

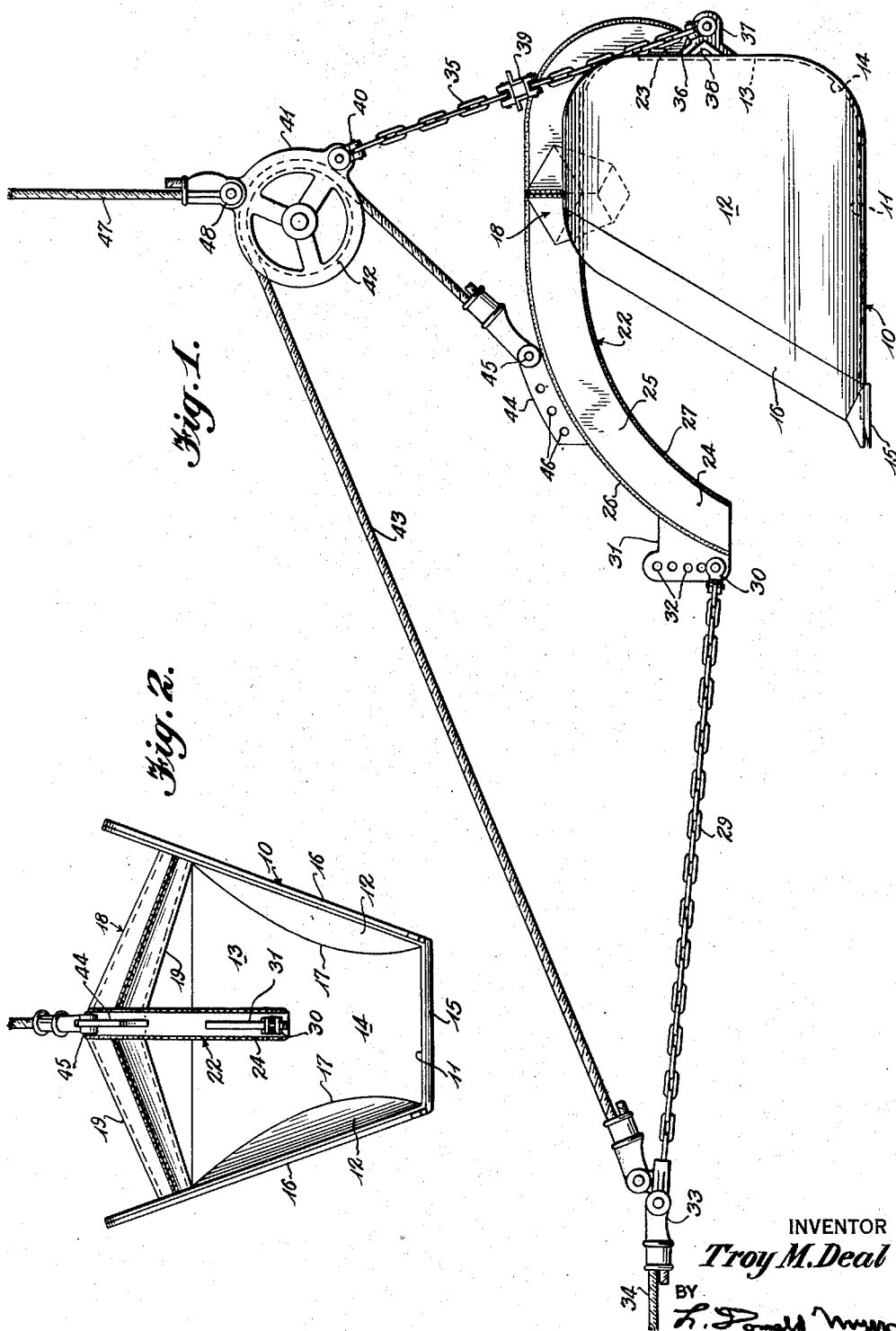
Oct. 10, 1950

T. M. DEAL
DRAGLINE BUCKET

2,525,528

Filed July 19, 1945

2 Sheets-Sheet 1



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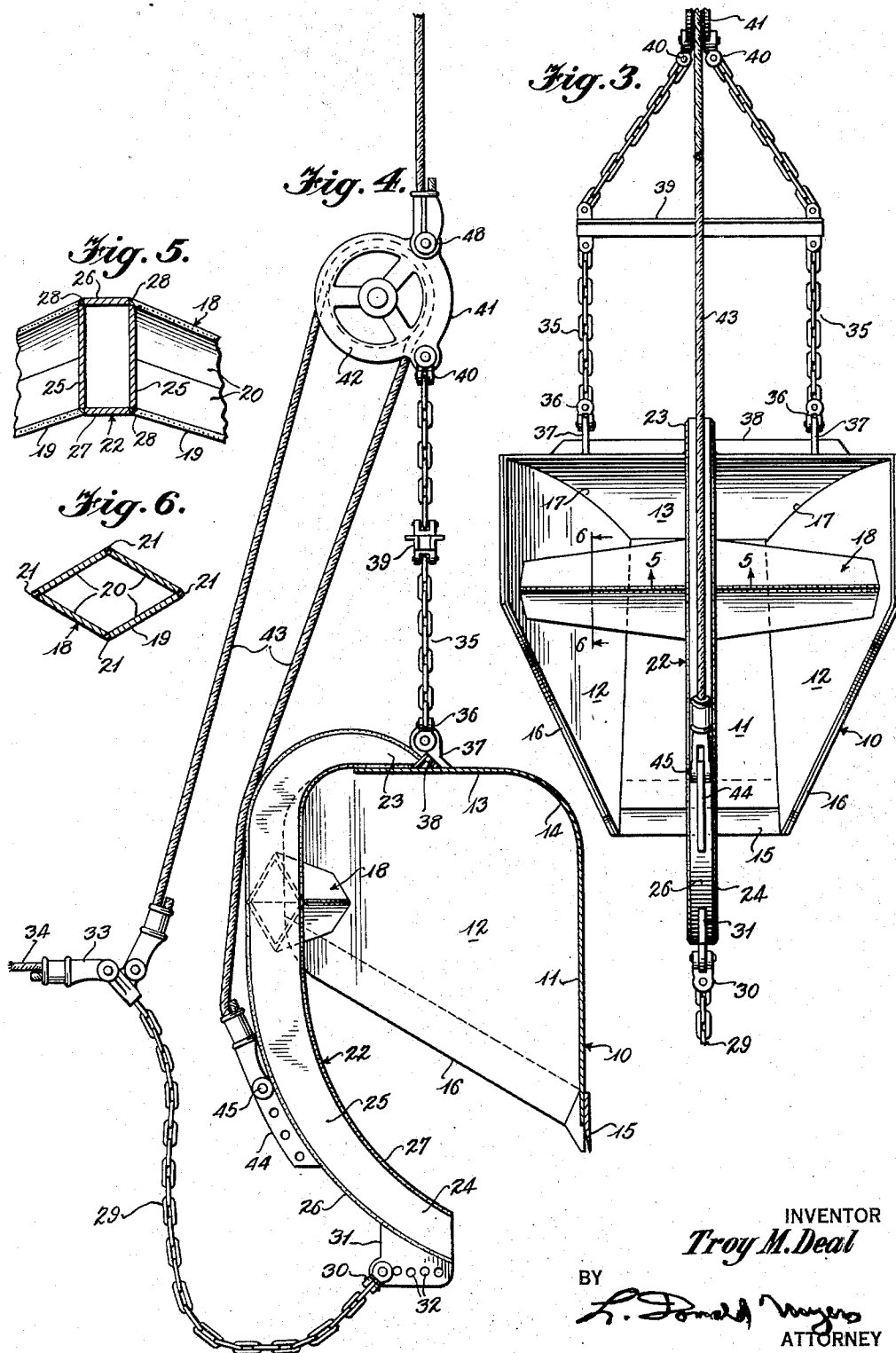
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UNITED STATES PATENT OFFICE

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DRAGLINE BUCKET

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10 Claims. (Cl. 37—135)

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This invention relates to dragline buckets, and deals more particularly with buckets of the type employed for cleaning out existing ditches and digging new ditches of special contour.

Although dragline buckets have been built especially for cleaning out existing and digging new ditches, they have followed conventional dragline bucket practices. For example, their arches have been located at or in advance of the front of the bucket and their suspension chains or cables have been anchored to the centers of these arches. Such an arrangement does not permit the suddenness or completeness of dumping action that is essential to effect thorough emptying of the bucket when handling sticky materials. The bucket contours employed, likewise, have been a hindrance to complete and rapid emptying. Double drag chains, attached one to each side of the bucket or to forwardly extending arms, have been employed and have offered obstruction to debris entering the bucket. The hoist chains have been anchored to the opposite sides of the bucket, adjacent its rear, and, consequently, have presented lateral projections which prevent the bucket from maintaining the desired contour for the full depth of a ditch.

It is a primary object of this invention to provide a dragline bucket for ditch digging and cleaning operations in which a single arch type plow beam is connected to the bucket at its back and by means of a special shaped arch which is located high and to the rear of the side cutters of the bucket, the said plow beam being arranged to extend centrally of the bucket and to have an adjustable hitch with a single drag chain at a height which will permit unobstructed digging. This single plow beam further acts as a plow or separator for parting debris or growth to either side of the bucket, thus clearing the way for the effective cutting of the earth by the side cutters of the bucket. The use of a single drag chain connected to the plow beam results in accurate centering of the bucket in the ditch and avoids the collecting of debris and plant growth as occurs when double drag chains are employed. The use of an adjustable hitch between the drag chain and the plow beam permits the depth of the cut to be regulated accurately.

A further important object of the invention is to provide a dragline bucket which is formed with smooth, unobstructed surfaces, both inside and outside, and with rearwardly inclined side cutters to minimize the resistance to material entering the bucket during digging, to permit

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thorough cleaning when dumping, and to give a gradual, smooth and efficient cutting action requiring a minimum amount of power.

Still another important object of the invention is to provide a dragline bucket in which the hoist chains are anchored to the outside rear of the bucket, inwardly of the sides of the bucket, whereby the bucket will be permitted to maintain the desired contour to the full depth of a ditch.

Another important object of the invention is the provision of a dragline bucket in which a perfect balance is obtained when hoisting and a quick dump, with complete cleaning, is obtained when discharging by properly proportioning the hoist chains with the drag and suspension or dump hitches.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevational view of the dragline bucket embodying this invention,

Figure 2 is a front elevational view of the bucket,

Figure 3 is a front elevational view of the bucket when suspended in its dumping position,

Figure 4 is a vertical sectional view taken through the bucket proper and with drag, hoist, and suspension chains or cables illustrated in elevation in the positions they assume when the bucket is positioned to dump,

Figure 5 is a detail sectional view of the single arched plow beam with the associated portions of the arch taken on line 5—5 of Fig. 3, and

Figure 6 is a detail transverse sectional view of the arch taken on line 6—6 of Fig. 3.

In the drawings, wherein for the purpose of illustration is shown the preferred embodiment of this invention, the reference character 10 designates the bucket member in its entirety which includes the bottom 11, the two sides 12 and the rear wall 13.

By inspecting Figs. 1 and 4, it will be seen that the bottom 11 of the bucket is flat and is joined to the flat rear wall 13 by means of a curved wall portion 14. Fig. 3 discloses the bottom 11 of the bucket as gradually increasing in width from back to front while Figs. 1, 2 and 4 best illustrate the front edge portion of the bucket bottom as having a bottom cutter 15 suitably attached thereto.

The sides 12 of the bucket diverge upwardly,

as is best illustrated in Fig. 2, and are properly joined at their bottom and rear edges with the side edges respectively of the bottom 11 and rear wall 13 of the bucket. The front edges of the side walls 12 are provided with side cutters 16 which are clearly illustrated in Figs. 1 and 4 as being rearwardly inclined upwardly of the bucket when the latter is arranged in its digging position. This inclination of the side cutters produces a gradual, smooth, and efficient cutting action which causes unobstructed flow of the material into the bucket with a minimum amount of power required.

The relative arrangement of the bottom cutter 15 and the side cutters 16 is best illustrated in Fig. 2. This relative arrangement of the cutters, of course, determines the contour of the ditch that can be produced with a single pass of the bucket.

The shape of the side edges of the rear wall 13 of the bucket is clearly illustrated in Figs. 2 and 3 as being curved inwardly, as at 17. This rear bucket wall 13, also, increases in width from bottom to top. It might be said that the rear wall 13 of the bucket is somewhat of hour-glass shape when viewed in Fig. 2.

From the above detail description of the bucket 10, it will be seen that the contour of the same and the smooth, unobstructed surfaces, both inside and outside, offer a minimum amount of resistance to material entering the bucket and permits thorough cleaning when the bucket is arranged in its dumping position.

Extending transversely of the bucket, and between the upper edge portions of the sides 12 is an arch 18 which is considered to be of special construction. This arch consists of the two side portions or branches 19 which are best illustrated in Figs. 4 and 6 as being of diamond shape in cross section. These sides or branches gradually increase in size, or in transverse dimensions, from their outer ends to their inner ends. Each side or branch 19 is formed by four strips or plates 20 that are continuously welded at their longitudinal edges, as is best illustrated at 21 in Fig. 6.

The outer ends of the sides or branches 19 of the arch are suitably connected to the upper portions of the bucket sides 12 rearwardly of the side cutters 16. These sides or branches 19 extend upwardly and inwardly to have their inner, adjacent ends suitably connected to the opposite sides of a single plow beam 22. From the above description of the arch 18, it will be seen that it will offer no material obstruction to the movement of material into the bucket, because of its high location, and will interfere in no way with the action of the side cutters 16, because of its location rearwardly or inwardly of these cutters.

The single, narrow, arched plow beam 22 is illustrated in the several figures as being suitably connected to the outside of the rear wall 13 of the bucket at its inner end 23. From this point of attachment to the bucket, the single plow beam extends upwardly of the bucket to arch over the top of the latter and then downwardly to terminate in a front portion 24. By inspecting Figs. 2 and 3, it will be seen that this single, arched plow beam is centrally arranged with respect to the width of the bucket while the front end portion 24 terminates at a height that will permit unobstructed digging while acting as a plow or separator to part debris or growth to either side, thus clearing the way for effective cutting of the earth by the side cutters 16. This

beam 22 is of fabricated, box-like construction. It is formed of the two properly shaped side plates 25, the top plate 26, and the bottom plate 27. Fig. 5 best illustrates this construction. The longitudinal edges of these plates 25 to 27 inclusive are continuously welded at 28.

The drag chain 29 is adapted to be adjustably connected by the clevis 30 to the hitch plate 31 through the medium of the series of openings 32. This hitch plate is clearly illustrated in Figs. 1 to 4 inclusive as being suitably attached to the front end portion 24 of the plow beam 22. The use of a single drag chain 29 and its connection to the hitch plate 31, at the front end of the single, centrally positioned plow beam 22 results in accurately centering the bucket in the ditch and permits unimpeded digging of the bucket. That is to say, the single drag chain will not collect debris or plant growth like the double drag chains of conventional dragline buckets. The drag chain is illustrated in Figs. 1 and 4 as being connected by a suitable coupling structure 33 to the conventional drag cable 34.

Figs. 1, 3 and 4 show the two hoist chains 35 as being connected by the clevises 36 to lugs 37 that are attached to the outside of the rear wall 13 of the bucket. These hoist chain attaching lugs 37 are located inwardly of the sides of the bucket and for that reason will not prevent the bucket from maintaining the desired contour throughout the full depth of the ditch. A suitable bracing bar 38 is attached to the outer face of the bucket rear wall 13, and is associated with the hoist chain attachment lugs 37, in the manner best illustrated in Figs. 1, 3 and 4.

Figs. 1, 3 and 4 disclose a spreader bar 39 as being connected in the two hoist chains 35 intermediate their ends. The outer or free ends of the hoist cables are connected by clevises 40 to the dump block 41. This dump block includes a sheave 42 over which is trained the suspension and dump cable 43. The inner end of this cable 43 is adjustably connected to the dump hitch 44 by means of the connecting pin 45 and the series of openings 46. The remaining end of this cable 43 is suitably connected to the previously referred to coupling 33 that joins the drag chain 29 to the drag cable 34. The conventional hoist cable 47 is properly connected to the dump block 41, as is illustrated at 48 in Figs. 1 and 4.

Figs. 1, 3 and 4 clearly illustrate the proportioning and arrangement of the hoist chains 35, the drag chain 29 and the dump and suspension cable 43 which provide a perfect balance for the bucket during hoisting and quick dumping of the bucket, with complete cleaning, when material is being discharged. This proportioning and arrangement of these elements has been found to provide superior results when compared with conventional dragline bucket constructions.

As a more detailed explanation of the superior results that are obtained by this novel proportioning and arrangement of the several cables and chains, it will be noted that Fig. 1 shows the bucket 12 when arranged in the position it assumes for hoisting a load and for digging new or cleaning out existing ditches. When in this position, it will be seen that the bucket is suspended from the hoist cable 47, with this cable arranged substantially in vertical alignment with the longitudinal center line of the bucket arch 18. The actual suspension of the bucket 12 from the hoist cable 47 is accomplished by the dump block 41, the two hoist chains 35 and the suspen-

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sion and dump cable 43; when tension is applied to the latter cable by the drag cable 34.

The two hoist chains 35, being anchored to the outside of the rear wall 13 of the bucket 12 at two transversely spaced points, provide two points of suspension for the bucket while the suspension and dump cable 43, being hitched to the single, centrally located plow beam 22 forwardly of the bucket arch 18, provides a further point of suspension for the bucket. Collectively, therefore, the hoist chains 35 and the suspension and dump cable 43 provide a three-point suspension for the bucket 12 when the latter is in its hoisting and digging or cleaning out position.

The side elevational view of the bucket 12 provided by Fig. 1 clearly shows that when the suspension and dump cable 43 is connected to the dump hitch 44 by means of the innermost opening 46, the three points of suspension for the bucket 12 are located in two vertical planes that are positioned on opposite sides of and at substantially equal distances from the vertical plane that is common to the center line of the bucket arch and the axis of the hoist cable 47. The three points of suspension for the bucket, therefore, are so arranged as to constantly and inherently assure transverse stability for the bucket and to permit the drag cable 34 to exercise complete control over the longitudinal stability of and the assuming of its hoisting and digging position by the bucket as a result of the tension it imposes on the suspension and hoist cable 43. Of course, the digging position that the bucket will assume, when the suspension and hoist cable is tensioned, can be varied by adjusting the point of connection of the suspension and hoist cable 43 to the dump hitch 44.

Figs. 3 and 4 show the position the bucket 12 assumes for dumping its load. The bucket, of course, is suspended in this position by the hoist cable 47 and two hoist chains 35.

The use of two hoist chains 35 and the anchoring of them to the rear wall of the bucket at two laterally spaced points assures transverse stability for the bucket even during dumping. Fig. 4 illustrates the fact that the points at which the hoist chains 35 are anchored to the bucket are so located with respect to the center of gravity of the bucket that the bucket will hang truly vertical, or with its bottom wall occupying a truly vertical plane, when it is positioned for dumping. This transverse stability and truly vertical position of the bucket assures quick and complete dumping of its load even when very sticky material is being handled.

It will be noted from such figures as 1, 2, and 3 that the bucket 12, also, is provided with a three-point suspension from the arched plow beam 22. The connection between the inner end 23 of the plow beam and the rear wall 13 of the bucket provides one point while the two side portions or branches 19 of the bucket arch 18 provide the remaining two points. It is important to note that this three-point suspension is reversed with reference to the three-point suspension of the bucket 12 from the hoist cable 47; i. e., two of the points of suspension of the bucket from the hoist cable 47 are arranged at the same end of the bucket 12 as one of the points of suspension of the bucket from the plow beam 22 while the three remaining points are located forwardly with reference to the length of the bucket.

It is to be understood that the form of this invention herewith shown and described is to be taken as the preferred example of the same, and

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that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In a dragline bucket, the improvement which comprises a bucket member, a single plow beam centrally connected to the outside rear of and arched to extend above, forwardly and downwardly centrally of the width of the bucket member, a single drag chain hitched to the front end of the single plow beam, a pair of hoist chains anchored to the outside of the rear wall of the bucket inwardly on its side edges and at such a location relative to the center of gravity of the bucket as to cause the bottom of the bucket to be arranged substantially vertically when the bucket is suspended in dumping position by the hoist chains, a dump block connected to the outer ends of the hoist chains, a hoist cable connected to the dump block, and a suspension and dump cable connected at its opposite ends to the drag chain and to the single plow beam at a location substantially midway the outer end portion of the same and trained through the dump block.

2. In a dragline bucket, the improvement which comprises a bucket member, a single plow beam centrally connected to the outside rear of and arched to extend above, forwardly and downwardly centrally of the width of the bucket member, a bucket arch connected to the upper portions of the sides of the bucket and to the overlying portion of the single plow beam, a single drag chain hitched to the front end of the single plow beam, a pair of hoist chains anchored to the outside of the rear wall of the bucket inwardly of its side edges and at such a location relative to the center of gravity of the bucket as to cause the bucket to be suspended truly vertically on the two hoist chains for dumping, a dump block connected to the outer ends of the hoist chains, a hoist cable connected to the dump block, and a suspension and dump cable connected at its inner end to the single plow beam at a location substantially midway the outer end of the plow beam and the bucket arch and at its outer end to the outer end of the drag chain and trained through the dump block.

3. In a dragline bucket, the improvement which comprises an open-topped bucket member having a rearwardly tapered bottom, a downwardly tapered rear wall, upwardly diverging sides, and rearwardly and upwardly inclined straight cutters on the front edges of the sides; a single plow beam centrally connected to the outside rear of and arched to extend above, forwardly and downwardly centrally in front of the bucket member, a bucket arch connected to the sides of the bucket and to the overlying portion of the single plow beam, a single drag chain hitched to the front end of the single plow beam, a pair of hoist chains anchored to the outside of the rear wall of the bucket inwardly of its side edges and at such a location relative to the center of gravity of the bucket as to cause the bucket to be suspended truly vertically on the two hoist chains for dumping, a dump block connected to the outer ends of the hoist chains, a hoist cable connected to the dump block, and a suspension and dump cable connected at its opposite ends to the drag chain and to the single plow beam at a location midway the front end of

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the plow beam and the bucket arch and trained through the dump block.

4. In a dragline bucket, the improvement which comprises a bucket member, a single plow beam centrally connected to the outside rear of and arched to extend above, forwardly and downwardly centrally of the width of the bucket member, a bucket arch connected to the upper portions of the sides of the bucket and to the overlying portion of the single plow beam, a dragline hitch attached to the front end of the single plow beam, a dump hitch attached to the plow beam midway its front end and the bucket arch, said dragline and dump hitches each having a series of connection adjustment openings formed therein, and hoist chain anchorage lugs attached to the rear wall of the bucket member inwardly of its opposite side edges and substantially midway its top and bottom.

5. In a dragline bucket, the improvement which comprises a bucket member, a single plow beam arched throughout its length to provide inner and outer end portions and an intermediate portion, means providing a rigid three-point suspension connection between the bucket and the intermediate and inner end portions of the single plow beam, a hoist cable, means providing a flexible two-point suspension connection between the hoist cable and the rear wall of the bucket, a drag cable, means providing a flexible connection between the drag cable and the outer end portion of the single plow beam, and means providing a flexible connection between the drag cable, the hoist cable, and the intermediate portion of the plow beam with the portion of said means that connects the hoist cable and the plow beam providing a one-point adjustable suspension for the front end of the bucket, whereby the degree of tension applied to the drag cable will determine whether the bucket is suspended from the hoist cable in its load dumping position solely by the said flexible two-point suspension connection means or whether the bucket is suspended in its digging and load hoisting position by the said flexible two-point suspension connection means and the said one-point adjustable suspension means.

6. In a dragline bucket, the improvement which comprises a bucket member, a plow beam arched to extend forwardly and downwardly centrally of the width of the front of the bucket member, means for connecting the upper portions of the sides of the bucket member to the plow beam, a single drag chain hitched to the front end of the plow beam, a pair of hoist chains anchored to the outside of the rear wall of the bucket inwardly of its side edges and at such a location relative to the center of gravity of the bucket as to cause the bucket to be suspended truly vertically on the two hoist chains for dumping, a dump block connected to the outer ends of the hoist chains, a hoist cable connected to the dump block, and a suspension and dump cable connected at its inner end to the plow beam at a location that is substantially midway the portion of the plow beam that projects forwardly and downwardly of the front of the bucket member and at its outer end to the outer end of the drag chain and trained through the dump block.

7. In a dragline bucket, the improvement which comprises an open-topped bucket member having a rearwardly tapered bottom, a down-

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wardly tapered rear wall, upwardly diverging sides, and rearwardly and upwardly inclined straight cutters on the front edges of the sides; a plow beam arched to extend forwardly and downwardly centrally of the width of the front of the bucket member, means for connecting the upper portions of the sides of the bucket member to the plow beam, a single drag chain hitched to the front end of the plow beam, a pair of hoist chains anchored to the outside of the rear wall of the bucket member inwardly of its side edges at such a location relative to the center of gravity of the bucket as to cause the bucket to be suspended truly vertically on the two hoist chains for dumping, a dump block connected to the outer ends of the hoist chains, a hoist cable connected to the dump block, and a suspension and dump cable connected at its opposite ends to the drag chain and to the plow beam at a location that is substantially midway the portion of the plow beam that projects forwardly and downwardly of the front of the bucket member and trained through the dump block.

8. In a dragline bucket, the improvement which comprises a bucket member, a plow beam arched to extend forwardly and downwardly centrally of the width of the front of the bucket member, means for connecting the upper portions of the sides of the bucket member to the plow beam, a dragline hitch attached to the front end of the plow beam, a dump hitch attached to the plow beam midway the portion that projects forwardly and downwardly of the front of the bucket member, said dragline and dump hitches each having a series of connection adjustment openings formed therein, and hoist chain anchorage lugs attached to the outside of the rear wall of the bucket member inwardly of its opposite edges and substantially midway its top and bottom.

9. In a dragline bucket, the improvement which comprises a bucket member, a plow beam arched to extend forwardly and downwardly centrally of the width of the front of the bucket member, means for connecting the upper portions of the sides of the bucket member to the plow beam, a hoist cable, means for providing a flexible two-point connection between the hoist cable and the rear wall of the bucket, a drag cable, means for providing a flexible adjustable connection between the drag cable and the outer end portion of the plow beam, and means providing a flexible connection between the drag cable, the hoist cable, and the plow beam at a location that is substantially midway the portion of the plow beam that projects forwardly and downwardly of the front of the bucket member, with the portion of said last mentioned means that connects the hoist cable and the plow beam providing a one-point adjustable suspension for the front of the bucket, whereby the degree of tension applied to the drag cable will determine whether the bucket is suspended from the hoist cable in its load dumping position solely by the said flexible two-point suspension connection means or whether the bucket is suspended in its digging and load-hoisting position by the said flexible two-point suspension connection means and the said one-point adjustable suspension means.

10. In a dragline bucket, the improvement which comprises a bucket member, a plow beam arched to extend forwardly and downwardly centrally of the width of the front of the bucket member, means for connecting the upper portions

of the sides of the bucket member to the plow beam, a single drag chain hitched plate carried by the front end of the plow beam, a single dump hitch plate carried by the plow beam at a location that is substantially midway the portion 5 that projects forwardly and downwardly of the front of the bucket member, and a pair of transversely spaced hoist chain attachment lugs carried by the outside of the rear wall of the bucket member inwardly of its side edges and at a location 10 relative to the center of gravity of the bucket that will cause the bucket member to be positioned truly vertically when suspended solely by chains connected to said attachment lugs.

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