

June 1, 1948.

W. RUDDOCK

2,442,571

MATERIAL HANDLING BUCKET

Filed May 4, 1945

3 Sheets-Sheet 1

Fig. 2.

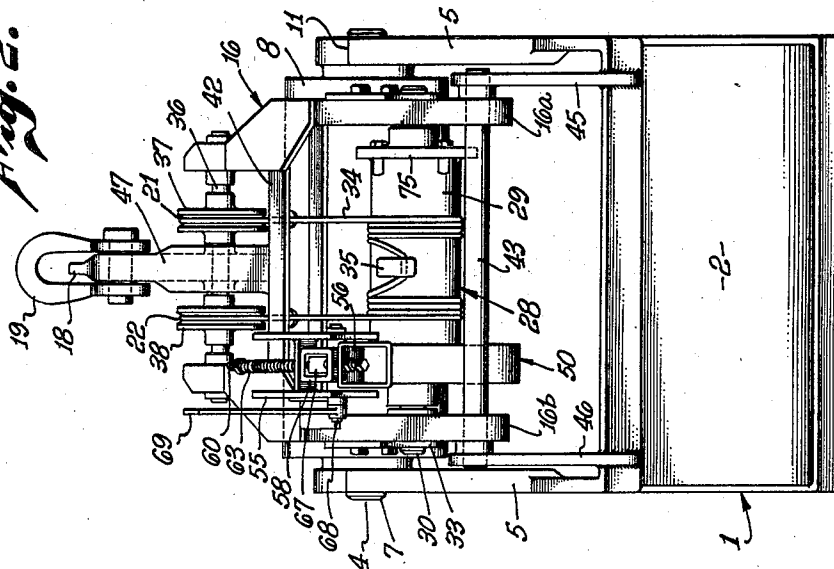
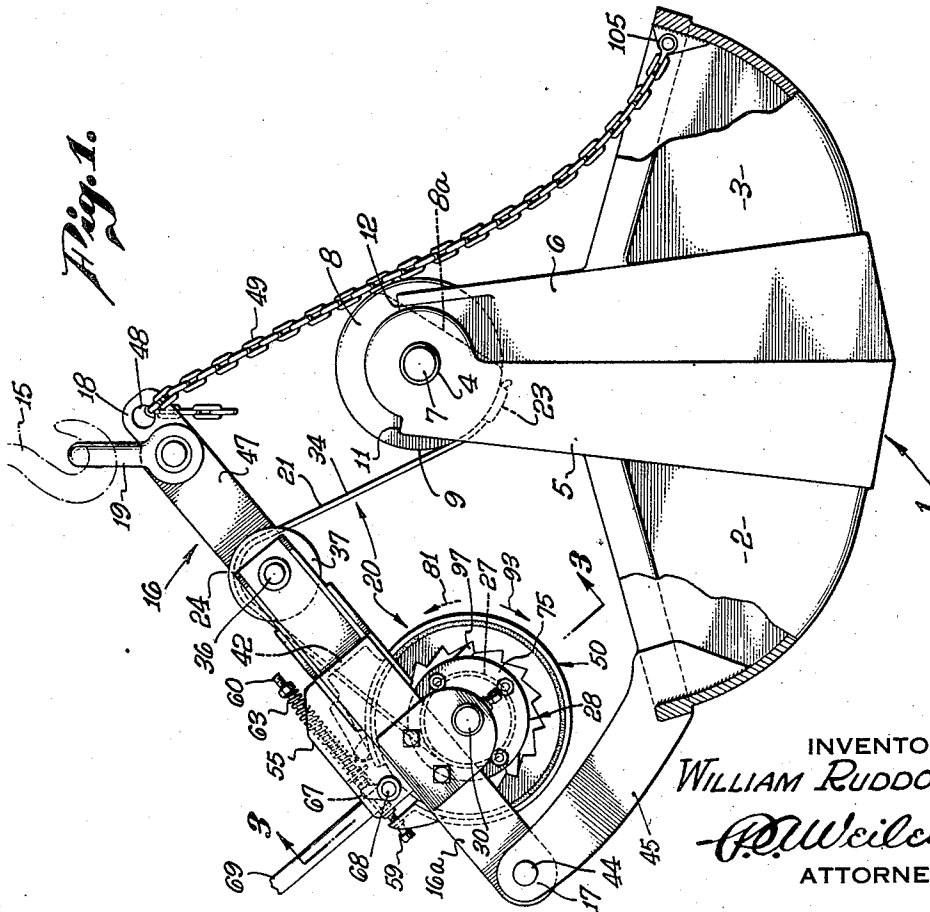


Fig. 1.



INVENTOR.
WILLIAM RUDDOCK,
P. D. Weilein
ATTORNEY.

June 1, 1948.

W. RUDDOCK

2,442,571

MATERIAL HANDLING BUCKET

Filed May 4, 1945

3 Sheets-Sheet 2

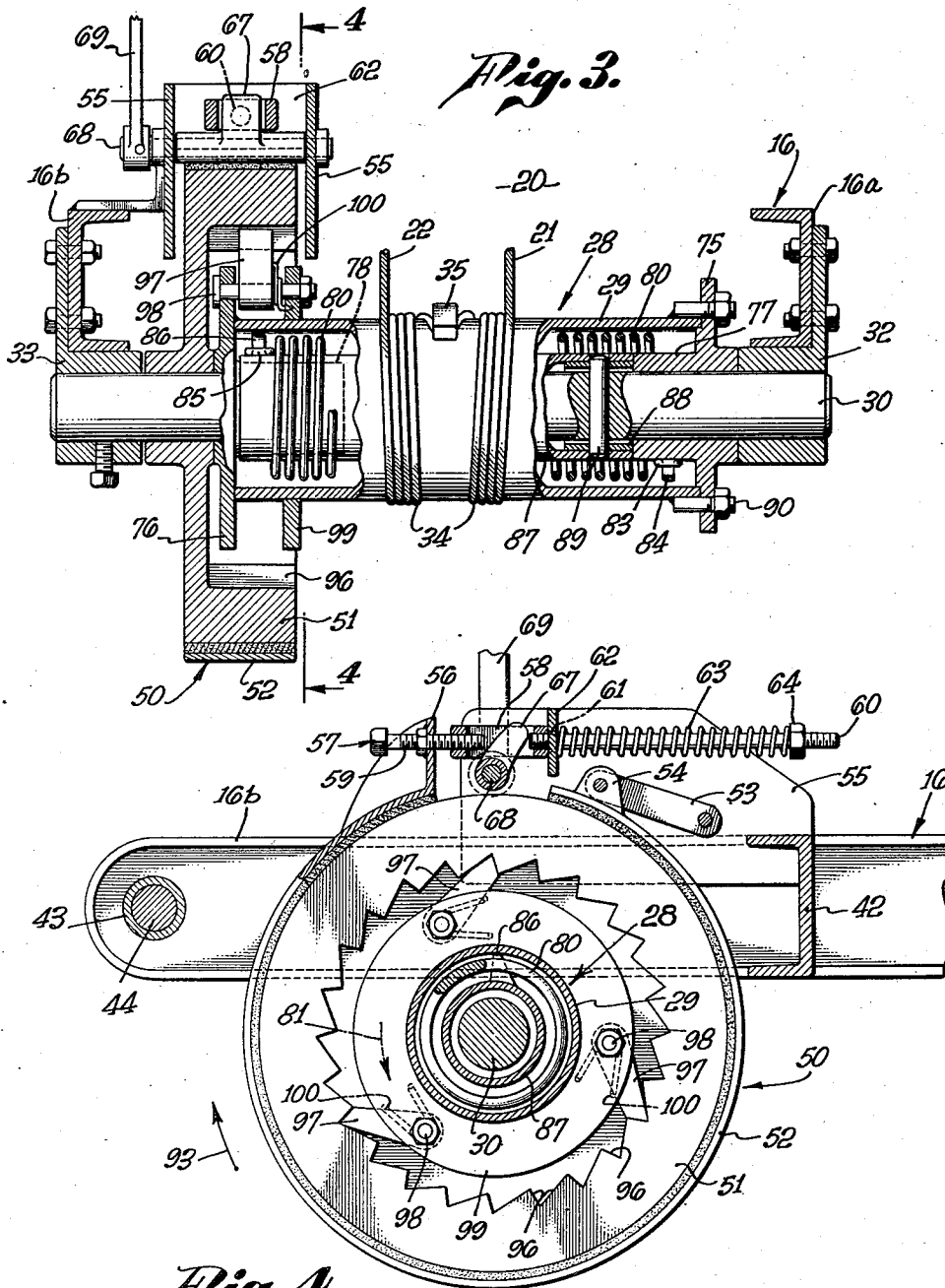


Fig. 4.

INVENTOR.
WILLIAM RUDDOCK,
BY *A. W. Weilin*
ATTORNEY.

June 1, 1948.

W. RUDDOCK

2,442,571

MATERIAL HANDLING BUCKET

Filed May 4, 1945

3 Sheets-Sheet 3

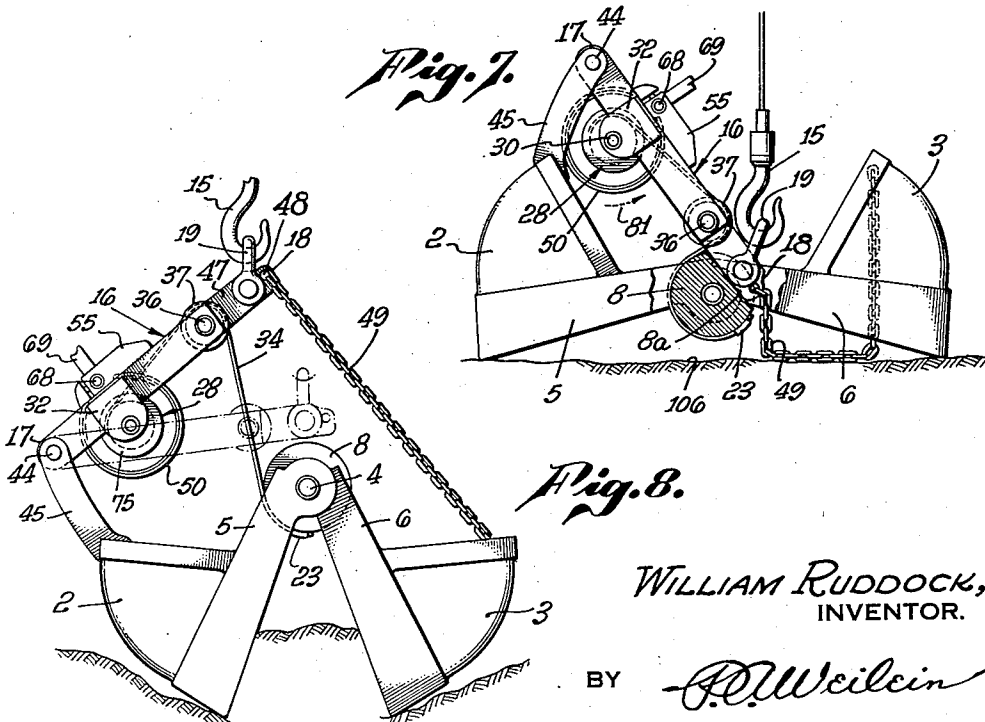
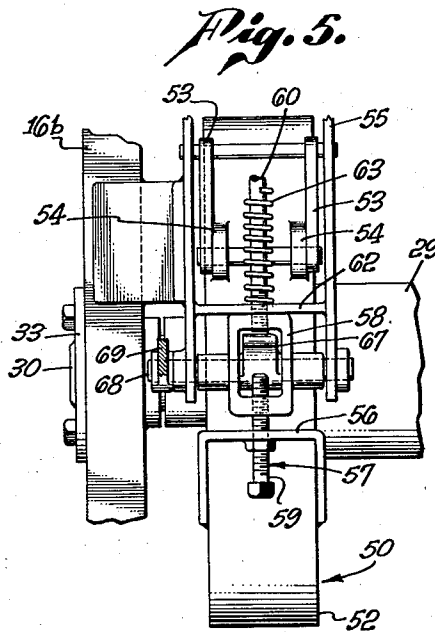
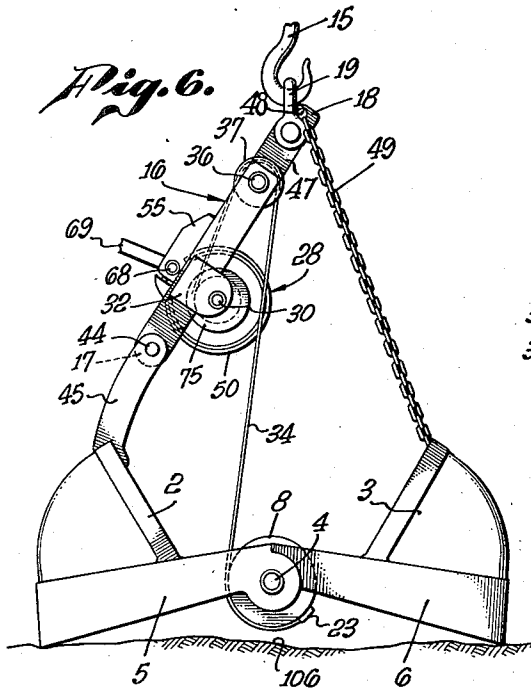


Fig. 8.

WILLIAM RUDDOCK,
INVENTOR.

BY

R. D. Weilsin

ATTORNEY.

UNITED STATES PATENT OFFICE

2,442,571

MATERIAL HANDLING BUCKET

William Ruddock, South Pasadena, Calif.; Braeme E. Gigas, executor of said William Ruddock, deceased, assignor to H. V. Griffiths, Leslie E. Edwards, Jr., and Paul Weilein, as trustees

Application May 4, 1945, Serial No. 591,877

14 Claims. (Cl. 37-184)

1

This invention relates to material handling apparatus of the type commonly known as clam shell buckets.

Such buckets usually comprise a pair of pivotally connected sections or halves which are adapted to be swung together or closed to pick up and carry a load, and swung apart or opened to discharge the load. In the operation of picking up a load, the load is picked up by the digging or biting action into the material to be loaded by the bucket halves as they come together, and considerable force must be exerted to close the bucket. It is an object of this invention to provide a bucket of this character wherein the closing force is applied to the bucket sections in an improved manner.

It is another object of this invention to provide a clam shell bucket capable of operating to open and to close in reduced height or head room as compared with previously known buckets of similar capacity.

It is another object of this invention to provide a clam shell bucket in which the closing operation may optionally be accomplished in a succession of steps.

It is another object of this invention to provide a single line bucket wherein the bucket may be closed by a succession of raising and lowering movements of the operating line.

It is another object of this invention to provide a clam shell bucket having a novel force multiplying means for increasing the closing force acting on the bucket sections.

Clam shell buckets in which a single line suffices to operate the bucket to open and to close as well as to raise and lower the bucket are known. A bucket of this type is disclosed in my copending application, Serial Number 532,119, filed April 21, 1944, and entitled "Material handling apparatus." It is an object of this invention to improve in general buckets of the type disclosed therein.

It is still another object of this invention to provide a clam shell bucket which does not require the usual bale structure.

It is a still further object of this invention to provide a clam shell bucket suitable for attachment directly to the line from the hoisting apparatus.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown a form in the drawings accompanying and forming part of the present speci-

2

cation. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

In the drawings:

Figure 1 is a side elevation of a clam shell bucket in closed or load carrying position, embodying the features of the invention;

Figure 2 is an end elevation of the bucket as seen from the left of Figure 1;

Figure 3 is a section on an enlarged scale, taken as indicated by line 3-3 of Figure 1;

Figure 4 is a section taken as indicated by line 4-4 of Figure 3;

Figure 5 is a top plan view of the structure illustrated in Figure 4; and

Figures 6, 7 and 8 are views on a reduced scale showing different operating positions of the bucket of Figure 1.

Referring to the drawings, and particularly to Figures 1 and 2 thereof, a material handling bucket 1 is shown, which is of generally conventional construction as far as the details of the bucket are concerned, and comprises a pair of complementary bucket sections 2 and 3 pivotally joined for relative movement at 4. For this purpose, the sections 2 and 3 are provided respectively on their opposite sides with extensions or arms 5 and 6, which overlap at their upper ends as shown in Figure 2. The arms 6 are the inside pair, and carry the projections or pintles 7, which engage the other arms 5 and form the pivotal connections between the bucket sections 2 and 3. The upper ends of the arms 6 of the section 3 are joined by a cross member 8, fixed to rotate with the arms 6 and having a surface 9 curved about the pivot pins 7. The usual bale structure additionally connecting the sections 2 and 3 is omitted, this additional connection being provided in a novel manner to be presently described.

The bucket sections 2 and 3 tend to swing apart or rotate in opposite directions about their pivotal connection 4 to the open position of Figure 6, as is customary. The parts may be so arranged as to cause such complete opening, or the cross member 8 may be made of substantial weight so as to ensure such complete opening. To appropriately limit opening movement of the bucket sections 2 and 3, the arms 5 and 6 may be provided with shoulders 11 and 12 respectively, adapted to engage when the sections reach the fully open position.

As is well understood, in operating such a

3

bucket, it is necessary, in addition to raising and lowering the bucket, to optionally prevent such opening of the bucket, as well as to cause the bucket sections to approach each other and close for the purpose of picking up and retaining the load. Additionally, it may be desirable to control the extent of the bucket opening and the rate at which such opening occurs, thus regulating the discharge of the load from the bucket.

For this purpose, an arrangement is provided connecting the hoisting line and the bucket 1, which optionally permits movement of the bucket sections 2 and 3 with respect to the hoisting hook 15, which is provided to raise and lower the bucket. This hook 15 is secured at the free end of a suitable cable or the like, operated by hoisting apparatus to desirably control the bucket. Thus, when the hook 15 is held to support the bucket 1, and the bucket sections 2 and 3 are allowed to move, the bucket opens, or if the bucket is otherwise supported, hoisting of the hook 15 serves to close the bucket. If such movement of the sections 2 and 3 is prevented, the bucket may be raised or lowered, in either open or closed position.

Thus, the hook 15 may be conveniently attached to the bucket 1 by means of a control arm 16, pivotally secured at one end 17 to that bucket section as 2, which does not carry the cross member 8. The opposite end 18 of the arm 16 is provided with a shackle 19 by which the arm 16 is connected to the hook 15. Means 20 are provided, forming a releasable connection between the arm 16 and the pivot 4 between the bucket sections 2 and 3, to permit or restrain movement of the sections with respect to the arm. The means 20 is arranged to cause differential movement of the arm 16 with respect to the bucket sections 2 and 3 upon upward movement of the arm, whereby the resultant of the lifting force exerted by the hook 15 which acts to close the bucket 1 is substantially increased.

The means 20 comprises a cable or flexible element 34, which is doubled to provide a pair of lines 21 and 22, connected to the cross member 8 at axially spaced points thereon, and arranged to act simultaneously. For purposes of this discussion, these lines 21 and 22 may be considered as anchored at points 24 on the arm 16. Since the points 23 on the member 8 are spaced radially from the pivot 4, upward movement of the arm 16 imparts an angular movement to the cross member 8 and to the attached bucket section 3 about the pivot 4 in closing direction. Furthermore, this causes the point 24 to have a greater linear movement than the pivot 4, whereby the force applied to the arm 16 is substantially increased in its action on the bucket section 3.

The bucket section 2 is similarly urged in closing direction about the pivot 4, since the force applied to the arm 16 by the hook 15 causes the arm to fulcrum about the point 24, the lower end 17 of the arm 16 which is connected to the bucket section 2 thus being urged to the right (Figure 1).

The releasable connection 20 includes a spring driven winch 28 (see Figures 3 and 4) of the type disclosed in either my copending application entitled "Control mechanism for material handling apparatus," filed June 8, 1943, under Serial Number 490,006, or in my patent entitled "Tagline device," issued July 18, 1939, and bearing Number 2,166,479. This mechanism 28 includes a drum 29 rotatably supported on a shaft 30 extending between the side members 16-a and 16-b of the arm 16, and fixed thereto as by being secured in

4

brackets 32 and 33 mounted respectively on the arms. The cable 34 is attached at a point intermediate its ends to the drum 29 as by a hook 35. The cable portions or lines 21 and 22 extend from the drum 29 over the spaced sheaves 37 and 38 on the arm 16 to their points of attachment 23 on the cross member 8, the sheaves 37 and 38 forming the points 24 at which the load is applied by the lines 21 and 22 to the arm 16.

As above mentioned, the control arm comprises a pair of spaced parallel side members 16-a and 16-b, joined near their upper ends by a cross member 42 (see Figure 2), and near their lower ends by a tubular cross member 43 by means of which the arm 16 is swingably mounted on the bucket section 2. For this purpose the bucket section 2 is provided with elongated ears 45 and 46 respectively adjacent its opposite sides, which support a transverse shaft 44 on which the cross member 43 is mounted.

The upper end portion of the arm comprises a center member 47 suitably secured to the cross piece 42 and carrying the shackle 19 near its upper end. Just beyond the shackle 19 an aperture 48 is provided for receiving a flexible element 49 to be described presently. The sheaves 37 and 38 are rotatably supported on a shaft 36 extending between the side members 16-a and 16-b and through the center member 47.

Movement of the bucket sections 2 and 3 from the closed position of Figure 1 to open position, as shown in Figure 6, will cause the drum 29 to rotate in a clockwise direction by virtue of the cable 34. Brake mechanism 50 is provided to optionally control or prevent such rotation of the drum 29, and thus to control the opening of the bucket 1.

The brake mechanism 50 is shown in Figures 3, 4 and 5, and comprises a brake drum 51 which for the present may be considered as fixed to rotate with the winch drum 29. Since the brake 50 is relied on to maintain the bucket closed, it is preferred to arrange the brake 50 to be normally engaged to prevent rotation of the drums 29 and 51, and to provide means for releasing the brake when it is desired to allow the drums to rotate and the bucket to open.

A brake band 52 embraces the drum 51 and is anchored against rotation by a pair of links 53 pivotally secured at one end to lugs 54 provided on the band 52 near one end thereof, and to a bracket 55 carried by the arm structure 16. The other end of the band 52 has an upstanding ear 56 formed thereon, through which is threaded the actuating member 57. As shown in Figure 5, this member 57 is built up of an intermediate slotted member or yoke 58 into the opposite ends of which are threaded respectively a short rod 59 and a rod 60. The rod 59 is threaded through the ear 56, while the rod 60 is freely slideable through a clearance hole 61 in a transverse web wall 62 of the bracket 55. The yoke 58 is positioned intermediate the ear 56 and the web 62. A compression spring 63 is adjustably confined on the actuator 57 between the web 62 and a nut 64 threaded on the end of the rod 60. The force of the spring 63 is transmitted through the rod 60, yoke 58 and rod 59 to ear 56, to contract the band 52 about the drum 51.

For releasing the band 52, a cam 67 is provided. This cam 67 projects upwardly into the yoke 58 and is secured to a shaft 68, rockably supported in the bracket 55, and having an operating lever 69 mounted thereon. The inner end of the rod 59 is adapted to be engaged by the

5

cam 67 upon appropriate movement thereof by the lever 69 (to the left in Figure 4), a continuation of such movement serving to release the band 52 against the force of the spring 63. The rod 57 is adjustable with respect to the ear 56 and the yoke 58, to provide proper working clearances, while the nut 64 may be adjusted to alter the force exerted by the spring 63.

The brake and drum arrangement so far described would be effective to maintain the bucket closed as long as desired and to control its opening. However, to provide for closing the bucket, means must be provided for winding the cable 34 onto drum 29 after it has been unwound to open the bucket.

For this purpose, means are provided which continually urge the drum 29 to rotate in cable winding direction. Since the force exerted by such means acts in opposition to the force tending to open the bucket, it is obvious that the force tending to wind the cable should be relatively light and under no conditions capable of nullifying the bucket opening force.

Thus, referring to Figure 3 and particularly to Figure 4, it will be seen that the drum 29 is tubular, its ends being closed respectively by heads 75 and 76, suitably secured to the drum and provided with hubs 77 and 78. Within the drum 29 is a torsion spring 80 arranged to urge the drum 29 as indicated by the broken arrow 81 in Figures 1 and 4. One end, as 83, of the spring 80, is arranged to rotate with the drum 29 as by being attached to a lug 84 on the hub 77. The other end 85 of the spring 80 is fixed against rotation by attachment to a lug 86 formed on a sleeve 87. Sleeve 87 is supported at one end on the exterior of the hub 78 and at its other end by a spacer 88. A diametrical pin 39 extends through the shaft 30, the sleeve 87 and spacer 88, serving to hold the sleeve 87 and the end 85 of the spring 80 against rotation with respect to the shaft.

As the drum 29 is rotated in the direction of the full arrow, 93 in Figures 1 and 4, in a bucket opening operation, the spring 80 is wound to increase the tension therein. When the arm 16 is lowered to the position of Figure 7 preparatory to closing the bucket, the bucket being otherwise supported as by resting on the surface of the ground, the drum 29 is rotated by the spring 80 in the direction of the broken arrow 81 of Figures 7 and 4 to rewind the cable 34 onto the drum to maintain the cable free of slack. To permit proper adjustment of the spring tension, the head 75 carrying the lug 84 is detachably secured to the drum 29 by bolts 90. Detachment of the head from the drum permits angular movement thereof with respect to the shaft 30 and the lug 86, thus altering the tension in the spring 80. After such adjustment, the head 75 is replaced on the drum.

To permit such rewinding of the cable 34, the brake 50 must of course be released to permit the drum 39 to be rotated by the spring 80. To obviate the necessity of releasing the brake 50 (which is normally engaged) for such purpose and thus greatly simplify the operation of the bucket, the brake mechanism 50 is connected to the drum 29 through a one way clutch mechanism, so that the brake is only capable of controlling the rotation of the drum 29 to allow unwinding of the cable 34 to cause the bucket to open, the drum 29 being free to rotate in cable winding direction in response to the spring 80 at all times regardless of the brake.

6

Referring to Figure 3, the brake drum 51 is freely rotatable on the shaft 30, being axially confined between the bracket 33 and the head 76. The drum 51 is provided with internal ratchet teeth 96 adapted to be engaged by a plurality of pawls 97 pivotally mounted on pins 98 carried by head 76 and a ring 99 spaced therefrom on the drum 29, and urged outwardly to engage the teeth 96 by springs 100. As clearly shown in Figure 4, the ratchet teeth 96 and the pawls 97 are so arranged as to engage upon any rotation of the drum 29 in the direction of the arrow 93 corresponding to tensioning of the cable 34; thus such rotation of the drum 29 will depend upon the rotation of the brake drum 51 and be controllable by the brake 50. On the other hand, any slackening of the cable 34 will permit the drum 29 to rotate in the opposite direction, as indicated by the arrow 81, in response to the spring 80, regardless of the brake 50, since such rotation will cause disengagement of the pawls 97 from the ratchet 96. Thus, by the use of such a clutch it is only necessary to maintain the brake 50 disengaged during the opening of the bucket, subsequent rewinding of the cable occurring automatically.

The operation of the bucket may now be described. With the bucket closed as in Figure 1, and suspended by the control arm 16 as from the hook 15, the bucket sections 2 and 3 are restrained from opening movement by the brake 50 and the bucket may be raised and lowered and transported by appropriate movement of the hook 15. Upon release of the brake 50, the sections move apart to the open position, shown in Figure 6. The rate at which such opening occurs can be controlled by partial release of the brake 50, or the opening movement may be caused to take place in a series of steps to desirably discharge the load. It is only necessary that the bucket be fully opened just before closing.

The flexible element 49 serves to limit movement of the bucket against movement as a whole about the lower end 17 of the control arm 16 upon release of the brake 50. When the brake is engaged, the cable 34 performs this function. It will be seen that when the bucket is open, the arm 16 and its attachment ears 45 and 46, and the flexible element 49 cooperate to properly support the bucket sections 2 and 3 from the hook 15. Further, by altering the effective length of the element 49, the distance between the arm 16 and the pivotal connection 4 between the bucket sections 2 and 3 when the bucket is open may be adjusted. Thus, the element 49 may conveniently be a conventional link chain, connected at one end to the bucket section 3 by a pivoted clevice 105 and at the other end to the extension 47 of the arm 16. The aperture 48 which receives the chain 49 provides clearance for the links thereof. The arrangement and the thickness of the extension 47 is such that a link of the chain may rest in a slot 48—a formed in the aperture 48, the links adjacent thereto engaging respectively the opposite sides of the extension 47, and preventing movement of the chain 49 in response to tension therein. However, upon manipulating the chain 49 to free such links, the chain may be pulled through the hole 48 to adjust its length, after which it may be secured to the arm 47 in the same way.

When it is desired to close the bucket 1, the bucket sections 2 and 3 are supported by resting on a suitable surface 106 (Figures 6 and 7) which is preferably formed by the material to be loaded.

The hook 15 is then lowered to cause the control arm 16 to approach the pivotal connection 4, the cable 34 being wound on the drum 29 which is rotated by the spring 80, the previously described ratchet mechanism permitting the drum 29 to rotate freely to take up the slack in cable 34. Upon upward movement of the arm 16 imparted by the hook 15, the brake 50 prevents unwinding of the cable 34 from the drum 29 and the cable is thus pulled upwardly by the sheaves 37 and 38, causing upward movement of the connection 4 and closing movement of the bucket sections 2 and 3. However, the upward movement of the connection 4 is substantially less than that of the connected point 24 on the arm 16, provided by the sheaves 37 and 38, due to the differential action provided by the unwrapping of the cable 34 from the curved surface 9 on the member 8 as the closing movement progresses.

Furthermore, this differential action permits the closing operation to be performed in a series of steps by successively raising and lowering the arm 16. This has the important advantage of making it possible to position the arm 16 in its most effective position when the greatest closing force is required. Thus, consider the partly closed position of the bucket shown in Figure 8. When the arm 16 is in some inclined position, such as shown by the full lines, it is obviously less effective than when more nearly horizontal as shown by the dotted lines. Thus, by lowering the arm to the dotted position and then raising it, a substantially increased closing force may be exerted.

To facilitate the closing operation, it is desirable to permit approach of the arm 16 as close to the connection 4 as practicable. Thus, the cross member 8 immediately adjacent the arms 6 is cut away as indicated by 8-a (Figures 1 and 7) to accommodate the side members 16-a and 16-b. When the length of the chain 49 is adjusted below a certain amount, it may be necessary to close the bucket in two steps. Thus, in Figure 8, with the parts in the full line positions, further upward movement of the arm 16 will be prevented by the element 49. Thus, it is necessary to lower the arm 16 to cause the cable 34 to be shorted by the drum 29, to permit completion of the closing operation.

I claim:

1. In a material handling bucket including complementary bucket sections pivotally connected for movement with respect to each other between closed load retaining position and open load discharging position, a control arm mounted on one section for swinging movement with respect to said section in response to operation of a hoisting line, means urging said bucket sections to open position including a member secured to the other section for angular movement with said other section about the pivotal connection, and means connecting said member with said arm to rotate said member and the bucket section to which it is secured, in closing direction upon movement of said arm in one direction.

2. In a material handling bucket including complementary bucket sections pivotally connected for movement with respect to each other between closed load retaining position and open load discharging position, a control arm mounted on one section for swinging movement with respect to said section in response to operation of a hoisting line, means urging said bucket sections to open position including a member secured to the other section for angular movement with said other section about the pivotal connection, and

a flexible element connected to said member at a point spaced radially from the pivot, means connecting said element with said arm, comprising a rotatable drum arranged to rotate upon movement of the bucket sections to open position, and means for controlling rotation of the drum, said point of connection being so located as to rotate said member and the attached bucket section in closing direction upon lifting movement of the arm.

3. In a material handling bucket including complementary bucket sections pivotally connected for movement with respect to each other between closed load retaining position and open load discharging position, a control arm mounted on one section for swinging movement with respect to said section in response to operation of a hoisting line, means urging said bucket sections to open position including a member secured to the other section for angular movement with said other section about the pivotal connection, and a flexible element connected to said member at a point spaced radially from the pivot, means connecting said element with said arm comprising a rotatable drum arranged to rotate upon movement of the bucket sections to open position, means normally preventing rotation of the drum to maintain the bucket closed, and means for optionally releasing said rotation preventing means to cause the bucket to open, said point of connection being so located as to rotate said member and the attached bucket section in closing direction upon lifting movement of the arm.

4. In a material handling bucket including complementary bucket sections, means pivotally joining said sections for relative movement between closed and open positions, a control arm connected to one section for swinging movement with respect thereto in response to operation of a hoisting line, a member curved about said pivot means and joined to the other section, a flexible element joined to said member so as to wind thereon as the bucket sections open and to be unwound therefrom to cause the bucket sections to close, and means connecting said flexible element to said control arm.

5. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between closed and open positions, a control arm pivoted on one section for swinging movement in response to operation of a hoisting line, and means connecting said arm with said sections for differential movement with respect to the sections when the arm is moved to close the bucket, said means including a member fixed to the other bucket section.

6. In a material handling bucket including complementary bucket sections, means pivotally joining said sections for relative movement between closed and open positions, a control arm connected to one section for swinging movement with respect thereto in response to operation of a hoisting line, a member curved about said pivot means and joined to the other section, a flexible element joined to said member so as to wind thereon as the bucket sections open and to be unwound therefrom to cause the bucket sections to close, and means connecting said flexible element to said control arm, said means comprising a drum arranged to rotate in response to movement of said element as the bucket sections open, means optionally restraining said drum against rotation to control the opening movement, and means urging the drum to wind the element as it is unwound from said member.

9

7. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between closed and open position, means urging said bucket sections to open, a control arm pivoted to one section, means forming a releasable connection between said arm and said sections for optionally causing said urging means to open the bucket, or to cause said sections to close upon operation of said arm by a hoisting cable, and an adjustable element extending between the arm and said other section for limiting relative movement of said arm and said other section.

8. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between closed and open position, means urging said bucket sections to open, a control arm pivoted to one section at a point remote from the connection between the sections, means forming a releasable connection between an intermediate point on said arm and said sections adjacent the connection therebetween for optionally causing said urging means to open the bucket or to cause said sections to close in response to movement of said arm by a hoisting cable, and means forming an adjustable connection between the free end of said arm and a point on the other bucket section corresponding in position to the point of attachment of the arm to said one section.

9. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between open and closed positions, and urged toward open position, a control arm pivoted on one of said sections, means connecting said arm and said sections, comprising a flexible element and means forming winding drums therefor respectively on said arm and the other of said sections, one of said drums being arranged to rotate in response to opening and closing movement of said sections, and means optionally causing the other drum to wind and unwind the flexible element whereby said arm is operative to control opening and closing movement of the sections.

10. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between open and closed positions, and urged toward open position, a control arm pivoted on one of said sections, means connecting said arm and said sections, comprising a flexible element and means forming winding drums therefor respectively on said arm and the other of said sections, said element being arranged to unwind from one drum and wind on the other drum to allow said sections to open, means for causing said one drum to rewind said element in response to lowering of said arm about its pivot, and means controlling rotation of said one drum, whereby movement of the control arm in hoisting direction about its pivot unwinds the element from the other drum to cause said sections to close.

11. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between closed and open positions, and urged to open position, a control arm pivoted to one of said sections, means connecting said arm and said sections comprising, a flexible element, releasably secured to said arm, and means forming a winding surface for said element on the other bucket section for movement about the pivotal connection with said section, and adapted to wind said flexible element

10

upon opening movement of the bucket section, movement of said arm in hoisting direction about its pivot serving to unwind the flexible element from said drum whereby to cause said sections to close.

12. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between open and closed positions, and urged toward open position, a control arm pivoted on one of said sections, means connecting said arm and said sections comprising a flexible element, and means forming winding drums therefor respectively on said arm and the other of said sections, the drum on said other section being arranged to wind said element in response to movement of said section in opening direction, means urging the drum on said arm in element winding direction, and means for optionally controlling rotation of said last mentioned drum, whereby the bucket sections are released for opening movement or caused to close in response to movement of said arm in hoisting direction.

13. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between open and closed positions, and urged toward open position, a control arm pivoted on one of said sections, means connecting said arm and said sections comprising a flexible element and means forming winding drums therefor respectively on said arm and the other of said sections, the drum on said other section being arranged to wind said element in response to movement of said section in opening direction, means urging the drum on said arm in element winding direction, and optionally operable means effective to control rotation of said drum in element unwinding direction only, whereby movement of the control arm in hoisting direction about its pivot unwinds the element from the other drum to cause said sections to close.

14. In a material handling bucket including complementary bucket sections pivotally joined for relative movement between open and closed positions, and urged toward open position, a control arm pivoted on one of said sections, means connecting said arm and said sections comprising a flexible element and means forming winding drums therefor respectively on said arm and the other of said sections, the drum on said other section being arranged to wind said element in response to movement of said section in opening direction, means urging the drum on said arm in element winding direction, brake mechanism including a rotatable brake drum, means connecting said brake drum for rotation with the winding drum, and optionally operable means for applying a rotation restraining force to said brake drum, one of said last mentioned pair of means being rendered inoperative in response to rotation of said winding drum in said one direction, whereby said winding drum is free to rotate at all times in said one direction.

WILLIAM RUDDOCK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
937,496	Williams	Oct. 19, 1909