

(No Model.)

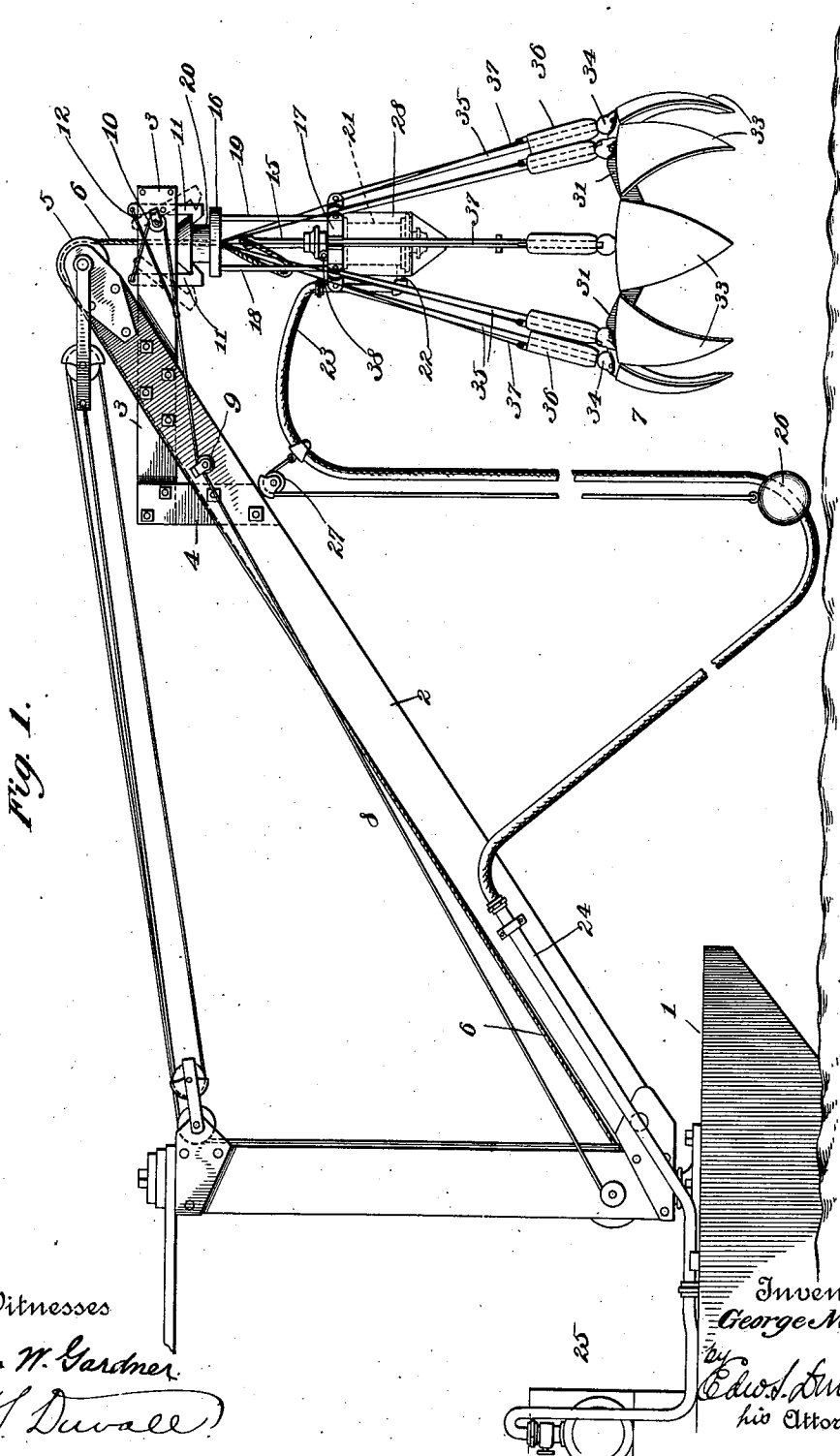
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G. M. URIE.

BUCKET OR GRAPPLE FOR EXCAVATING OR OTHER PURPOSES.

No. 564,038.

Patented July 14, 1896.



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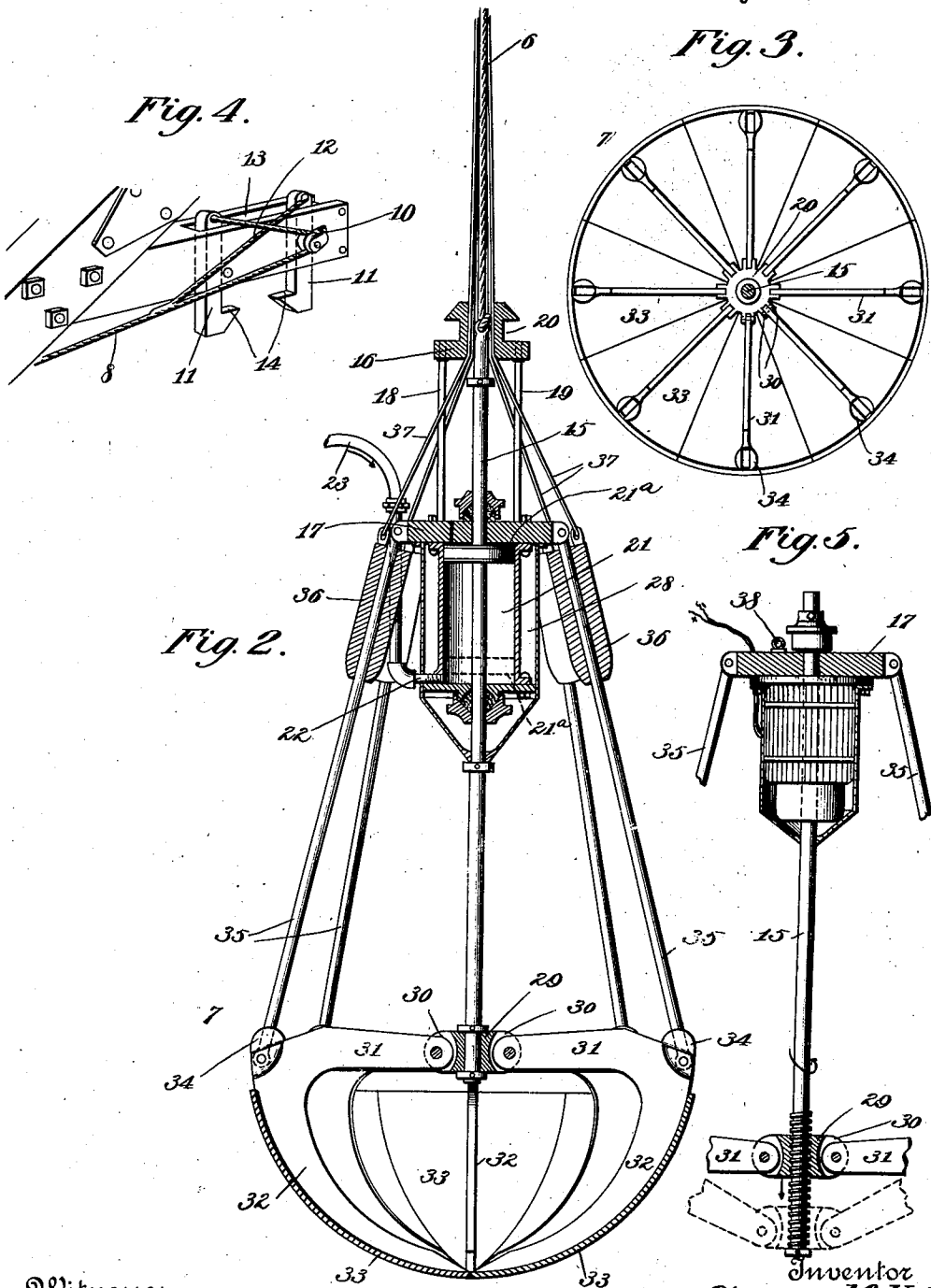
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Witnesses  
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# UNITED STATES PATENT OFFICE.

GEORGE M. URIE, OF IRONDALE, ALABAMA.

## BUCKET OR GRAPPLE FOR EXCAVATING OR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 564,038, dated July 14, 1896.

Application filed January 25, 1896. Serial No. 576,866. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. URIE, a citizen of the United States, residing at Irondale, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Buckets or Grapples for Excavating or other Purposes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in buckets or grapples for dredging or other purposes, and the objects are to provide a bucket or grapple which will be simple and durable in construction, with its component parts of the lightest material conformable with strength and utility, and which will successfully do away with the objection now common to grapples of this class, namely, that while they may be employed with more or less successful and satisfactory results in river operations, they accomplish in harbor and deep-sea dredging only a minimum result, if any at all, with a maximum consumption of time.

As buckets or grapples of this class require a speedy and positive entrance into the material and a penetration sufficient to insure a proper performance of the work, a most important feature is the incorporation into the construction of this bucket or grapple of means whereby, after the points of the same are in engagement with the material to be operated upon, the bucket may be farther and repeatedly forced or driven into it. These results are accomplished by the combination of certain new and novel features of construction fully illustrated in the accompanying drawings, clearly set forth in the following description, and more particularly pointed out in the hereto appended claims.

Referring to the drawings, Figure 1 is a side elevation of the bucket or grapple ready for use and shown attached to a dredging-scow. Fig. 2 is a longitudinal sectional view of the bucket or grapple detached, the same being closed. Fig. 3 is a top plan view of the bucket with the weights or drivers and rods detached. Fig. 4 is a detail perspective view of the locking device, and Fig. 5 a detail view of a modification.

Like numerals of reference indicate like parts throughout the several figures of the drawings.

1 represents a dredging scow or boat carrying the usual derrick and having the boom 2, at whose outer extremity is attached, by means of bolts or other fastening devices, a short beam or arm 3, braced and strengthened by an upright post or beam 4, connected to the inner end of the same and to the boom of the derrick directly beneath. In the outer end of the boom is journaled a pulley 5, over which operates a cable 6, whose function is to raise and lower the bucket or grapple 7. This cable is wound around a friction-drum of any ordinary or preferred construction or similar to those in common use in connection with buckets or grapples where the same are allowed to descend by reason of their weight.

Running from the operating scow or platform and over a pulley 9 is a releasing-cable 8, which passes around a second pulley 10, carried on the short supporting arm or beam 3, and from thence to one of a pair of gravity pawls or catches 11, the other of which is connected to the releasing-cable by means of a short cable 12, spliced thereto between the said pulleys 9 and 10 and at a suitable point. By reason of this arrangement of the cable around the pulley 10 and the additional short cable 12, the gravity pawls or catches 11 are simultaneously and reversely actuated, assuming a position similar to that indicated in dotted lines in Fig. 1. These catches are pivoted, at a point above their centers, in a vertical opening 13 in the end of the supporting-arm and act conjointly to form a clutch. At its lower extremity each gravity-pawl is provided with an inwardly-projecting jaw 14.

Suspended from the hoisting-cable 6 is the vertical shaft 15 of the bucket or grapple, and this shaft is designed to reciprocate in two centrally-perforated collars 16 and 17. These collars are connected at diametrically opposite points by two vertical stay-rods 18 and 19. The upper collar 16 is provided with an annular recess or channel 20, into which the jaws of the aforesaid gravity-catches take when the bucket or grapple is hoisted into engagement therewith through the medium

of the hoisting-cable 6, where it is securely retained until released for descent by the cable 8.

The lower collar 17, which, as before stated, is centrally perforated to receive the shaft 15, is provided upon its periphery with a series of radially-disposed ears, the same being situated in pairs and acting as bearings in a manner hereinafter to be described. Properly secured to the under side of the said collar 17, and of suitable dimensions, is a steam or compressed-air cylinder 21, and the same is provided at or near the bottom thereof with an inlet-pipe 22, which is also used as the exit for the steam or compressed air when the same is exhausted from the cylinder, all of which will be more apparent from the description to follow. Coupled to the upper end of this pipe is a flexible conduit 23, of suitable length, which is coupled at the other extremity to a pipe-section 24, extending along the lower portion of the boom and connected by a flexible or other suitable conduit to a source of steam or compressed-air supply 25. This source of supply is provided with any convenient means for regulating the flow and also means for properly exhausting the supply from the cylinder 21 and diverting the same into a separate chamber for condensation or other use. This flexible conduit 23 is kept out of the path of the bucket or grapple and all strain or weight relieved therefrom by means of a counterbalancing-weight 26, attached thereto at a suitable point and suspended over a pulley 27, carried on the boom.

Mounted on the shaft 15, which is adapted to act as a piston-rod, and working in the cylinder is a piston 21<sup>a</sup>. Pack-boxes are provided for the shaft 15 at the lower extremity of the cylinder and the upper side of the collar 17, and completely inclosing the said cylinder 21 is a shell or housing 28, which is likewise firmly secured to the under side of the aforesaid collar 17. This housing is constructed of very light and durable material and proof against the entrance of water, and being conical shaped at the bottom offers little resistance to water when used in harbor-dredging. A suitable perforation is provided in the conical end of the housing for the passage therethrough of the shaft 15, whose movements are limited by suitable stops.

The shaft 15 is provided at its lower extremity with a collar or hub 29, securely fastened thereto and provided with ears 30, placed or situated in pairs. Pivoted between each pair of ears is an arm 31, projecting radially therefrom and provided with a downwardly and inwardly curving branch or continuation 32, having a sharp entering point at the termination thereof, the several curving portions meeting at a central point below the collar or hub 29 and directly in a vertical line with the shaft of the bucket or grapple. Securely attached to the downwardly-curving portions of the arms 31, which serve

the purposes of strengthening-ribs, are the shovels 33, eight in number and triangular in shape, the apex of the triangle being at the lower point of the continuation 32. These shovels are also shaped to conform to the curvature of the downwardly-projecting portions 32 of the arms 31, and when they are in a closed position and in contact with each other they combine to form a hemispherical bucket, each shovel being a section, as it were. At the outer ends of the arms 31 are secured impact-blocks 34, which are channeled through their upper portions to permit of the entrance therein and free movement of the guide-rods 35, said guide-rods being pivotally journaled in the ears of the collar 17, hereinbefore mentioned, and in the recesses formed in the ends of the arms 31. From this construction it will be readily observed that any movement of the shaft 15 in an upward direction will result in the closing of the sections of the buckets or grapple, and, vice versa, any downward movement will tend to open them. Mounted on these guide-rods and normally resting on the impact-blocks, though not necessarily so, are the weights or drivers 36, bored centrally to receive and travel upon said rods. These driving-weights are operated by means of short cables 37, connected to them near their upper extremities and running from thence through the bore of the collar 16, which is considerably enlarged to permit of the passage therethrough of the said cables 37 and the shaft 15, to a point on the cable 6 a short distance (predetermined) above its attachment to the shaft 15, where the said cables are united and secured.

After the bucket or grapple has been freed from the gravity pawls or catches 11 through the medium of the cable 8, and has descended to and partially embedded itself in the material, the cable 6 during such descent being allowed free and easy play, and the weights being in the position illustrated in Fig. 1, said cables 37 are actuated to draw up the driving-weights 36 by the said cable 6, which is wound in on the friction-drum until the said driving-weights are in a position near the collar 17. They are then allowed to drop while at this elevation, by giving play to the cable 6, and by the force of the descending shock or blow delivered upon the impact-blocks 34, to deeply embed the shovels in the material to be excavated and thus to successfully accomplish the best results possible in buckets or grapples of this description.

Fig. 5 illustrates the application of electricity to close and open the bucket-sections, the shaft being provided at its lower end with screw-threads and caused to revolve within the hub 29, which is internally threaded.

The operation of the device is as follows: The bucket or grapple is normally held in its upper position by the clutch formed by the gravity-catches, and while thus suspended, with the weights lowered and shaft 15 in the lowest position, (see Fig. 1,) it is released by

drawing upon the cable 8 and withdrawing the catches 11 from the annular groove 22 of the collar 16. Then by its own weight and with the shovels in a distended position and their points directed vertically downward, it descends rapidly into the material to be excavated. Before the catches are released the usual dog of the friction-drum is raised and play allowed the cable 6, so that in descending the only tension upon said cable will be that due to its own weight, which is so small in comparison to that of the grapple as to have no perceptible effect upon the weights. Through the medium of the hoisting-cable 6, the weights 36 are drawn up to their greatest altitude and permitted to drop, and the effect of the shock or blow imparted to the several shovels is to effectually drive them deeply into the material and to insure a load commensurate with the capacity of the bucket or grip. By reason of the fact that the cables 37 are attached to the cable 6 at a point whose distance from the point of connection of the latter to the shaft 15 is equal to the length of the rods 35 minus the distance traveled by said shaft when opening and closing, it will be apparent that the altitude of the weights, which at first will be their minimum altitude, will be governed by and vary as the slack in the cable 6. As the shovels are driven farther and farther into the material the shaft 15 will mount higher and higher and this slack in the said cable 6 become greater and greater until finally the full length of the rods 35 will be traversed. The operation of drawing these weights up and releasing them to deliver a blow is repeated as often as circumstances may require. Now by winding in the cable 6, or where steam or compressed air is used by the passage of the same in the cylinder and the pressure of the same upon the bottom of the piston, the shaft 15 is caused to move upward and the rods 35, serving to maintain pivotal points at the extremities of the radiating arms 31, cause the shovels to close inwardly and firmly retain the load. As soon as the shaft reaches its uppermost position in relation to the collars 16 and 17 the entire device begins to ascend until finally the gravity-catches drop into engagement with the annular groove 20 of the collar 16 and securely retain it in a suspended position while the hoisting-cable 6 is slackened and the load deposited at the desired point, the weights descending on the opening of the shovels. In this position it is ready for another descent.

Where steam or compressed air is to be used in closing the shovels, the cable 6 is detached from the shaft 15 and attached to the ring-bolt 38, secured to the collar 17, and is used only in lowering the grapple into the material and in operating the weights. The position of the piston when the grapple is descending is that indicated in dotted lines in Fig. 2, and steam or compressed air is forced into the cylinder beneath the said piston, causing the

same to move upward, by reason of the pressure exerted, until the grapple is closed, when the steam or compressed air is shut off and the grapple raised by the cable 6 into the clutch and the steam or compressed air exhausted from beneath the piston, allowing the same to offer no resistance to the force of the load which acts to open the grapple. Outside of this opening and closing of the grapple by agents adapted to exert a pressure in the cylinder the operation and action is the same.

It will thus be seen that I have provided a bucket or grapple of great capacity, empowered to penetrate successfully heterogeneous masses offering a great resistance, one which can be easily and quickly operated, and of strong and durable construction, and while I have seen fit to illustrate and describe my improved bucket as provided with eight shovels and as applied to a dredging-scow, it can be made of more or less sections at will, and is designed to be equally applicable to excavating-machines operated on land or water.

I do not desire to confine myself to the precise details of construction herein shown and described, nor to the agent to be used in exerting a force upon the piston, but reserve to myself the right and privilege to alter the same without departing from the spirit of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grapple or bucket of the character specified, the combination with the connected collars and the vertically-reciprocating shaft passing therethrough, of the curved shovels pivotally connected with said shaft, means for raising and lowering said shaft and shovels, and means, simultaneously actuated but independent of each other, for delivering blows directly to the tops of the shovels whereby the same are driven into the material to be excavated, substantially as specified.

2. In a grapple or bucket of the character described, the combination with the upper and lower connected collars, the vertically-reciprocating shaft passing therethrough, and the curved shovels pivotally connected with said shaft, of the rods pivoted to said lower collar and to said shovels, and means for each of said rods for delivering blows to the tops of the shovels whereby the same may be driven into the material to be excavated, substantially as specified.

3. In a grapple or bucket of the character described, the combination with the upper and lower connected collars, the vertically-reciprocating shaft passing therethrough, and the curved shovels pivotally connected with said shaft, of the rods pivoted to said shovels and to the lower collar and means for delivering blows to the tops of said shovels whereby the same may be positively driven into the ground, substantially as specified.

4. In a grapple or bucket of the character described, the combination with the connected upper and lower collars, the vertically-reciprocating shaft passing therethrough, the arms pivotally connected with said shaft and provided with curved shovels, of the rods pivoted to the lower collar and to the said arms and the slidable weights, carried by said rods, substantially as specified.

5. In a grapple or bucket of the character described, the combination with the vertical shaft, the hub secured to said shaft, having ears, the arms pivoted to said ears and provided with shovels, of the rods connected with said arms, and with a collar suspended from a suitable support, the slidable weights mounted on said rods, the ropes secured thereto and the releasing-cable, to which said ropes are secured, substantially as described.

6. In a bucket or grapple, the combination with the vertical shaft, the hub secured thereto, the arms pivoted to said hub, the shovels connected therewith, the rods pivoted to said arms and to a collar at the upper end thereof and means for actuating said rods, and the collar having a recess or channel at its upper end connected to said first-mentioned collar by vertical rods, of the pivoted gravity-dogs adapted to enter into engagement with the channel of said collar and means for releasing said collar therefrom, substantially as specified.

7. In a bucket or grapple, the combination with the beam, the cable or chain passing over a pulley connected therewith, the connected collars, the rods pivoted to the lower collar, the slidable driving-weights mounted on said rods, and means for actuating the same, of the shaft passing through said collars, the hub on said shaft having ears, the arms pivoted to said ears, and pivotally connected with said rods, and the shovels secured to said arms, substantially as described.

8. The combination with the beam, the pulley connected therewith, the pivoted gravity-dogs, the upper collar having a recess or channel, the lower collar connected therewith, the rods pivoted to said lower collar, the slidable weights mounted thereon and the cables secured thereto and connected with a releasing-cable, of the vertical shaft, the hub secured to said shaft, the arms pivoted to said hub, the shovels, the pivoted gravity dogs or pawls, the short crossed cables connected therewith and the cable connected with said short crossed cables, substantially as described.

9. In a bucket or grapple, the combination with the beam, the cable or chain passing over a pulley connected therewith, the connected collars, the rods pivoted to the lower collar, the slidable driving-weights mounted on said rods, and means for actuating the same, the shaft passing through said collars, the hub on said shaft having ears, the arms pivoted to said ears, and pivotally connected with said rods, and the shovels secured to said arms, of the cylinder secured to one of

said collars and adapted to centrally receive said shaft, the piston secured to said shaft and reciprocating in said cylinder and means for actuating the same, substantially as specified.

10. In a bucket or grapple, the combination with the beam, the cable or chain passing over a pulley connected therewith, the connected collars, the rods pivoted to the lower collar, the slidable driving-weights on said rods, and means for actuating the same, the shaft passing through said collars, the hub on said shaft having ears, the arms pivoted to said ears, and pivotally connected with said rods, and the shovels secured to said arms, of the cylinder secured to the lower collar and adapted to receive said shaft centrally, the piston secured to said shaft and adapted to reciprocate in said cylinder, a water-tight housing for said cylinder, a port in said cylinder, a conduit connecting said port with a source of steam or compressed-air supply, whereby pressure may be applied to actuate said piston, and means for holding said conduit out of the path of the bucket or grapple, substantially as specified.

11. In a grapple or bucket of the character described, the combination with the collar, the vertically-reciprocating shaft, passing therethrough, the piston on said shaft and the cylinder through which said shaft passes and in which said piston is located, provided with an inlet and exit opening, of the arms pivoted to said shaft, the shovels pivoted thereto and the rods pivoted to said arms and to the said collar, substantially as specified.

12. In a grapple or bucket of the character specified, the combination with the collar, the vertically-reciprocating shaft passing therethrough, the piston secured to said shaft and the cylinder through which said shaft passes, and in which said piston is located provided with an inlet and outlet opening, of the arms pivoted to said shaft, the shovels secured thereto, the rods pivoted to said arms and collar and the slidable weights carried by said rods, substantially as specified.

13. In a grapple or bucket of the character described, the combination with the collar, the vertically-reciprocating shaft passing therethrough, the piston on said shaft, the cylinder connected with said collar, through which said shaft passes and in which said piston is located, provided with inlet and outlet openings, of the arms pivoted to said shaft, provided with shovels, the rods pivoted to said arms and collar, the sliding weights carried by said rods and the cables secured to said shaft and weights, substantially as specified.

14. In a grapple or bucket, the combination with the upper and lower connected collars, the vertically-reciprocating shaft passing therethrough, the piston on said shaft, the cylinder secured to the lower collar having an inlet and outlet opening, the arms pivoted to said shaft, the shovels secured thereto, the

rods pivoted to said arms and lower collar, the sliding weights carried by said rods, the cables connected therewith, the cable connected with said shaft, the pivoted gravity-dogs adapted to engage with a peripheral groove in said upper collar and the cable connected with said dogs, substantially as and for the purpose specified.

15 In a bucket or grapple of the class described, the combination with the beam, the cable or chain passing over a pulley attached thereto, the clutch, the connected collars, the rods pivoted to the lower collar, the slidable driving-weights mounted on said rods, and  
20 means for actuating the same, the shaft pass-

ing through said collars, the hub on said shaft having ears, the arms pivoted to said ears, and pivotally connected with said rods, and the shovels secured to said arms, of means for actuating the shaft of the bucket or grapple whereby the shovel-sections of said bucket or grapple may be closed and opened at will, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

GEO. M. URIE.

Witnesses:

R. S. HAWKINS,  
W. D. HOLMES.