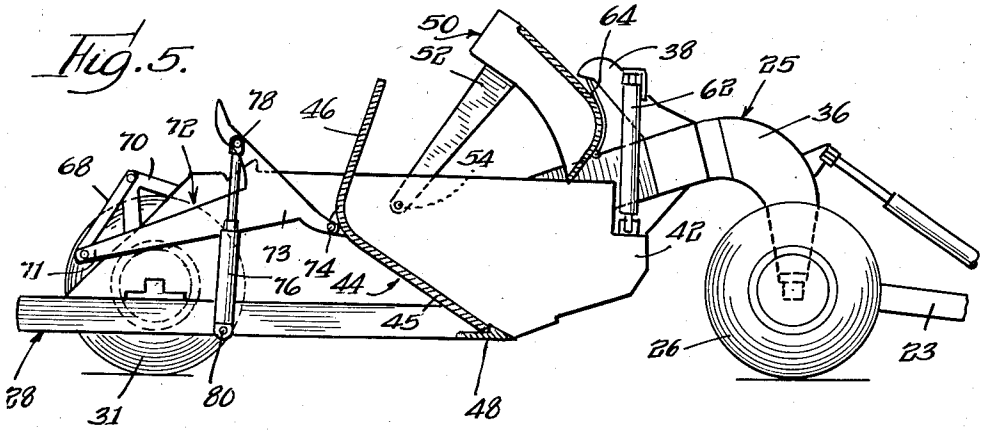
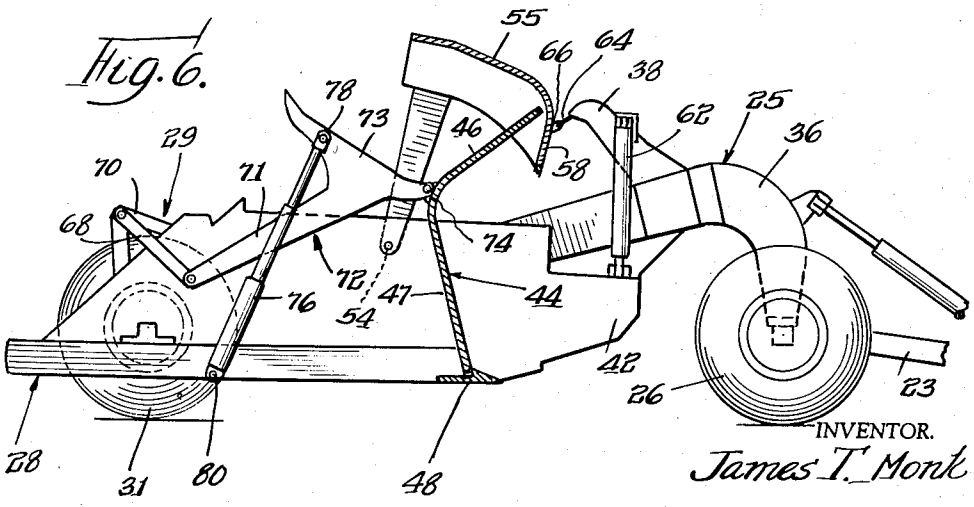


Fig. 6.



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Fig. 7.

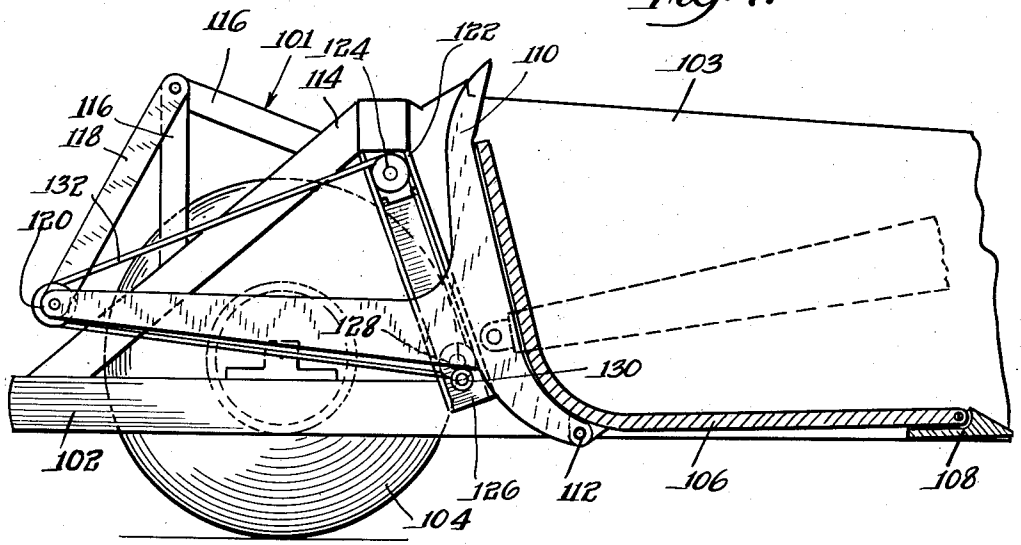
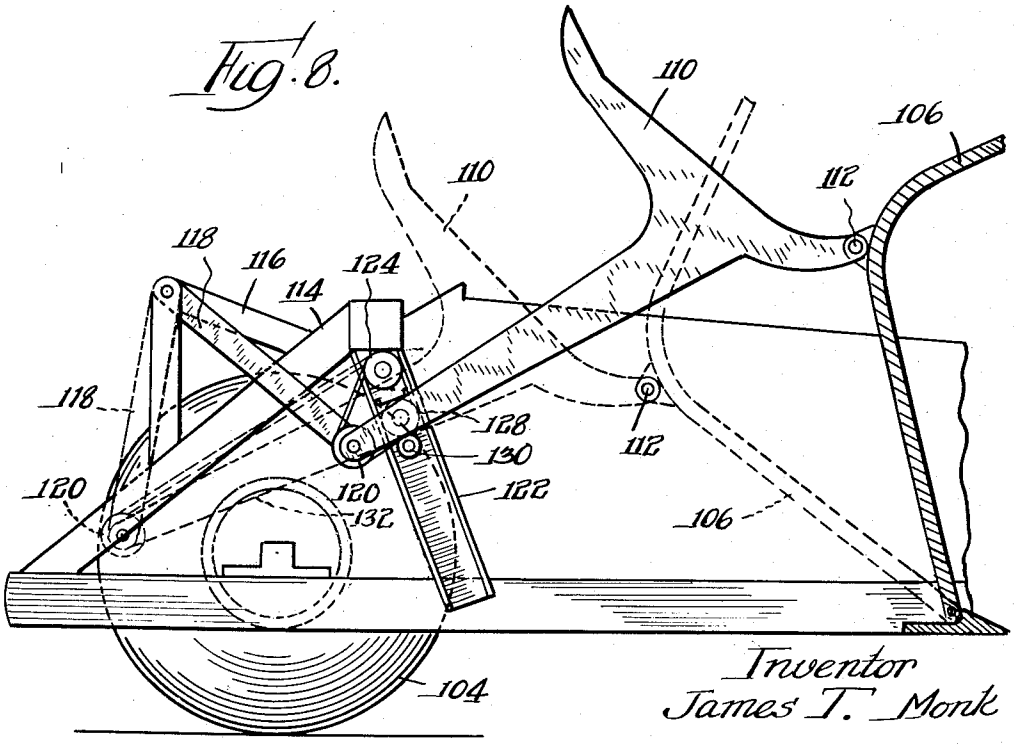


Fig. 8.



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Fig. 9.

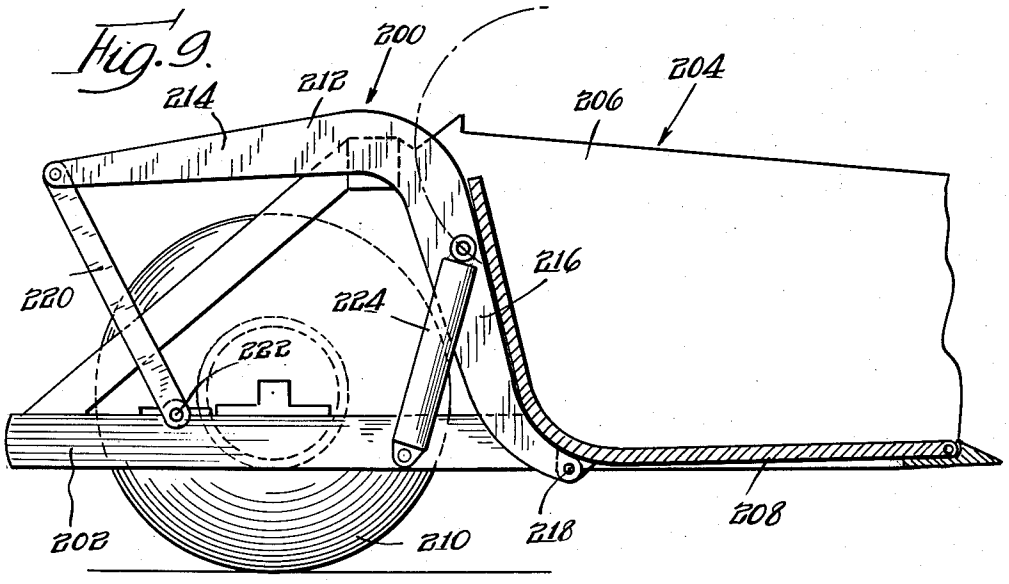
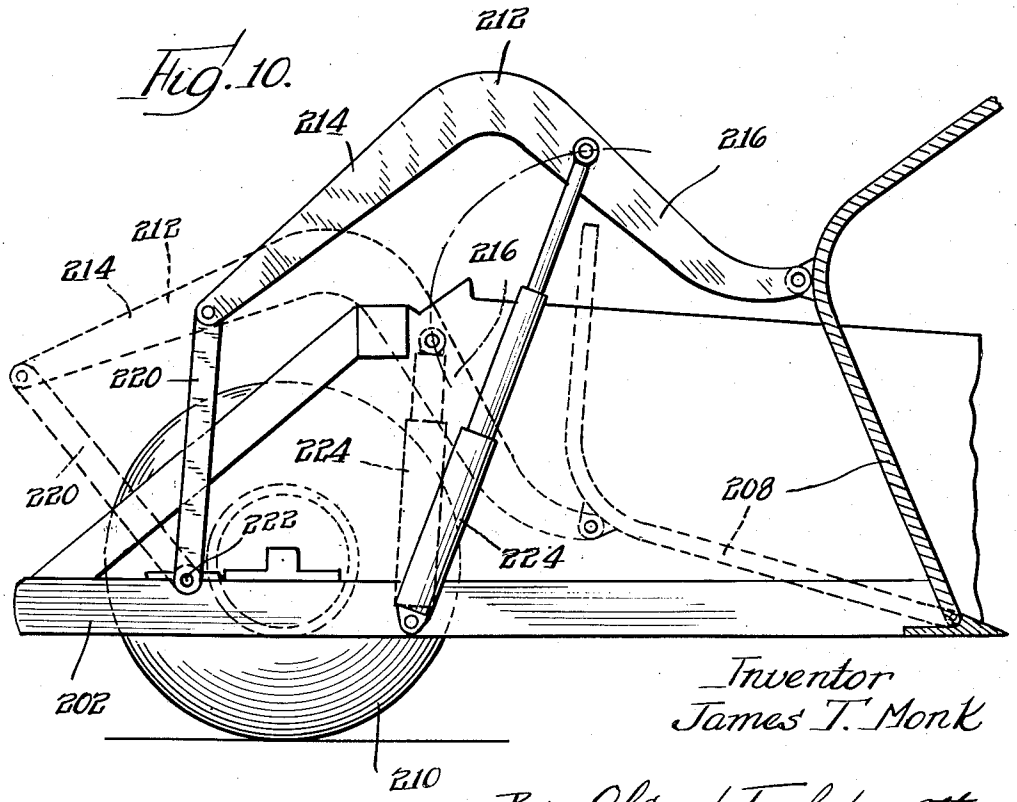


Fig. 10.



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Fig. 11.

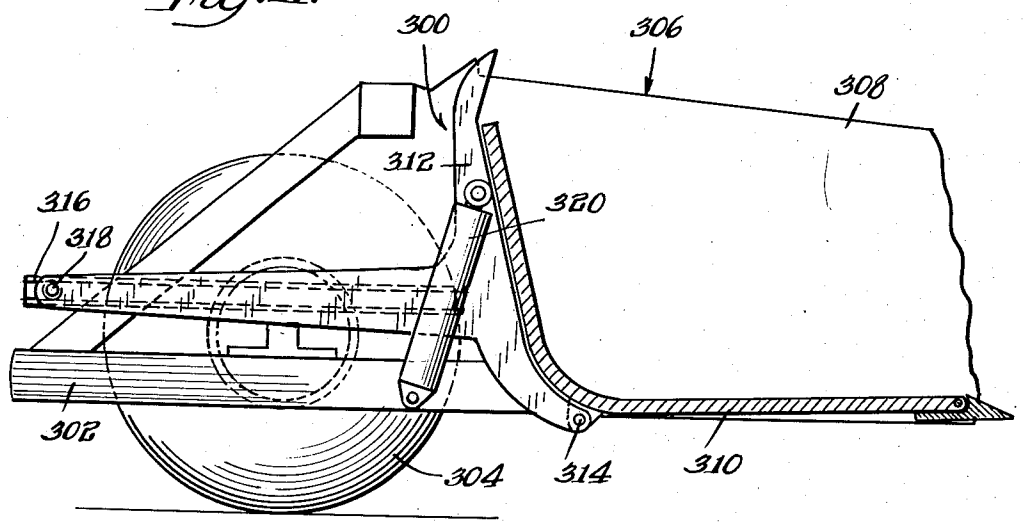
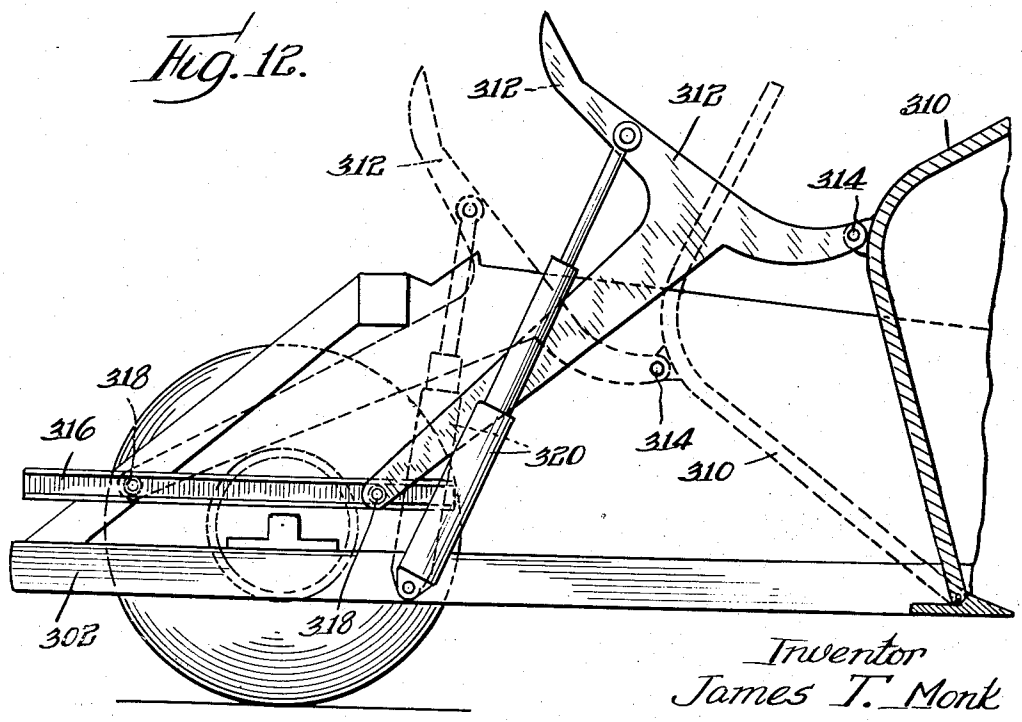


Fig. 12.



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United States Patent Office 2,965,988 Patented Dec. 27, 1960

2,965,988

SCRAPER

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Filed Feb. 26, 1958, Ser. No. 717,706

31 Claims. (Cl. 37—126)

This invention relates to improvements in earth movers and more particularly to digging and carrying scrapers.

Scrapers of the general type herein considered usually comprise a bowl into which dirt or materials are loaded by cutting into dirt with a blade at the forward edge of the bowl and moving the scraper forward, thereby loading the bowl. After the bowl is filled, the bowl and blade are raised to a carrying position and an apron is lowered, thereby retaining the dirt within the bowl. The dirt is carried to a desired location and the scraper is unloaded by first raising the apron and then ejecting the dirt within the bowl by tilting an ejector.

Certain types of dirt or other materials have a tendency to stick to the bowl sides, and in cold weather, the dirt has a tendency to freeze thereto. The adhesion of the dirt to the bowl sides in some instances is so great that the ejector is unable to tilt and eject the dirt. The operational failure of the ejector results in a considerable amount of down time for the scraper.

One of the objects of the present invention is to provide a digging and carrying scraper of the type described, having an ejector which is operated by an ejection mechanism which exerts a large force during initial movement of the ejector to start the movement of the dirt out of the bowl.

Another object of the instant invention is to provide a digging and carrying scraper wherein an ejector is accelerated from its initial position to its final position thereby providing a substantially uniform unloading of the dirt.

Other objects and advantages of this invention will become apparent from the accompanying drawings and the description of the features of the specific embodiment using the invention herein disclosed.

In the drawings:

Fig. 1 is a side elevation showing a scraper embodying the herein disclosed invention towed by a tractor;

Fig. 2 is a perspective view of the scraper shown in Fig. 1;

Fig. 3 is a perspective view of the rear end of the scraper shown in Fig. 1;

Fig. 4 is a cross-sectional view of the scraper shown in Figs. 1, 2 and 3, showing an apron and an ejector in a carrying position;

Fig. 5 is a cross-sectional view of the scraper shown in Fig. 4 with the apron in a raised position and the ejector in a partially pivoted position;

Fig. 6 is a cross-sectional view of the scraper shown in Fig. 4 with the apron in a fully raised position and the ejector in a fully pivoted position;

Fig. 7 is a partial cross-sectional view of a scraper showing an ejection mechanism embodying the instant invention, said ejection mechanism including pulleys to operate said mechanism;

Fig. 8 shows the ejector mechanism shown in Fig. 7 with the ejector in a fully pivoted position and a phantom view of the ejector in a partially pivoted position;

Fig. 9 is a cross-sectional view of a portion of a scraper

showing an ejection mechanism embodying the instant invention;

Fig. 10 shows the ejector mechanism shown in Fig. 9 with the ejector in the fully raised position and a phantom view of the ejector in a partially raised position;

Fig. 11 is a cross-sectional view of a portion of a scraper showing an ejection mechanism embodying the herein disclosed invention in which a floating link is attached to a slide; and

Fig. 12 shows the ejector shown in Fig. 11 in a fully raised position and a phantom view of the ejector in a partially raised position.

Referring now to the drawings: Fig. 1 shows a scraper generally indicated by numeral **21** embodying the herein disclosed invention. The scraper **21** is attached to an operator controlled tractor **22** by means of a tow bar **23**. The tractor **22** provides a source of motive force to transport the scraper **21** as well as an operator controlled power source to operate the scraper as described below.

The scraper **21** includes a yoke, generally indicated by numeral **25**, which is pivotally attached to the tow bar **23**. Rotatably and pivotally mounted on the aforementioned yokes are a pair of forward wheels **26** which support the forward portion of said scraper. A bowl **27** is pivotally attached to the yoke at a pair of pivots **30**, one of which is not shown. Said bowl is mounted on a bowl frame **28** upon which is mounted an ejection mechanism **29**. The ejection mechanism **29** is also operatively connected to bowl **27** as will be described hereinafter. A pair of rear wheels **31** are rotatably mounted on the bowl frame **28** by means of axles which are not shown herein.

Looking now to Figs. 2 and 3, it may be seen that yoke **25** includes a pair of arms **32**, which are joined by a cross member **34**. Attached to the central portion of cross member **34** is a gooseneck **36** which connects the cross member **34** to the tow bar **23** and the rotatably mounted wheels **26**. A cylinder and pulley tower **38** is fixed to the cross member proximate the junction of the gooseneck and the cross member.

The bowl **27** includes a pair of bowl sides **42** fixed to the bowl frame **28** and the arms **32** of the yoke are pivotally attached to the bowl sides by means of the aforementioned pivots **30**. As shown in Figs. 4, 5 and 6, an ejector **44** is pivotally mounted between the bowl sides **42** proximate the forward portion of the bowl sides. The ejector is generally L-shaped having a carrying plate **45** and a back plate **46** integral therewith. A blade **48**, which is adapted for cutting into dirt to be loaded into the bowl, is bolted to a moldboard **47** which in turn is welded to the bowl sides.

A generally L-shaped apron **50** includes a pair of apron arms **52** which are pivotally attached to the bowl sides **42** through a pair of apron pivots **54**, thereby providing means for pivoting the entire apron within the bowl. A forward retaining plate **55** holds the arms **52** together and said plate contains a screened viewing opening **56**. As may be seen in Fig. 4 a lower retaining lip **58** integral with the plate **55** cooperates with the blade **48** and the ejector **44** thereby retaining material in bowl **27**.

A pair of double acting hydraulic bowl cylinders **62**, which act as positive bowl raising and lowering means, are pivotally attached at one end to the tower **38** and are pivotally attached at the other end to the bowl sides **42** as may be clearly seen in Figs. 4, 5 and 6. The apron **50** which is pivotally attached to bowl sides **42** is supported by an apron cable **64**, which is attached at one end to the apron at cable loop **66**. The cable **64** runs over a sheave not shown, which sheave is rotatably mounted in tower **38**. The other end of the cable **64** is operatively connected to a pair of hydraulic apron cylin-

ders within the yoke cross box of yoke 25, and said apron cylinders are not shown herein.

Referring now to Figs. 4, 5 and 6, ejector mechanism 29 includes a guide link 68 pivotally attached at one end to an ejection mechanism support 70, which is a part of bowl frame 28. The other end of the guide link 68 is pivotally attached to a stem 71 of generally T-shaped floating link 72. The ejector 44 is pivotally attached at pivot 74 to one end of a cross member 73 integral with stem 71 of floating link 72. A two stage telescopic hydraulic cylinder 76 is pivotally attached at one end to cross member 73 at pivot 78, and the other end of cylinder 76 is pivotally attached to the bowl frame 28 at pivot point 80.

In normal operation an empty scraper 21 is towed by the tractor 22 to a place where the material is to be loaded. The operator controls the hydraulic power source to motivate the apron cylinders which operate the cable 64 thereby raising apron 50. Next, the operator controls a hydraulic power source to extend the bowl cylinder 62 thereby lowering bowl 27 so that blade 48 engages the ground to be cut and loaded into the bowl. Should the ground be frozen or otherwise extremely hard, the operator may further extend hydraulic cylinders 62 to apply a positive downward force on blade 48, thus, a greater amount of the weight of the scraper is applied to the blade 48 to cut into the dirt. After the blade cuts into the ground, the tractor pulls the scraper forward taking a substantially uniform cut of ground and forcing the dirt into the bowl and onto the carrying plate 45 of the ejector. When the bowl is filled, the operator controls the hydraulic source thereby shortening the hydraulic cylinders 62, thus pivoting the bowl about the yoke arms 32 at pivots 30. Since the apron 42 operates independently of the bowl, the operator controls the lowering of the apron by lengthening the apron cable 64 and the weight of the apron pulls it down to a lowered or carrying position. In the lowered positions, the retaining lip coacts with the blade 48, thereby sealing the bowl for carrying dirt.

The loaded scraper is towed to a desired location by the tractor and the dirt is discharged while the scraper is moving forward. The apron 50 is raised to allow the dirt to fall out of the apron and on to the ground, then the dirt is ejected from the bowl 27 by the ejector 44.

The unloading of the bowl is continued as the scraper progresses in a forward direction. The operator directs hydraulic pressure to the hydraulic cylinder 76, and in its carrying position, while in the initial position for the dumping cycle, the hydraulic cylinder exerts its greatest force against the ejector 44 so that should any dirt be frozen to the sides of the bowl or should the dirt be particularly wet and sticky, the cylinder's greatest force is applied to the ejector when it is most needed to initially move the ejector.

The cylinder 76 or power means exerts a force against the cross member 73 of the floating link 72. As was described above, the initial force is great and by the operation of the guide link 68, which acts as a guide means for the floating link, the initial movement is small, but as the ejector is further pivoted, the rate of pivoting is accelerated and the force applied to the ejector is decreased.

The initial movement of the piston in hydraulic cylinder 76 is quite small, but in the initial movement a quantity of dirt falls out of the bowl. As the ejector pivots a greater degree the rate of pivoting of the ejector accelerates and the amount of dirt ejected remains substantially constant. Thus, the dirt spread by the scraper as it travels forward is substantially uniform.

Turning now to Figs. 7 and 8, an ejection mechanism, generally indicated by numeral 101, embodying the present invention is mounted in a scraper substantially identical to scraper 21. The principal difference between the ejector mechanism 101 and the previously described ejector 29 is in the application of the force from the power means. The ejection mechanism 101 is mounted on a bowl frame 102, to which are fixed bowl sides 103. A pair of wheels 104 are rotatably mounted on the bowl frame 102. An ejector 106, substantially identical to ejector 44, is pivotally mounted between the bowl sides 103 and cutting blade 108 is fixed to the bowl sides in the same manner that blade 48 is fixed.

The ejection mechanism 101 includes a floating link 110, which is substantially identical to the previously described floating link 72. The floating link 110 is pivotally attached to the ejector 106 at pivot 112. The bowl frame 102 includes an ejection mechanism support 114 and a pair of guide link support members 116, which members are joined at one end. A guide link 118 is pivotally mounted at the intersection of the members 116. The other end of the guide link 118 is pivotally attached to the stem portion of floating link 110 providing a guide means therefor.

A group of three sheaves, hereinafter called sheave 120, is rotatably attached at the point where guide link 118 is attached to the floating link 110. A block slide 122 is fixed to the ejection mechanism support 114 on bowl frame 102 and a group of five sheaves, hereinafter called sheave 124, is rotatably mounted at the upper end of the block slide 122. A hoist block 126 is slidably mounted in the block slide 122 and a group of five sheaves, hereinafter referred to as sheave 128, is rotatably mounted on the hoist block 126. A hoist block roller 130 is rotatably mounted on the hoist block 126. The roller 130 rotatably engages the stem of floating link 110 and in the carrying position as shown in Fig. 7, the roller 130 engages the stem at the junction of the stem and cross bar and the sheave lines are relaxed.

A wire cable 132 passes over the sheaves 120, 124 and 128. The cable 132 has three lines between sheaves 120 and 124 and three lines between sheaves 120 and 128. Between sheaves 124 and 128, there are five lines on the outside of the triangle formed by the three sheaves, and two lines within the triangle. The cable 132 is attached to an operator controlled power source for shortening and lengthening the cable; though the source is not shown, it may be a hydraulically operated winch or any other suitable power means.

In normal operation, the scraper operates in the same manner as the scraper 21 described above. Though the ejection mechanism 101 achieves the same result as the ejection mechanism 29 described above, the operation is slightly different. After the apron has been lifted and the initial dirt is dumped from the scraper bowl, the cable 132 is shortened. Since there are seven lines between sheaves 124 and 128, and only six lines extending from sheave 120, the greatest force is applied between sheaves 124 and 128, thus, the force tends to draw said sheaves 124 and 128 together. As the block 126 slides within the block slide 122, it applies an upwardly directed force to floating link 110, which pivots the ejector 106 about its pivot. After sheaves 124 and 128 are drawn together and the hoisting block 126 is brought to the end of the slide 122, as may be seen in phantom view Fig. 8, the sheave 120 takes over the movement of the floating link. As the cable is drawn tighter, the sheave 120 is brought forward toward the sheave 124 so that the stem of the floating link 110 passes over roller 130. The sheave 120 has six lines extending to the sheaves 124 and 128, while the sheaves 128 and 124 are connected by seven lines, thus, the rate of movement of the sheave 120 toward the sheave 124 is increased, accelerating the rate of pivoting of the ejector 106 from its initial position to the end position. However, the force applied to the ejector is decreased over the initial force. The final condition of the ejector 106 is shown in Fig. 8, where all of the sheaves 120, 124 and 126 are brought together.

As the ejector moves from its initial position to its

final position the force applied thereto is greater at the initial movement of the ejector, though the rate of movement is smaller; then the ejector accelerates, but the force applied thereto diminishes. It is inherent in the instant construction that when the ejector requires a greater force at the initial movement, a greater force is applied. The rate of ejection is increased from the initial position to the end position, thus, dirt is ejected at a substantially uniform rate so that the dirt is spread substantially uniformly at a constant speed of the scraper.

An ejection mechanism embodying the herein disclosed invention is generally indicated by numeral **200** in Figs. 9 and 10. The ejection mechanism **200** is shown in a scraper similar to scraper **21**. A bowl **204** is mounted on a bowl frame **202**, and bowl sides **206** are also fixed to the bowl frame. An ejector **208** is pivotally mounted between the bowl sides **206**, and the remainder of the bowl **204** is not shown since the construction is substantially identical to bowl **27**, which was described above in detail. A pair of wheels **210** are rotatably mounted on the bowl frame **202**, and the wheels **210** are identical to the above described wheels **31** and **104**.

The ejection mechanism **200** includes a generally L-shaped floating link **212**, having a pair of arms **214** and **216** at substantially right angles. Arm **216** is pivotally attached to ejector **208** at pivot **218**; and at the other end of floating link **212**, the free end of arm **214** is pivotally connected to one end of a guide link **220** which provides a guide means. The other end of the guide link is pivotally connected to bowl frame **202** at pivot **222**. The guide link **220** tensibly supports the floating link **212** and defines the movement of link **212** during the operation of the ejection mechanism described below. The ejection mechanism **200** is completed by a power means in the form of a two stage telescopic hydraulic cylinder **224**. The cylinder **224** is pivotally attached to the bowl frame **202** at one end and the other end is pivotally attached to arm **216** of floating link **212**.

Dirt is scraped into bowl **204** by the same means and in the same manner as was described for bowl **27** of scraper **21** and the preliminary steps of unloading bowl **204** are identical to the unloading of said bowl **27**. The ejector **208** is pivoted by applying a hydraulic pressure to the hydraulic cylinder **224**, which exerts a force against arm **216** of the L-shaped floating member **212**. The initial position of the ejection mechanism is shown in Fig. 9 and the final and an intermediate position are shown in Fig. 10 in solid and phantom views respectively.

In the initial movement ejector **208**, the floating link with guide link **220** moves backward slightly as the ejector **208** begins its rise, as may be seen in Fig. 9. A further extension of the hydraulic cylinder **224** moves the guide link **220** forward, and said link in cooperation with the pivoting ejector **208** determines the path followed by the floating link. At a substantially constant rate of extension of the hydraulic cylinder and a substantially constant force applied thereby, the floating link accelerates the ejector's rate of pivoting but diminishes the force applied to the ejector.

It is evident that the ejection mechanism **200** applies a great force to initially move the ejector when the greatest load is applied to the ejector and the material contained in the bowl may be sticking to the bowl sides. During the initial movement of the ejector, a large quantity of material is ejected from the bowl with a little movement of the bowl; while in the latter stages, a greater movement of the ejector is required to eject the same amount of material. Thus, the acceleration of the ejector serves to eject dirt at substantially uniform rate through the entire cycle so that the dirt carried in the bowl may be uniformly spread.

Another embodiment of the herein disclosed invention is shown in Figs. 11 and 12, wherein an ejection mechanism **300** is a part of a scraper similar to the scraper **21**, which was described in detail above. A bowl frame **302** has a pair of wheels **304** rotatably mounted thereon, a bowl **306** including a pair of bowl sides **308** is fixed to the bowl frame **302**, and an ejector **310** is pivotally mounted between the bowl sides **308**.

All of the above mentioned parts are substantially identical to their counterparts in scraper **21**. The ejection mechanism **300** consists of a T-shaped floating link **312**, which is similar to the floating link **27** of ejection mechanism **29**, and floating link **110** of ejection mechanism **101**. One end of a crossbar of T-shaped floating link **312** is pivotally connected to ejector **310** at pivot **314**. The stem of the T-shaped floating link **312** is slidably and pivotally mounted in a guide means, slide **316**, which is fixed to bowl frame **302**. A slide pin **318** fixed in the end of stem **312** slides in the guide slide **316**, thereby providing a sliding and pivoting connection between the floating link and the slide. A power means in the form of hydraulic cylinder **320** completes the ejection mechanism **300**. The hydraulic cylinder **320** is a telescopic two stage hydraulic cylinder which has one end pivotally mounted on frame **302**, and the other end pivotally attached to the cross member of floating link **312**.

The ejection mechanism **300** operates in much the same manner as the other mechanisms described. The operator controls a supply of hydraulic fluid under pressure to the hydraulic cylinder **320**. As the hydraulic fluid extends the cylinder, a great force is applied to the ejector **310** through the floating link **312**.

The cylinder **320** applies a generally upwardly directed force to the cross member of the floating link and the ejector and slide determine the path followed by said link. In the initial movement of the cylinder **320** the ejector **310** moves only a short distance. However, the initial force applied to the ejector **310** is relatively great; and as the cylinder **320** continues to expand, the force applied to the ejector **310** through the floating link is diminished but the rate of pivoting of the ejector **310** is accelerated. Thus, a great force is applied to the ejector for initial movement of the ejector but the force diminishes as the rate of pivoting increases. The dirt is uniformly ejected from the bowl, thus improving the operation of the scraper since the operator can maintain a constant speed during dumping and get a substantially uniform spreading of dirt.

Therefore, in each of the forms described above, the effective lengths of the moment arms change during the operation of an ejection mechanism, providing an initial force advantage and slow rate of pivoting when a large force is needed to pivot an ejector in a bowl full of dirt. Subsequently, the force advantage is decreased and the rate of pivoting is increased as the amount of dirt in the bowl is decreased, whereby the dirt carried in the bowl is dumped at a substantially uniform rate.

It is obvious that various changes may be made in the specific embodiments set forth without departing from the spirit of the invention. The invention is accordingly not to be limited to the specific structure shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. In a digging and carrying scraper having a bowl frame, a bowl mounted on said frame, a pair of wheels rotatably mounted on said bowl frame, a yoke pivotally attached to said bowl, an apron pivotally mounted on said bowl within said yoke, an ejector pivotally mounted on said bowl pivoting in a direction opposite to the apron, and an ejection mechanism outside said bowl and operatively connected to the ejector, said ejection mechanism comprising a floating member pivotally attached to the ejector, a power means engaging said floating member for raising and lowering said floating member, and a guide means attached to said bowl frame and the floating member, said guide means cooperating with the ejector to determine the movement of the floating member, whereby the initial movement of the floating member moves the ejector a small distance with a great force, accelerates the

pivoting of the ejector, and diminishes the force applied to the ejector.

2. In a digging and carrying scraper having a bowl frame, a bowl mounted on said bowl frame, a yoke pivotally attached to said bowl, extending in a direction away from said frame, an apron pivotally mounted within said bowl for retaining material carried in said bowl, an ejector pivotally mounted in said bowl pivoting in a direction opposed to the direction of pivoting of said apron, and an ejection mechanism operatively connected to said ejector, said ejection mechanism comprising a floating link pivotally attached to said ejector, a hydraulic cylinder pivotally attached at one end to the bowl frame and at the other end to the floating link, and a guide link, tensibly supporting the floating link, pivotally attached to bowl frame at one end and pivotally attached to the floating link at the other end, whereby the hydraulic cylinder applies a force to the ejector through the floating link and the ejector is accelerated and the force applied thereto is decreased as the ejector is further displaced.

3. In a digging and carrying scraper having a yoke, a bowl pivotally mounted within said yoke, a bowl frame attached to said bowl, an apron pivotally mounted on said bowl providing a closure for a portion of the bottom of the bowl, an ejector pivotally mounted on said bowl and pivoting in a direction opposed to the direction of rotation of the apron, and an ejection mechanism operatively engaging said ejector for applying a force to move the ejector and accelerate the rate of movement of the ejector, said ejection mechanism comprising a floating link pivotally attached to said ejector, a guide link pivotally attached to the bowl frame supporting said floating link, a block slidably mounted relative to said bowl frame and slidably engaging the floating link, a sheave rotatably mounted on said block, a second sheave rotatably mounted on said bowl frame, a third sheave rotatably mounted on the floating link, and a line passing through said sheaves for drawing said sheaves together thereby pivoting the ejector.

4. In a digging and carrying scraper having a bowl, a yoke pivotally attached to said bowl, a bowl frame attached to said bowl, extending in a direction away from said yoke, an apron pivotally mounted on said bowl, an ejector pivotally mounted on said bowl and independently controlled of said apron, said ejector cooperating with the apron for retaining material in said bowl, an ejection mechanism operating said ejector for ejecting material from said bowl, said ejection mechanism comprising a guide link pivotally mounted on the bowl frame, a T-shaped floating member pivotally attached to the guide link at one end and pivotally attached to the ejector at the end of the cross member of the floating member, a slide fixed to the bowl frame, a hoist block slidably mounted in said slide, a roller rotatably mounted on said hoist block engaging the floating member, a first sheave group rotatably mounted on the bowl frame proximate the end of said slide, a second sheave group rotatably mounted proximate the pivot point of the floating member of the guide link, and a third sheave group rotatably mounted on the hoist block, and a cable running through said sheaves having a greater number of lines between the first and third groups than the total number of lines between the first and second sheave groups and the second and third sheave groups, whereby said sheave groups are drawn together to pivot said ejector with a diminishing force and an accelerating rate of pivoting.

5. In a digging and carrying scraper having a bowl frame, a bowl fixed to said bowl frame, a yoke pivotally attached to said bowl, extending in a direction opposite to said frame, an apron pivotally mounted on said bowl proximate to said yoke, an ejector pivotally mounted on said bowl, said ejector cooperating with said apron to retain material in said bowl, and an ejection mechanism engaging said ejector for ejecting material from said bowl, said ejection mechanism comprising a slide fixed to the bowl frame, a hoist block slidably mounted in said slide, a roller rotatably mounted on the hoist block, a floating member engaging said roller, said floating member pivotally attached to the ejector, a guide link pivotally mounted on the bowl frame and pivotally attached to the floating member, a first sheave rotatably mounted on the bowl frame proximate the end of the slide, a second sheave rotatably mounted proximate the junction of the floating member and the guide link, a third sheave rotatably mounted on the hoist block, a cable connecting said sheaves, whereby a shortening of the cable brings the first and third sheaves together and then brings the second sheave proximate the first and third sheaves, thereby applying a greater initial force to the ejector and accelerating the tilting of the ejector with a diminishing force.

6. In a digging and carrying scraper having a yoke, a bowl pivotally attached to said yoke, a bowl frame supporting said bowl, an apron pivotally mounted in said bowl for retaining material carried in the bowl, an ejector pivotally mounted within said bowl for expelling material carried within the bowl, said ejector pivoting in a direction opposite to the direction of pivoting of the apron and cooperating with the apron to carry a material in said bowl, and an ejection mechanism for pivoting the ejector with a great force initially and accelerating the rate of pivoting and decreasing the force applied to said ejector, said ejection mechanism comprising a slide fixed to said bowl frame, a floating link slidable and pivotally mounted in said slide, said floating link pivotally attached to the ejector, and a hydraulic cylinder pivotally mounted on the bowl frame and pivotally attached to the floating link, whereby the extension of the hydraulic cylinder applies a force to the floating link for pivoting the ejector to eject the material in the bowl at a substantially uniform rate.

7. An earth moving machine comprising frame means ground engaging transport means movably mounted on said frame means, carrying means for earth and the like having a supporting floor and open along at least one side, means pivotally mounting said carrying means on said frame means adjacent an open side of said carrying means, a floating link, means pivotally connecting said floating link to said carrying means substantially opposite to the frame means pivot mounting means, guide means on said frame means for guiding said floating link at a position thereon remote relative to the pivotal connection thereof to the carrying means, and power means acting between said floating link and a predetermined position on said frame means, said power means moving said floating link to pivot said carrying means about the pivot mounting means on the frame means to dump earth and the like from the open side thereof, the movement of said floating link as determined by said guide means progressively decreasing the mechanical advantage of said floating link and power means, whereby to pivot said carrying means with progressively decreasing force and progressively increasing speed.

8. In a digging and carrying scraper having a yoke, a bowl pivotally attached to said yoke, a bowl frame attached to said bowl extending in a direction opposite said yoke, an apron pivotally mounted on said bowl for retaining material therein, an ejector pivotally mounted in said bowl and independently controlled of said apron and pivoting in a direction opposed to said apron, an ejection mechanism for ejecting materials from said bowl and operatively engaging said ejector, said ejection mechanism comprising a floating link pivotally attached to said ejector and one end of said floating link pivotally attached to a guide link pivotally mounted on the bowl frame, a sheave rotatably mounted on the floating link proximate the junction of the guide link and the floating link, a slide fixed to said frame, a sheave rotatably mounted on said frame proximate said slide, a hoist block slidably mounted on said slide, a sheave rotatably mount-

ed on said hoist block, a roller rotatably mounted on the hoist block and engaging the floating link, and a line joining said three sheaves together, whereby shortening of the line brings the sheaves together and the ejector is pivoted to a full dumping position.

9. In a digging and carrying scraper having a bowl frame, a bowl fixed to said bowl frame, a yoke pivotally attached to said bowl, an apron pivotally mounted on said bowl proximate said yoke, an ejector pivotally mounted on said bowl pivoting in a direction opposite the direction of pivoting of said apron, and an ejection mechanism operating said ejector for ejecting material from said bowl, said ejection mechanism comprising a slide fixed to the bowl frame, a hoist block slidably mounted in said slide, a roller rotatably mounted on the hoist block, a floating member engaging said roller, said floating member pivotally attached to the ejector, a guide link pivotally mounted on the bowl frame and pivotally attached to the floating member, a first sheave rotatably mounted on the bowl frame proximate the end of the slide, a second sheave rotatably mounted proximate the junction of the floating member and the guide link, a third sheave rotatably mounted on the hoist block and a cable connecting the three sheaves, whereby a shortening of the cable brings the first and third sheaves together and then brings the second sheave proximate the first and third sheaves, thereby applying a greater initial force to the ejector and accelerating the rate of tilting of the ejector with a diminishing force applied to the ejector.

10. A digging and carrying scraper of the type described comprising a bowl frame, a bowl mounted on said bowl frame, an apron pivotally mounted on said bowl, an ejector pivotally mounted in said bowl for ejecting material carried within the bowl, said ejector cooperating with the apron to carry dirt in the bowl, an ejection mechanism operatively connected to the ejector, said ejection mechanism comprising a floating link pivotally connected to the ejector, a guide link pivotally mounted on the bowl frame at one end and pivotally connected to a floating member at the other end, a power means directly connected to the floating link and the bowl frame, said power means independently controlled of an operating means for the apron, a yoke pivotally attached to said bowl, extending in a direction away from the frame, a cutting blade mounted on the bowl proximate the leading edge of said ejector for cutting into ground to be carried by said bowl, and a positive two-way acting hydraulic raising and lowering means connected to the yoke and the bowl for raising and lowering said bowl, said positive raising and lowering hydraulic means being controlled independently of the apron operating means and the ejection mechanism power means, whereby said positive hydraulic lowering means applies a positive downward force to the cutting blade to cut into the ground to be scraped into the bowl.

11. A digging and carrying scraper having a pair of wheels, a bowl frame mounted on said wheels, a bowl mounted on said bowl frame, a yoke pivotally attached to said bowl, an ejector pivotally mounted on said bowl frame, a floating link pivotally attached to said ejector, a guide link pivotally attached at one end to said floating link, and at the other end to the bowl frame compressively supporting the floating link, and a hydraulic cylinder pivotally mounted on the bowl frame at one end and pivotally attached at the other end to the floating link between the points of attachment of the guide link and the ejector, said hydraulic cylinder providing a power means for pivoting said ejector with a great force at the initial movement of the ejector and accelerating the rate of pivoting of the ejector and decreasing the force applied to the ejector through the floating link, and an apron pivotally mounted on said bowl independently controlled for retaining material carried therein.

12. In a digging and carrying scraper having a yoke, a bowl pivotally mounted on said yoke, a bowl frame fixed to said bowl extending in a direction away from said yoke, an apron pivotally mounted within said bowl for retaining material carried in the bowl, an ejector pivotally mounted on said bowl pivoting in a direction opposite to the direction of pivoting of said apron, and an ejection mechanism operatively connected to said ejector for ejecting material from said bowl, said ejection mechanism comprising a floating link pivotally attached to said ejector, a guide link pivotally attached to the bowl frame at one end and pivotally attached to the floating link at the other end tensibly supporting the floating link, and a power means pivotally mounted at one end to the bowl frame and at the other end to the floating link between the points of attachment of the ejector and the guide link.

13. In a digging and carrying scraper having a bowl frame, a bowl mounted on said bowl frame, a yoke pivotally attached to said bowl, extending in a direction opposite to said frame, an apron pivotally mounted within said bowl for retaining material carried by said bowl, an ejector pivotally mounted on said bowl, pivoting in a direction opposite to said apron, said ejector cooperating with said apron for carrying material in said bowl, and an ejection mechanism operatively connected to said ejector, said ejection mechanism comprising a T-shaped floating link having one end of its cross member pivotally attached to the ejector, and the end of the stem of said floating link pivotally attached to a guide link, said guide link pivotally attached to the bowl frame at the other end, and a hydraulic cylinder pivotally mounted at one end to the bowl frame and at the other end to the floating link.

14. In a carrying scraper having a yoke, a bowl pivotally mounted on said yoke, a bowl frame mounted on said bowl extending away from said yoke, an apron pivotally mounted in said bowl, an ejector pivotally mounted in said bowl, pivoting in a direction opposite to that of the apron, and said apron and ejector cooperating to carry material in the bowl, an ejection mechanism operatively connected to the ejector to eject material from said bowl, said ejection mechanism comprising a floating member having a pair of arms, the first of said arms pivotally attached at one end to the ejector, a guide link pivotally mounted on the bowl frame at one end and at the other end pivotally attached to the free end of the other arm of said floating member, and a power means between the bowl frame and the floating member, said power means attached to the floating member between the pivot points at which the floating member is attached to the ejector and the guide link, whereby said power means applies a tilting force to the ejector through the floating member with a great force during the initial movement of the ejector and accelerating the rate of pivoting and diminishing the force applied to the ejector.

15. A scraper of the type described comprising a bowl frame, a bowl fixed on said bowl frame, an ejector pivotally mounted in said bowl proximate said frame, an ejector mechanism operatively connected to the ejector for ejecting material from said bowl, said ejector mechanism comprising a slide fixed to said bowl frame, a floating member pivotally attached to the ejector and slidably attached to said slide, a power means between the floating member and the bowl frame, whereby the power means applies a force to said floating member, thereby pivoting the ejector about its pivot with an initial great force and increasing the rate of pivoting and diminishing the force applied to the ejector, a cutting blade mounted within the bowl, a yoke pivotally mounted on the bowl extending in a direction away from the frame, and a positive raising and lowering means pivotally connected to said yoke and bowl, whereby the bowl may be pivoted about the yoke thereby raising and lowering the cutting blade, and the cutting blade is lowered to cut into ground, which supplies the material to be carried within said

bowl, with a positive downward force to cut into hard ground.

16. In a digging and carrying scraper having a bowl, a yoke pivotally attached to said bowl, extending in a direction away from said yoke, a bowl frame attached to said bowl, an apron pivotally mounted on said bowl, an ejector pivotally mounted on said bowl, pivoting in a direction opposite to the direction of pivoting of said apron, and independently controlled of said apron, an ejection mechanism pivoting said ejector for ejecting material from said bowl, said ejection mechanism comprising a guide link pivotally mounted on the bowl frame, a T-shaped floating member pivotally attached to the guide link at one end and pivotally attached to the ejector at one end of the cross member of the floating member, a slide fixed to the bowl frame, a hoist block slidably mounted in said slide, a roller rotatably mounted on said hoist block and engaging the floating member, a first sheave group rotatably mounted on the bowl frame proximate the end of said slide, a second sheave group rotatably mounted proximate the pivot point of the floating member of the guide link, and a third sheave group rotatably mounted on the hoist block, and a cable running through said sheave groups having a greater number of lines between the first and third groups than the total number of lines between the first and second groups and the second and third groups.

17. A digging and carrying scraper comprising a yoke, a bowl pivotally mounted on said yoke, an ejector pivotally mounted in said bowl for carrying material in said bowl, a cutting blade mounted on the bowl proximate the leading edge of said ejector, a bowl frame affixed to the bowl, extending in a direction opposite said yoke, a positive raising and lowering means pivotally mounted on the yoke and the bowl, whereby the positive lowering means applies a positive downward force to the blade for cutting into hard ground scraped and loaded into the bowl, and an ejection mechanism operatively connected to said ejector for ejecting material from said bowl, said ejection mechanism comprising a guide link pivotally mounted at one end on the bowl frame, a floating link pivotally attached to the other end of said guide link, and one end of said floating link pivotally attached to said ejector, a hydraulic cylinder pivotally mounted at one end on the bowl frame and at the other end attached to the floating link, whereby expansion of the hydraulic cylinder applies a great initial force to the ejector through the floating link and accelerates the rate of pivoting the ejector in the bowl.

18. A digging and carrying scraper comprising a yoke, a bowl pivotally mounted on said yoke, an ejector pivotally mounted in said bowl, a ground cutting blade mounted on the bowl proximate the leading edge of the ejector, a positive raising and lowering means pivotally mounted on the yoke and pivotally attached to the bowl, whereby said positive lowering means lowers the bowl and the blade and applies a positive downward force to cut into the ground to be cut and loaded into the bowl, an ejection mechanism operatively connected to said ejector for ejecting material from said bowl, said ejection mechanism comprising a floating T-shaped member pivotally attached at the end of the cross bar to the ejector, a guide link pivotally attached to the bowl frame at one end and pivotally attached to the end of the stem of floating member compressively guiding said floating member, and an expandable hydraulic power means independently controlled of the positive raising and lowering means pivotally connected at one end to the bowl frame and at the other end to the floating member, whereby the expansion of the power means at a constant rate applies a great initial force to the ejector through the floating link and the rate of pivoting of the ejector accelerates as the ejector is further disposed from its carrying position.

19. In a digging and carrying scraper having a yoke, a bowl pivotally attached to said yoke, a bowl frame attached to said bowl extending in a direction away from said yoke, an apron pivotally mounted on said bowl proximate said yoke, an ejector pivotally mounted in said bowl and independently controlled of said apron, an ejection mechanism pivoting said ejector for ejecting materials from said bowl, said ejection mechanism comprising a floating link pivotally mounted on said ejector, one end of said floating link pivotally attached to a guide link pivotally mounted on the bowl frame, a sheave rotatably mounted on the floating link proximate the junction of the guide link and the floating link, a slide fixed to said frame, a sheave rotatably mounted proximate one end of said slide, a hoist block slidably mounted in said slide, a sheave rotatably mounted on said hoist block, a roller rotatably mounted on the hoist block and engaging the floating link, and a line joining said three sheaves together, whereby shortening of the line brings the sheaves together and the ejector is pivoted to a fully dumping position, a blade on said bowl for cutting into the material scraped, and a positive raising and lowering means between the bowl and the yoke, whereby a positive force is applied to the blade for cutting into material to be scraped and carried by said scraper.

20. An earth moving machine comprising frame means, ground engaging transport means movably mounted on said frame means, carrying means for earth and the like having a supporting floor and open along at least one side, means pivotally mounting said carrying means on said frame means adjacent an open side of said carrying means, a floating link, means pivotally connecting said floating link to said carrying means substantially opposite to the frame means pivot mounting means and substantially on a level therewith when the carrying means is in carrying position, guide means on said frame means for guiding said floating link at a position thereon remote relative to the pivoted carrying means, and power means acting between said floating link and a predetermined position on said frame means, said power means moving said floating link to pivot said carrying means about the pivot mounting means on the frame means to dump earth and the like from the open side thereof, the movement of said floating link as determined by said guide means progressively decreasing the mechanical advantage of said floating link and power means, whereby to pivot said carrying means with progressively decreasing force and progressively increasing speed.

21. An earth moving machine comprising frame means, ground engaging transport means movably mounted on said frame means, carrying means for earth and the like having a supporting floor and open along at least one side, means pivotally mounting said carrying means on said frame means adjacent an open side of said carrying means, a floating link, means pivotally connecting said floating link to said carrying means substantially opposite to the frame means pivot mounting means, guide means on said frame means for guiding said floating link at a position thereon remote relative to the pivoted carrying means, and power means acting substantially vertically between said floating link and a predetermined position on said frame means, said power means moving said floating link to pivot said carrying means about the pivot mounting means on the frame means to dump earth and the like from the open side thereof, the movement of said floating link as determined by said guide means progressively decreasing the mechanical advantage of said floating link and power means, whereby to pivot said carrying means with progressively decreasing force and progressively increasing speed.

22. An earth moving machine comprising frame means, ground engaging transport means movably mounted on said frame means, carrying means for earth and the like having a supporting floor and open along at least one side, means pivotally mounting said carrying means on said frame means adjacent an open side of said carrying means, a floating link, means pivotally connecting said floating

link to said carrying means substantially opposite to the frame means pivot mounting means, guide means on said frame means for guiding said floating link at a position thereon remote relative to the pivoted carrying means, and power means acting substantially vertically between said floating link and a predetermined position on said frame means, said power means moving said floating link to pivot said carrying means about the pivot mounting means on the frame means to dump earth and the like from the open side thereof.

23. An earth moving machine as set forth in claim 22 wherein the power means comprises hydraulic cylinder means mounted in substantially upright position.

24. An earth moving machine as set forth in claim 23 wherein the carrying means comprises a wall extending upwards from the floor opposite the frame means pivot mounting means, the floating link being pivotally connected to the carrying means adjacent the bottom of said wall, the hydraulic cylinder means being pivotally mounted at its lower end on said frame means adjacent the pivotal connection of the floating link to said carrying means with the carrying means in carrying position.

25. An earth moving machine as set forth in claim 24 wherein the pivotal connection of the lower end of the hydraulic cylinder means to the frame means is substantially on a level with the pivotal connection of the floating link to the carrying means with the carrying means in carrying position.

26. An earth moving machine comprising frame means, ground engaging transport means movably mounted on said frame means, carrying means for earth and the like having a supporting floor and open along at least one side, means pivotally mounting said carrying means on said frame means adjacent an open side of said carrying means, a floating link, means pivotally connecting said floating link to said carrying means substantially opposite to the frame means pivot mounting means, guide means on said frame means for guiding said floating link at a position thereon remote relative to the pivotal connection thereof to the carrying means, and power means acting between said floating link and a predetermined position on said frame means, said power means moving said floating link to pivot said carrying means about the pivot mounting means on the frame means to dump earth and the like from the open side thereof.

27. An earth moving machine as set forth in claim 26 wherein the floating link is L-shaped, and wherein the carrying means has a wall upstanding from the floor thereof opposite to the means pivotally mounting the carrying means on the frame means, one arm of said floating link being substantially vertically disposed adjacent said wall with said carrying means in carrying position, the means pivotally connecting the floating link to the carrying means being fixed on said carrying means adjacent the bottom end of said one arm, the L-shaped floating link having another arm extending away from the top of said one arm substantially horizontally away from said carrying means with said carrying means in carrying position, and wherein the guide means is mounted on said frame and acts on said link substantially at the end thereof remote relative to said carrying means.

28. An earth moving machine as set forth in claim 27 wherein the power means acts substantially vertically between the floating link and the predetermined position on the frame means.

29. An earth moving machine as set forth in claim 26 wherein the floating link comprises a T-shaped lever having a stem which is disposed generally horizontally and a cross arm which is disposed generally vertically with the carrying means in carrying position, said carrying means having a wall thereon extending upwards from the floor thereof remote from the means pivotally mounting the carrying means on the frame means, the cross arm of said link lying substantially along said wall, the means pivotally connecting the floating link to the carrying means being connected to said carrying means adjacent the bottom of said wall and to the cross arm of said link near the bottom thereof, said power means acting on said cross arm adjacent the upper end thereof, and said guide means acting on said stem adjacent the end thereof remote from said cross arm.

30. An earth moving machine as set forth in claim 29 wherein the guide means comprises an arm having upper and lower ends and pivotally connected to said frame means adjacent the upper end of said last mentioned arm and pivotally connected to the stem of the floating link adjacent the lower end of said last mentioned arm.

31. An earth moving machine as set forth in claim 29 wherein the power means acts substantially vertically between said floating link and said predetermined position on said frame means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,159,045	Paulsen et al.	May 23, 1939
2,203,713	Austin	June 11, 1940
2,609,622	Murray	Sept. 9, 1952