Sept. 17, 1963 R. J. TAKACS 3,103,753

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Filed June 22, 1960 3 Sheets-Sheet 1

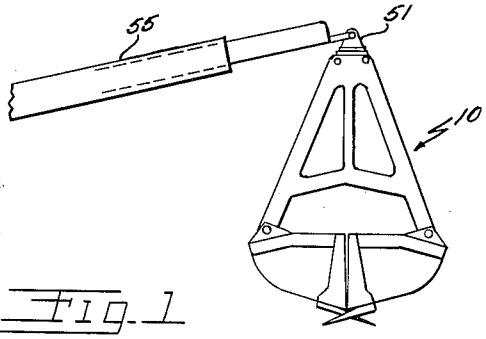


FIG. 1

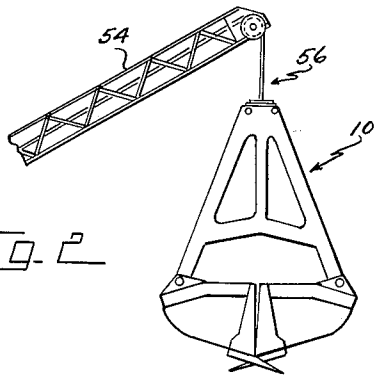


FIG. 2

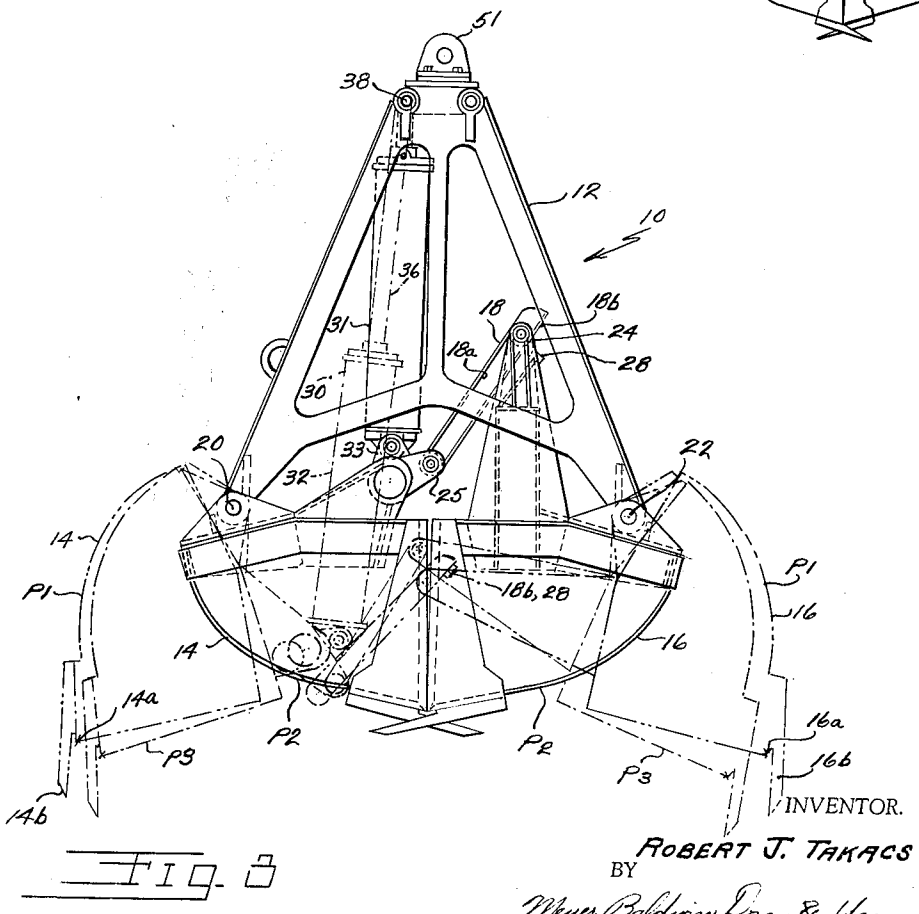


FIG. 3

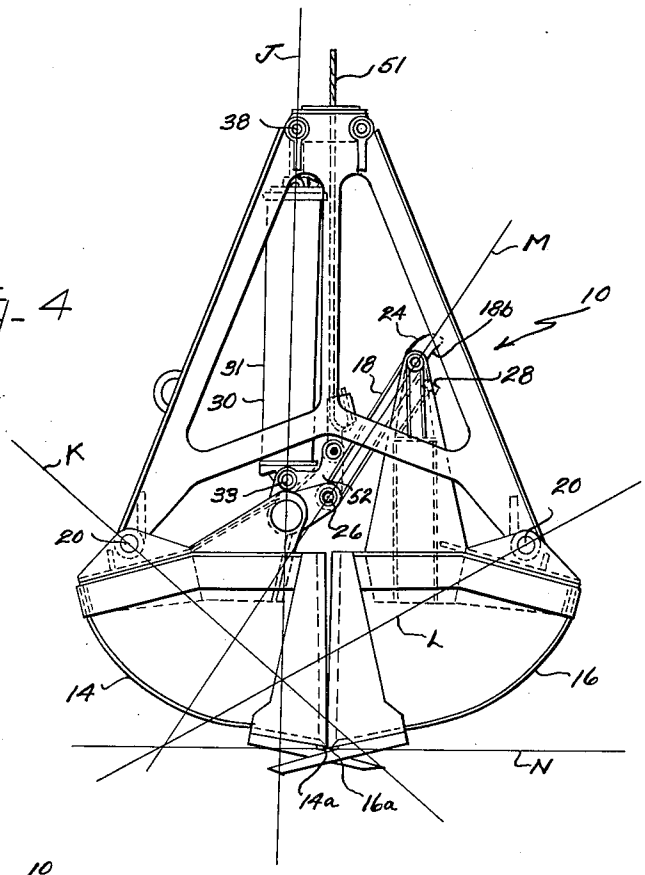
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FIG. 4



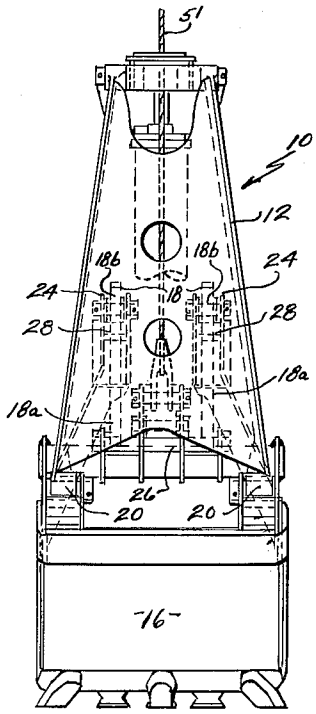


FIG. 5

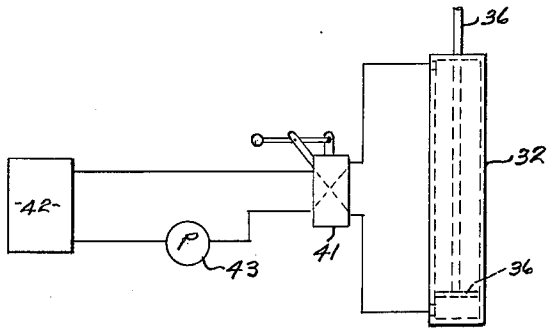


FIG. 5A

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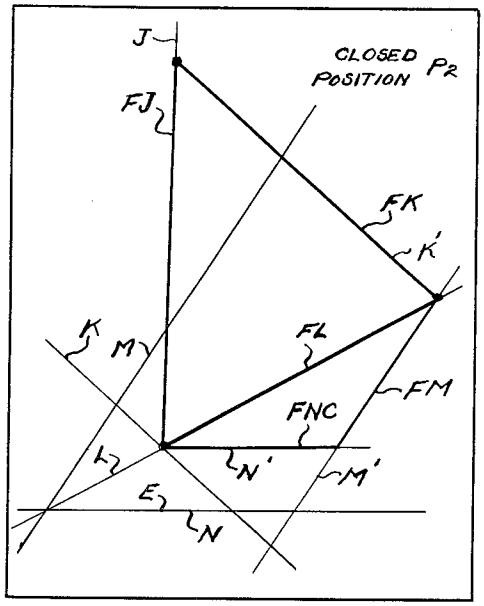


FIG. 7

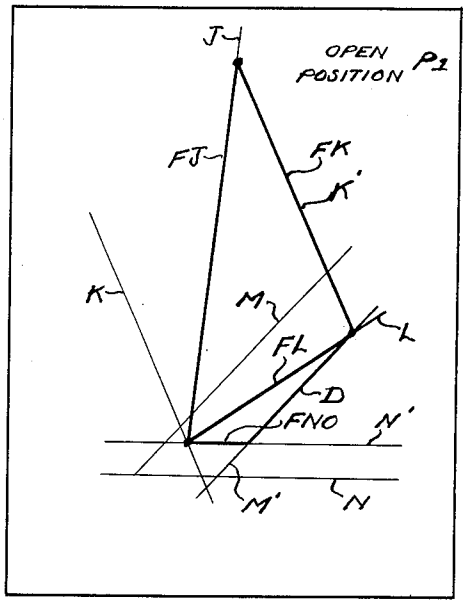


FIG. 6

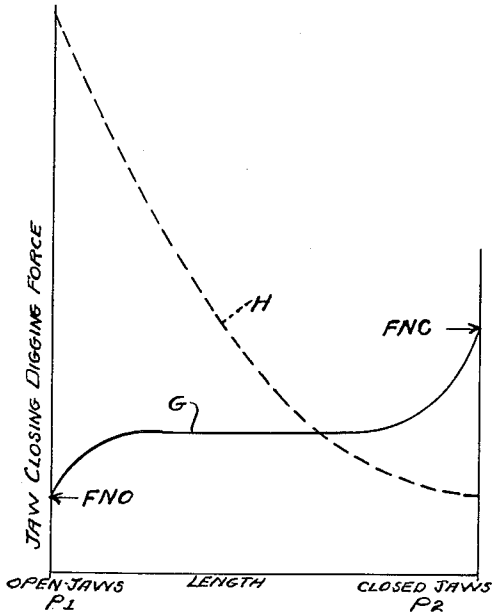


FIG. 8

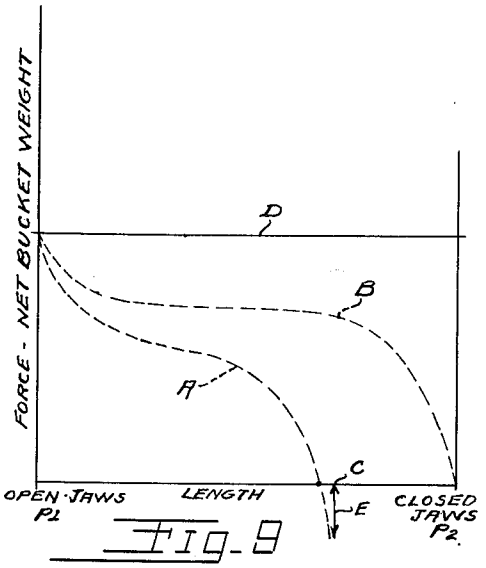


FIG. 9

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3,103,753

BUCKET

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Filed June 22, 1960, Ser. No. 37,876
21 Claims. (Cl. 37—187)

This invention relates to improvements in a bucket and more particularly to an automatic grab bucket.

One of the objects of the present invention is to provide a bucket having positive power opening to fully open position, positive power closing to fully closed position and bowl locking in any intermediate position.

A further object of the present invention is to provide a bucket having good digging characteristics and powered by a fluid operated piston and cylinder unit to move the bucket members between open and closed positions.

A further object of the present invention is to provide a bucket having good digging characteristics by having during the closing stroke a larger closing force near the closed position than near the open position.

A further object of the present invention is to provide a bucket having self-contained features wherein the bucket members are operated independenly of the support of the bucket.

A further object of the present invention is to provide a bucket characterized by its structural simplicity, strong and sturdy nature, operating efficiency, economy of manufacture, ease of assembly of its component parts, and multiplicity of functional advantages for some component parts.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and description and the essential features will be set forth in the appended claims.

In the drawings,

FIG. 1 is a side elevational view of the bucket disclosed herein schematically shown on the end of a rigid boom;

FIG. 2 is a side elevational view of the bucket disclosed herein schematically shown with parts omitted and supported by a flexible line or cable;

FIG. 3 is a side elevational view of a first form of bucket disclosed herein with the bucket members shown in solid lines in closed position and shown in dot-dash lines in the fully opened position and in an intermediate position;

FIG. 4 is a side elevational view of a second form of bucket, the same as the bucket in FIG. 3 except for the supporting construction thereof;

FIG. 5 is a side elevational view taken from the right of the bucket in FIG. 4;

FIG. 5A is a schematic flow diagram for the fluid motor and its control for opening and closing the bucket;

FIGS. 6 and 7 are force diagrams of the forces in the bucket occurring during the movement of the bucket members from open position to closed position with the diagram in FIG. 6 showing the forces near open position and the diagram in FIG. 7 showing the forces near closed position;

FIG. 8 is a graph of the forces exerted by the jaws of the bucket members during the closing operation with the forces of the present bucket generally shown in solid line and of some prior art buckets generally shown in dotted line; while

FIG. 9 is a graph of the downward force exerted by the net weight of the bucket during closing with the force exerted by the present bucket generally shown in solid line and by prior art buckets with a closing cable generally shown in dotted lines.

Before the bucket here illustrated is specifically described, it is to be understood that the invention here involved is not limited to the structural details or arrangement of parts here shown since a bucket embodying the present invention may take various forms. It is also to be understood that the phraseology or terminology herein employed is for purposes of description and not of limitation since the scope of the present invention is denoted by the appended claims.

While the present invention might be adapted to various types of load handling equipment, it has been chosen to show the same as applied to a grab bucket for illustration purposes.

Bucket 10 includes head frame member 12, two bucket members 14 and 16, and power operated means 30 for power opening and closing of said bucket.

Bucket members or bowls 14 and 16 have respectively jaws or cutting edges 14*a* or 16*a*, which may have secured thereto and extending outwardly therefrom teeth 14*b* and 16*b* respectively, if desired.

Suitable connecting means operatively connects these members 12, 14 and 16 together for relative movement of the jaws on these bucket members between open position P1 (shown in dot-dash lines in FIG. 3) and closed position P2 (shown in solid line in FIG. 3) through an intermediate position P3 (also shown in dot-dash lines).

This connecting means includes spaced parallel first pivots connecting each of the bucket members to the head frame member, and link 18 pivotally connected by spaced parallel second pivots to said bucket members. These first pivots include, as one pivot, two coaxial pins 20 pivotally connecting bucket member 14 to head frame member 12; and as another pivot, two coaxial pins 22 pivotally connecting bucket member 16 to head frame member 12. Link 18 is shown as two parallel link elements 18*a*, 18*a* in FIG. 5, but it should be readily apparent that these may be replaced by a single, solid link. Head frame member 12 rigidly maintains these first pivots 20 and 22 in a constant spaced relationship by its rigidity. These first pivots 20 and 22 are located outwardly from and straddling the second pivots, which comprise two coaxially aligned pins 24 at one end of link 18 and shaft 26 at the other end of link 18.

For best operation, and especially to avoid any over center action of the link preventing the aforedescribed desired movement of the bucket members 14 and 16, the straight line distance between the first and second pivots 20 and 26 on bucket member 14 is non-symmetrical at all time with respect to the corresponding distance between these pivots 22 and 24 on the other of the bucket members 16. Non-symmetrical means that these distances are not of equal length and of the same angular orientation with respect to the vertical center line of the bucket 10.

When the bucket is in its fully opened position P1, this position is determined by engagement, in lateral alignment with each pin 24 in FIG. 5, of stop surface 18*b* on link elements 18*a* against stop surface 28 rigidly carried on bucket member 16. Engagement of these stop surfaces in position P1 in FIG. 3 prevents turning the bucket inside out during outward movement from position P2 toward position P1, and establishes open position P1.

Power operated means 30 is adapted to apply a force in the downward direction to move bucket members 14 and 16 from closed position P2 to open position P1 and to apply a closing force in the upward direction in FIG. 3 to move the bucket members 14 and 16 from open position P1 to closed position P2. These forces are exerted by a double acting fluid cylinder and piston unit 31

having telescopically connected cylinder 32, and the piston rod 36 therein. This unit 31 includes brackets on bucket member 14 and the lower end of cylinder 32 pivotally connected by shaft 33, and on the upper end of piston rod 36 pivotally connected in FIG. 3 by shaft 38 to head frame member 12. These shafts 33 and 38 provide the proper operative connection so that the endwise force applied by cylinder 32 and piston 36 is applied along a generally vertical line between pivots 20 and 22.

This double acting cylinder and piston unit 31 may be operated by any suitable fluid, such as air or hydraulic liquid, and may be controlled in any suitable manner to move cylinder 32 in the downward direction to move bucket members from position P2 to position P1 or to move cylinder 32 in the upward direction so as to move bucket members from position P1 to position P2. This control may take the form in FIG. 5A of a conventional, manually controlled, four-way valve 41 having two ports connected through a closed loop to fluid reservoir 42 and pump 43 arranged in series, and having the other two ports connected to ports at opposite ends of cylinder 32. When valve 41 is in one position, the fluid is supplied under pressure by pump 43 through valve 41 to the lower end of cylinder 32 and is exhausted from the upper end of cylinder 32 back through valve 41 to reservoir 42. Then, cylinder 32 moves downwardly and bucket members 14 and 16 will be moved from position P2 to position P1. Then, valve 41 may be moved to another position so as to reverse the flow into and out of cylinder 32. Then, cylinder 32 moves upwardly and the bucket members will be moved back from position P1 to position P2.

Also, it should be apparent that link 18 operates in tension during movement of the bucket member from position P2 to position P1.

It should be readily apparent that fluid operated power unit 31 may be pivotally connected between head frame member 12 and bucket member 16, instead of between members 12 and 14 as shown; and then some of the desirable features of this bucket will still be obtained.

A bucket supporting means is secured to the bucket 10 for supporting this bucket 10 and to place it in position for working, that is for digging or discharging material. This means includes bracket 51 secured to the top of head frame member 12 in FIG. 3 or bracket 52 secured to bucket member 14, a cantilever type support member (such as boom 54 or endwise telescoping arm 55), and includes either holding line or cable 56 extending downwardly from said boom-like member in FIG. 2 or other connection in FIG. 1 at the end of arm 55. Two forms of the invention are shown in FIGS. 3 and 4 with the distinguishing structure on the bucket being the use of bracket 51 or 52 thereon. Bracket 51 is pivotally secured to arm 55, or other suitable cantilever type support member, as shown in FIG. 1, or is secured to cable 56, as schematically shown in FIG. 2. Then, cable 56 will have to be payed out, or arm 55 will have to be lowered, during the digging operation while the bucket members 14 and 16 move from open position P1 to closed position P2 to maintain lips 14*a* and 16*a* at the proper level to obtain proper digging action. If cable 56 is attached to bracket 52 in FIG. 4, as schematically shown in FIG. 2, instead of being attached to bracket 51 shown in FIG. 3, bucket member jaws 14*a* and 16*a* will automatically remain at the proper digging level for digging, during bucket member movement toward closing position P2, without lowering said cable 56.

The disclosed apparatus, including bucket 10, has many desirable structural and operational characteristics set forth in detail in the following paragraphs.

First, power operated unit 31 in FIGS. 3 and 4, with its fluid operated cylinder 32 and piston rod 36, provides positive and rapid power opening of bucket members 14 and 16 to fully open position P1, positive and rapid power closing to fully closed position P2, and locking in any intermediate position, such as position P3. These bucket members will open quickly, and will close with great force, so as to provide maximum digging capacity for digging a maximum volume of material in minimum time.

Second, only one piston and cylinder unit 31 is required to move both bucket members 14 and 16 simultaneously both through the opening stroke from positions P2 to P1 and through the closing stroke from positions P1 to P2.

Third, bucket 10 has a simplicity of construction for minimum cost of manufacture and maintenance while providing many desirable operational features, including more efficient and more rapid digging and dumping. Only link 18 is required to coordinate, and move simultaneously between the illustrated positions, the inner ends of the bucket members 14 and 16, rather than a complex mechanism including vertical guides, toggle links, a plurality of links, or gears, all of which mechanisms have high maintenance costs and are difficult to adjust and maintain. No locks are required to hold the bucket members in open position P1 after gravity has partially opened them.

Fourth, the bucket members are easily and quickly moved to open position P1 by power and are held in position P1. Since closing cables are not required, minimum frictional resistance is encountered during the bucket opening operation by the downward force exerted by fluid power unit 31. Since the bucket members are opened by power instead of by gravity, no lock mechanism is required to hold them in the fully open position P1.

Fifth, a one-piece, rigid head frame member 12 is provided for simplicity of construction. Also, since the rigidity thereof maintains the pivots 20 and 22 thereon a fixed distance apart, good digging characteristics are obtained. Now, these pivots provide an unyielding reaction by which bucket member closing unit 31, exerting an upward force in a substantially vertical direction, exerts maximum force between jaws 14*a* and 16*a* as the bucket members approach closed position P2, as will be brought out more in detail hereinafter.

Sixth, bucket 10 has better digging characteristics than a bucket with a closing line or cable because piston and cylinder unit 31 provides a self-contained bucket wherein the forces exerted by this unit (its upwardly directed closing force on shaft 33 and its reaction force on shaft 38) are exerted only on the members of bucket 10 with these including respectively members 14 and 12. This upwardly directed closing force on shaft 33 is applied independently of the supporting force applied to bucket 10 by cable 56 or by member 54 or 55 of the bucket supporting means.

In a bucket having a closing cable, this closing cable is pulled upwardly to close the bucket so that this upward pull will exert a lifting tendency on the bucket to reduce the net bucket weight, as shown for example by the net bucket weight curve A for hard digging material and curve B for easy digging material in FIG. 9. This may cause the bucket to prematurely lift from the ground, such as at point C, when it has grabbed a load of weight E so that either an under sized load is grabbed or the load in the unclosed jaws is dropped. In the present construction, no such closing cable is provided so that the bucket maintains a constant net weight along solid line D to exert the essential downward pressure against the material by jaws 14*a*, 16*a* and by teeth 14*b*, 16*b*, so that a full size load will be grabbed by bucket 10. Since both the closing force and reaction force of unit 31 are contained within bucket 10, no such lifting tendency (corresponding to upward pull of a closing cable) on bucket 10 will be experienced.

Seventh, bucket 10 is constructed so that a given upwardly directed, jaw closing force exerted by cylinder and piston unit 31 causes bucket members 14 and 16 to exert a digging force between their jaws 14*a* and 16*a* near closed position P2 greater than near open position

P1. This provides substantially better digging characteristics, by operation along curve G in FIG. 8, than some prior art buckets operating along curve H in FIG. 8. The jaws in applicant's construction have a faster movement during the left portion of curve G during the beginning of the closing action (because they exert less force) so that fast closing of the bucket is permitted, require less closing power (as shown by the smaller area under curve G than under curve H), and exert a greater closing force as they approach position P2 at the right end of curve G so as to bite off tougher material.

Applicant's force relationships on the members of the bucket during the jaw closing position are shown by force diagrams in FIGS. 6 and 7 with the diagram in FIG. 6 being in the open position P1 and the diagram in FIG. 7 in the closed position P2. This force analysis is made in the usual manner for determining forces on bucket components wherein the weight of the bucket is excluded; the forces are considered as extending through lips or jaws 14*a* and 16*a* because the bucket members may be used without teeth 14*b* and 16*b*; and a horizontal outward force is assumed to be exerted on each of these jaws during the closing operation. Now, consider FIGS. 4 and 7. Line J extends through pivot shafts 33 and 38, line N extends horizontally through jaws 14*a* and 16*a*, line M extends through link pivots 24 and 26, line L extends through pivot 22 and the intersection of lines M and N, and line K extends through pivot 20 and the intersection of lines J and L. Since the fluid in cylinder 32 will exert a substantially constant force throughout the closing stroke, this force is laid out as forces FJ in FIG. 7 along line J. Since the three forces acting on head frame member 12 must intersect, the length of force FJ exerted on pin 38 by unit 31 determines force FL acting on pivot 22 and force FK acting on pivot 20. Line K' is drawn parallel to line K to determine forces FL and FK. Then, lines M' and N' are drawn parallel respectively to lines M and N to complete the force diagram in FIG. 7. Now, the forces are formed by these lines; and these forces FJ, FK, FL, FM, and FNC are shown by heavy black lines in FIG. 7. Now, it should be evident that the forces acting on left-hand bucket member or tray 14 are forces FJ at pivot 33, FNC at lip 14*a*, force FK at pivot 20, and force FM at pivot 26. The forces on the right-hand bucket member 16 include force FL at pivot 22, force FNC at lip 16*a*, and force FM at pivot 24. The forces on lips 14*a* and 16*a* are equal and opposite ofrces FNC acting in opposite directions with one force acting on each of these lips. The force diagram in FIG. 6 is made in substantially the same way for open position P1. Forces FJ in both FIGS. 6 and 7 are of the same length because the fluid in cylinder 32 will exert a substantially constant force throughout the closing stroke. Hence, the forces on jaws 14*a* and 16*a* in their respective open and closed positions P1 and P2 are shown respectively by force FNO and FNC in FIGS. 6, 7 and 8, and each of these jaw forces generally move along curve G in FIG. 8 during the closing operation.

Now, it should be apparent that applicant has a greater closing force FNC near closed position P2 than force FNO near open position P1. This may be expressed in another way by considering the resisting moment or torque exerted on these lips 14*a* and 16*a*. The resisting forces FNO or FNC on these lips act along horizontal lines N in FIGS. 4, 6 and 7 so that the resisting torque or moment is a product of this force and the perpendicular distance therefrom to pivot or fulcrum 20 or 22. It should be noted that when lip 14*a* is directly below pivot or fulcrum 20 during jaw closing, this perpendicular distance will decrease as the jaws move toward closed position P2 because the resistance plane N approaches these fulcrums 20 and 22. Therefore, for a given closing torque, the force will increase, as shown by force FNC.

Applicant's bucket 10, operating along curve G in FIG. 8, has more desirable operating characteristics than prior art buckets operating along curve H. These prior art buckets include a pair of bowls pivotally connected together at their adjacent inner ends, pivotally mounted links at their outer ends, a head block pivotally supported by these links, and a bowl closing power unit pulling the head block toward the inner ends of the bowls to close the bucket. This prior art bucket has a high force in the jaw open position and a low closing force in the jaw closed position, as shown by curve H.

If this last mentioned bucket has a cable type closing line, the lower end of curve A in FIG. 9 will be displaced further toward the left because a greater pulling force must be exerted upwardly on the closing line to exert the proper closing force, and thus the net weight of the bucket is reduced. Since the bowls are pivotally connected together at their adjacent inner ends near the vertical center line of the bucket, these connections act as a fulcrum. Hence, a torque or resisting moment analysis of this bucket may be made corresponding with this same type analysis earlier made for bucket 10. In this prior art bucket, the jaws of the bowls, when moving toward each other toward closed position, are so arranged that the force exerted on the jaws by the material in the resistance plane of the material, corresponding to line N in FIGS. 6 and 7, constantly moves downwardly away from these fulcrums so that the resisting moment will increase progressively so as to make necessary an increasing upward pull on the closing cable in order to maintain this closing movement. Hence, this construction compounds the disadvantages of curves H and A in FIGS. 8 and 9 to provide very poor digging characteristics.

Applicant's bucket 10 has no such defects because it operates along curves G and D in FIGS. 8 and 9 respectively. This bucket has a good operating factor, which is the dominant factor governing digging performance and is the ratio between the horizontal force FNO or FNC on cutting edges 14*a* and 16*a* and the internal closing power of the bucket exerted as force FJ. At the beginning of the closing stroke from position P1 to position P2, the jaws in position P1 are disposed at a relatively great vertical angle with respect to line N in FIG. 6 and hence merely scrapes through the material without being able to penetrate or engage this material to any important degree. Therefore, only relatively slight resistance is encountered and a low closing force (shown herein as force FNO) by these jaws is not only sufficient but desirable in order that the jaws will close as quickly as possible. Conversely, as jaws 14*a* and 16*a* advance through the material during the last half of the closing stroke to approach position P2, these jaws are positioned at a relatively small vertical angle with respect to plane N in FIG. 7 so that firm engagement with the bed of unloosened material is obtained. Relatively great closing resistance is encountered because of this firm engagement and the necessity for compressing the material already loosened and scraped within bowls 14 and 16. Now larger force FNC in FIG. 7 is required, and is provided by applicant's bucket 10, in order to maintain closing movement of these jaws.

Now it should be apparent that a bucket having a greater closing force during the first portion of the stroke, as shown by curve H in FIG. 8, will not scrape together substantially more material than one having a relatively low closing force than applicant's bucket operating on curve G, but that the former will require more time for the same movement. Also, a bucket, having a high closing force during the last portion of the stroke (see curve G) as applicant's bucket 10, will have deeper penetration and secure more material between the bowls 14 and 16 than one having a smaller closing force (see curve H).

Therefore, applicant's bucket 10, operating on curves D and G, has substantially better operating characteristics than buckets operating on curves A, B or H.

Various changes in details and arrangement of parts

can be made by one skilled in the art without departing from either the spirit of this invention or the scope of the appended claims.

What is claimed is:

1. A bucket, comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, and bucket supporting means secured to one of said members so that the jaws thereof will remain at the proper digging level during bucket member movement toward closing position without lowering said bucket supporting means.

2. A bucket comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, said connecting means including spaced first pivots connecting each of said bucket members to said head frame member, and including a link connected by spaced second pivots to said bucket members, said power operated means including means for applying an opening force and a closing force to move said bucket members to both open position and closed position respectively, said head frame member rigidly maintaining said first pivots in a constant spaced relationship, said first pivots being located outwardly from and straddling said second pivots, said power actuated means including means operatively connecting it to said head frame member and at least one of said bucket members for applying said force along a line between said first pivots, the distance between said first and second pivots on one of said bucket members being non-symmetrical with the corresponding distance on the other of said bucket members.

3. A bucket comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open and closed positions, power operated means for applying a force for moving said bucket members from one to the other of said positions, said connecting means including spaced first pivots connecting each of said members to said head frame member, and including a link connected by spaced second pivots to said bucket members, said power operated means including means for applying an opening force and a closing force to move said bucket members to both open position and closed position respectively, said head frame member rigidly maintaining said first pivots in a constant spaced relationship, said first pivots being located outwardly from and straddling said second pivots, said power actuated means including means operatively connecting it to said head frame member and to at least one of said bucket members for applying said force along a line between said first pivots, bucket-supporting means secured to one of said members for supporting said bucket so that the jaws of said bucket members will remain at the proper digging level during bucket member movement toward closing position without lowering said bucket supporting means.

4. A bucket comprising a head frame, two bucket members each pivotally mounted on said frame, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, power operated means supported on said frame and having a movable part in operative contact with one only of said bucket members for applying a force for moving said bucket members from one of said positions to the other of said positions.

5. A bucket as defined in claim 4 wherein said connecting means which operatively connects said members consists of a link pivoted at one end to one of said members and at the other end to the other of said members.

6. A bucket as defined in claim 4 wherein supporting means is provided for carrying said head frame, said supporting means being operatively independent of said power operated means.

7. A bucket as defined in claim 4 wherein said power operated means consists of double acting piston-cylinder members, one of the piston-cylinder members being connected to said frame and the other to the bucket member.

8. A bucket comprising a head frame, two bucket members, each pivotally mounted on said frame at respectively spaced points, link means operatively connecting said members together independent of said frame for relative movement of jaws on said bucket members between open position and closed position, power-operated means supported on said frame and having a movable part in operative contact with one only of said bucket members for applying a force for moving said bucket members from one of said positions to the other of said positions said movable part of said power operated means being extendable and retractable within a zone between said spaced pivots.

9. A bucket, comprising a rigid head frame member, two bucket members independently pivotally connected to said head frame member by rigidly spaced apart pivots for relative movement of jaws on said bucket members between open position and closed position, and power means for closing said bucket and for opening said bucket by applying a force for moving said bucket members between said positions, the connections between said members and power means including means operatively connecting said members and power means so that a given closing force by said power means causes said bucket members to exert a digging force between their jaws near closed position greater than near said open position.

10. A bucket, as set forth in claim 9, with said power means being constructed to open said bucket in any bucket oriented position.

11. A bucket, as set forth in claim 9, with said power means comprising a double acting, fluid pressure actuated cylinder and piston unit.

12. A bucket, comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, and power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, said connecting means including spaced first pivots connecting each of said bucket members to said head frame member, and including a link connected by spaced second pivots to said bucket members, said power operated means including means for applying an opening force and a closing force to move said bucket members to both open position and closed position respectively, said head frame member rigidly maintaining said first pivots in a constant spaced relationship, said first pivots being located outwardly from and straddling said second pivots, said power actuated means including means operatively connecting it to said head frame member and at least one of said bucket members for applying said force along a line between said first pivots, a bucket supporting means secured to one of said members for supporting said bucket, the distance between said first and second pivots on one of said bucket members being non-symmetrical with the corresponding distance on the other of said bucket members; said power means including a double acting fluid cylinder and piston unit for exerting said closing force; and means operatively connecting said members, connecting means, and power means so that a given force by said power means causes said bucket

members to exert a digging force between their jaws near closed position greater than near said open position, so that said closing force is applied independently of the supporting force applied to said bucket by said bucket supporting means and so that the closing and reaction forces exerted by said unit are exerted only on said members to provide a self-contained bucket.

13. A bucket, comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, and power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, said connecting means including spaced first pivots connecting each of said bucket members to said head frame member, and including a link connected by said second pivots one to each of said bucket members with said second pivots spaced apart in the plane of jaw opening and closing movement, said power operated means including means for applying an opening force and a closing force to move said bucket members to both open position and closed position respectively, said head frame member rigidly maintaining said first pivots in a constant spaced relationship, said first pivots being located outwardly from and straddling said second pivots, said power actuated means including means operatively connecting it to said head frame member and at least one of said bucket members for applying said force along a line between said first pivots.

14. An apparatus, comprising a bucket, as set forth in claim 13, with a bucket supporting means secured to one of said members for supporting said bucket.

15. An apparatus, as set forth in claim 14, with said bucket supporting means including a holding cable.

16. An apparatus, as set forth in claim 14, with said bucket supporting means including a cantilever type support member.

17. An apparatus, as set forth in claim 14, with said bucket supporting means being secured to the top of said head frame member.

18. A bucket, comprising a head frame member, two bucket members, a link connecting said members together for relative movement of jaws of said bucket members between open position and closed position, each bucket member having a first pivot on said head frame and a second pivot on said link, the distance between said first and second pivots on one of said bucket members being non-symmetrical with the corresponding distance on the other of said bucket members, and power operated means for applying a force for moving said bucket members from said closed position to said open position in any orientation of said bucket.

19. A bucket, comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, and power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, said connecting means including a link pivotally connected to each of said bucket members, said power means being connected to said head frame member and to one bucket member spaced from said link and the pivotal connections on said link.

20. A bucket, comprising a head frame member, two bucket members, connecting means operatively connecting said members together for relative movement of jaws on said bucket members between open position and closed position, power operated means for applying a force for moving said bucket members from one of said positions to another of said positions, said power operated means including means for applying an opening force and a closing force to move said bucket members to both open position and closed position respectively; and means operatively connecting said members, connecting means, and power means so that a given closing force by said power means causes said bucket members to exert a digging force between their jaws near closed position greater than near said open position.

21. A bucket, comprising a rigid head frame member, two bucket members independently pivotally connected to said head frame member by rigidly spaced apart pivots for relative movement of jaws on said bucket members between open position and closed position, and power means for closing said bucket and for opening said bucket by applying a force for moving said bucket members between said positions so that a given closing force by said power means causes said bucket members to exert a digging force between their jaws near closed position greater than near said open position, a rigid link means movable relative to said head frame member and having two rigidly spaced apart pivots with each pivot connected to a different bucket member.

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CERTIFICATE OF CORRECTION

Patent No. 3,103,753 September 17, 1963

Robert J. Takacs

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 48, for "ofrces" read -- forces --; column 8, line 23, after "positions" insert a comma; column 9, line 5, after "means" insert a comma; line 17, strike out "said".

Signed and sealed this 7th day of April 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents