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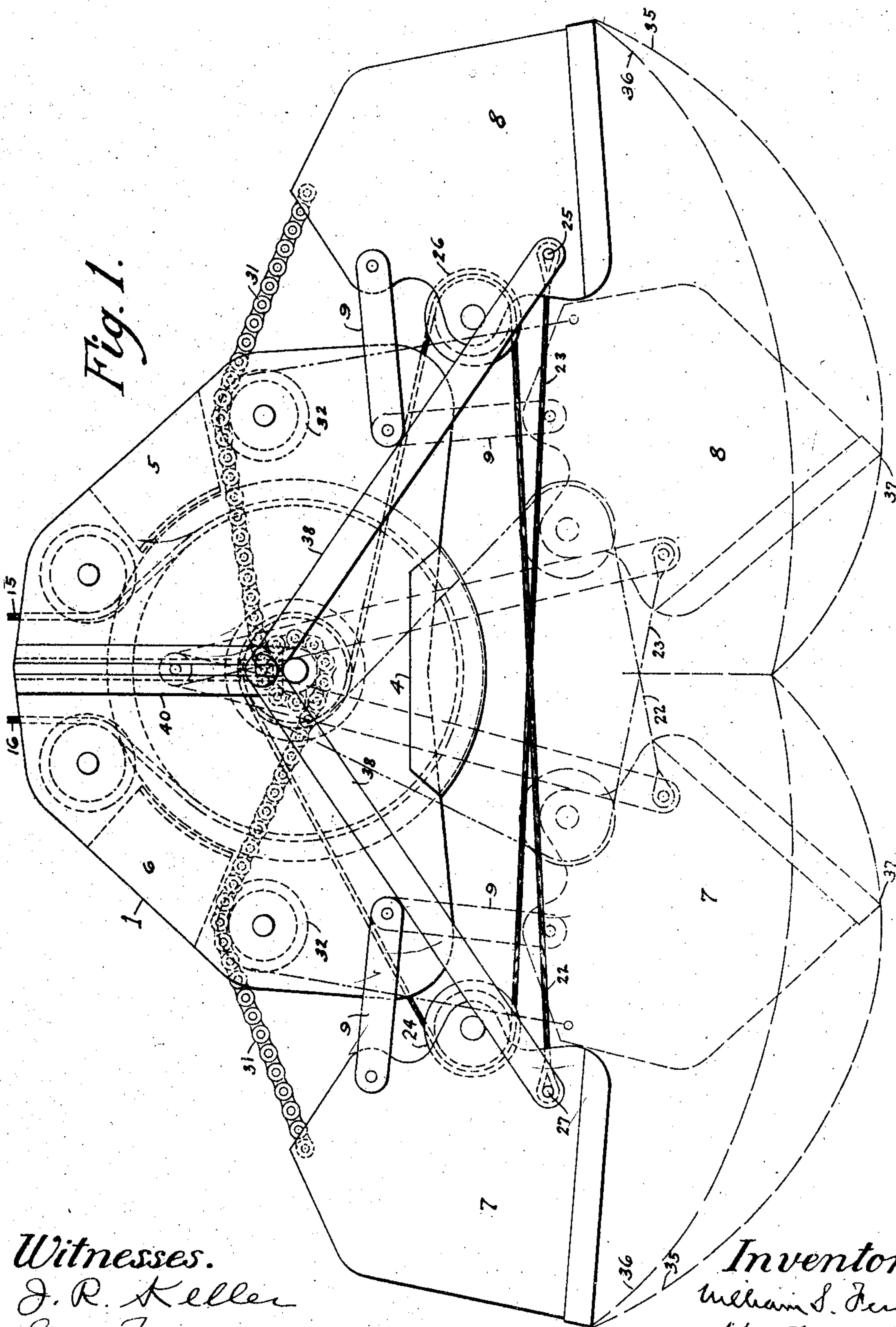
PATENTED AUG. 23, 1904.

W. S. FERGUSON.  
DIGGING OR DREDGING BUCKET.

APPLICATION FILED JULY 28, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses.  
J. R. Keller  
G. C. Raymond

Inventor.  
William S. Ferguson  
per Kay Fottum & Winter  
Attorneys.

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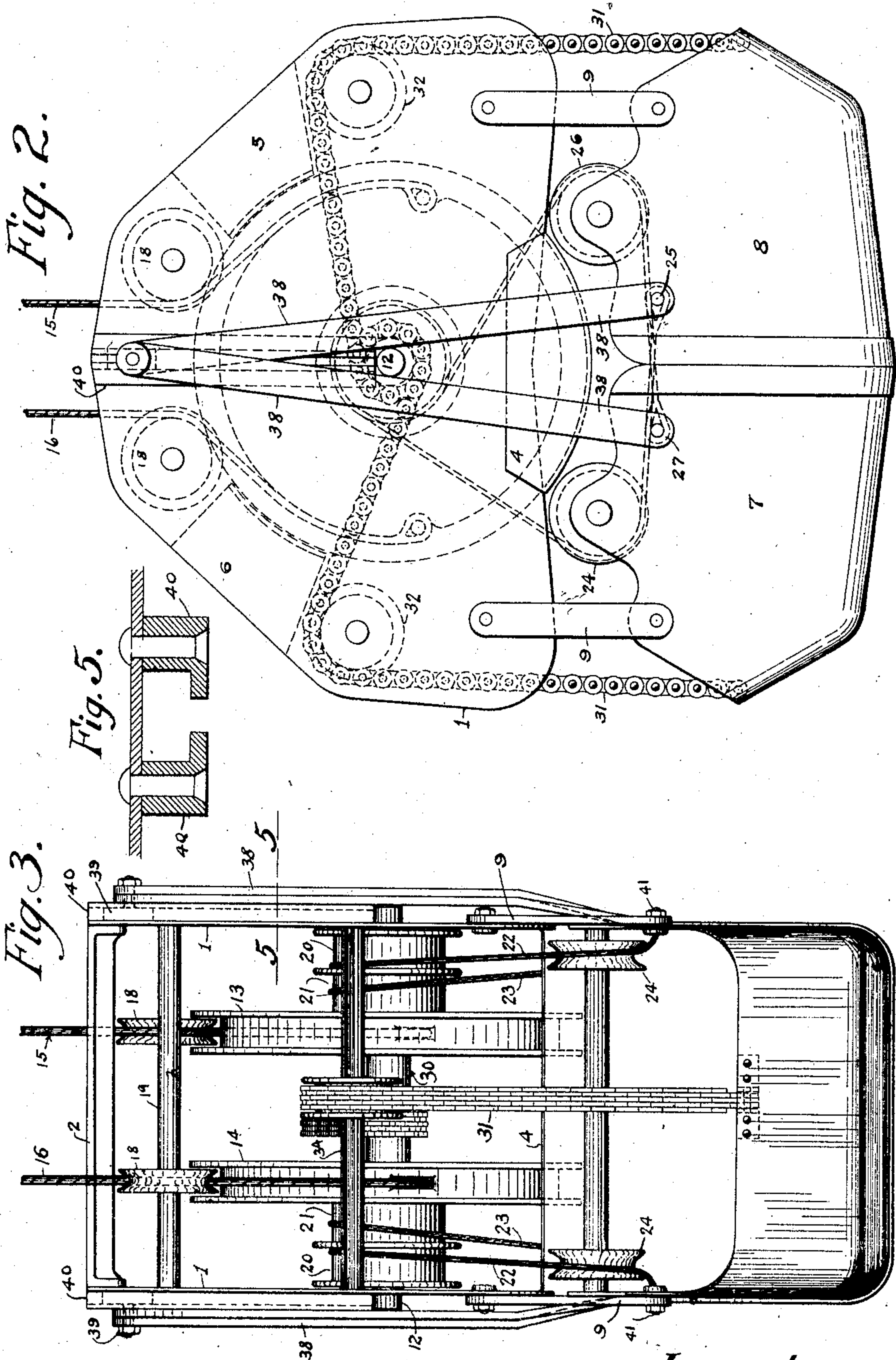
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3 SHEETS—SHEET 2.



Witnesses.

J. R. Keller  
G. C. Raymond

Inventor.

William S. Ferguson  
per Ray J. J. J. J. J.  
Attorneys.



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3 SHEETS—SHEET 3.

Fig. 6.

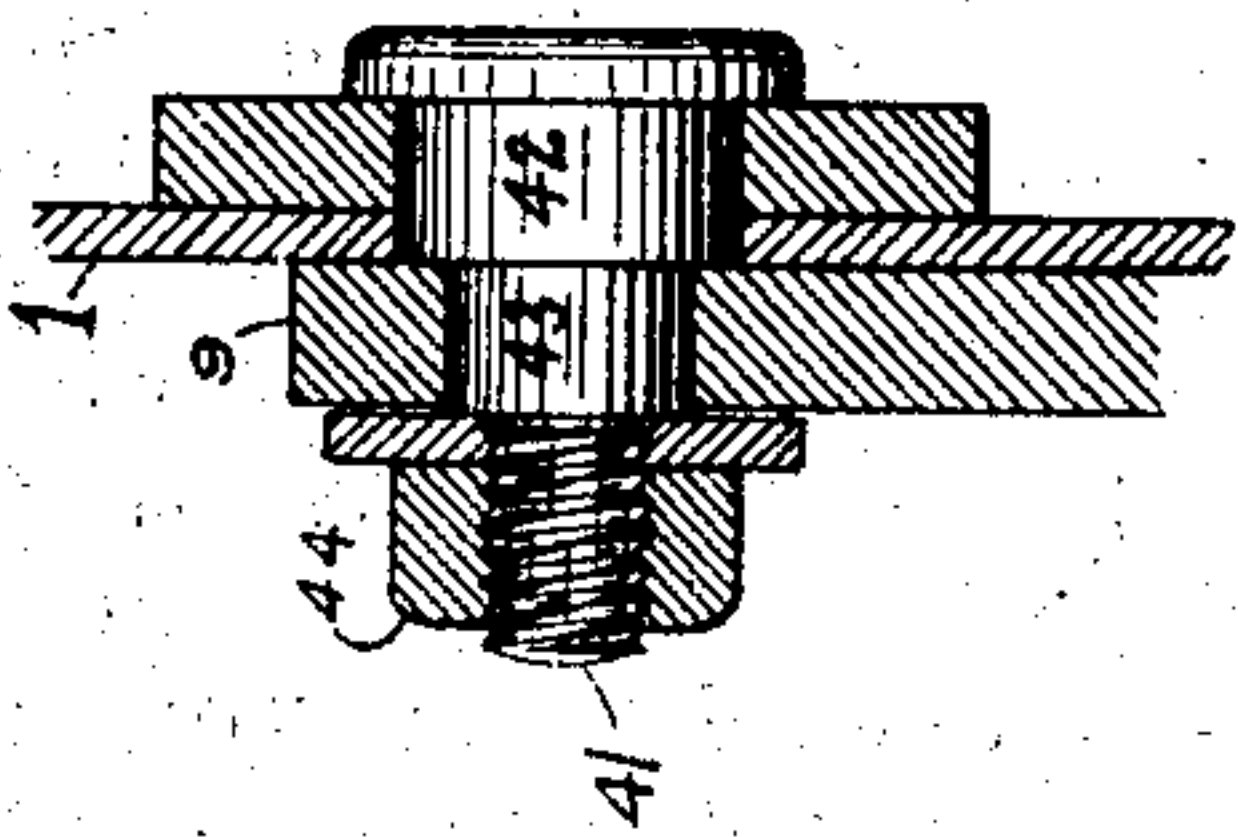
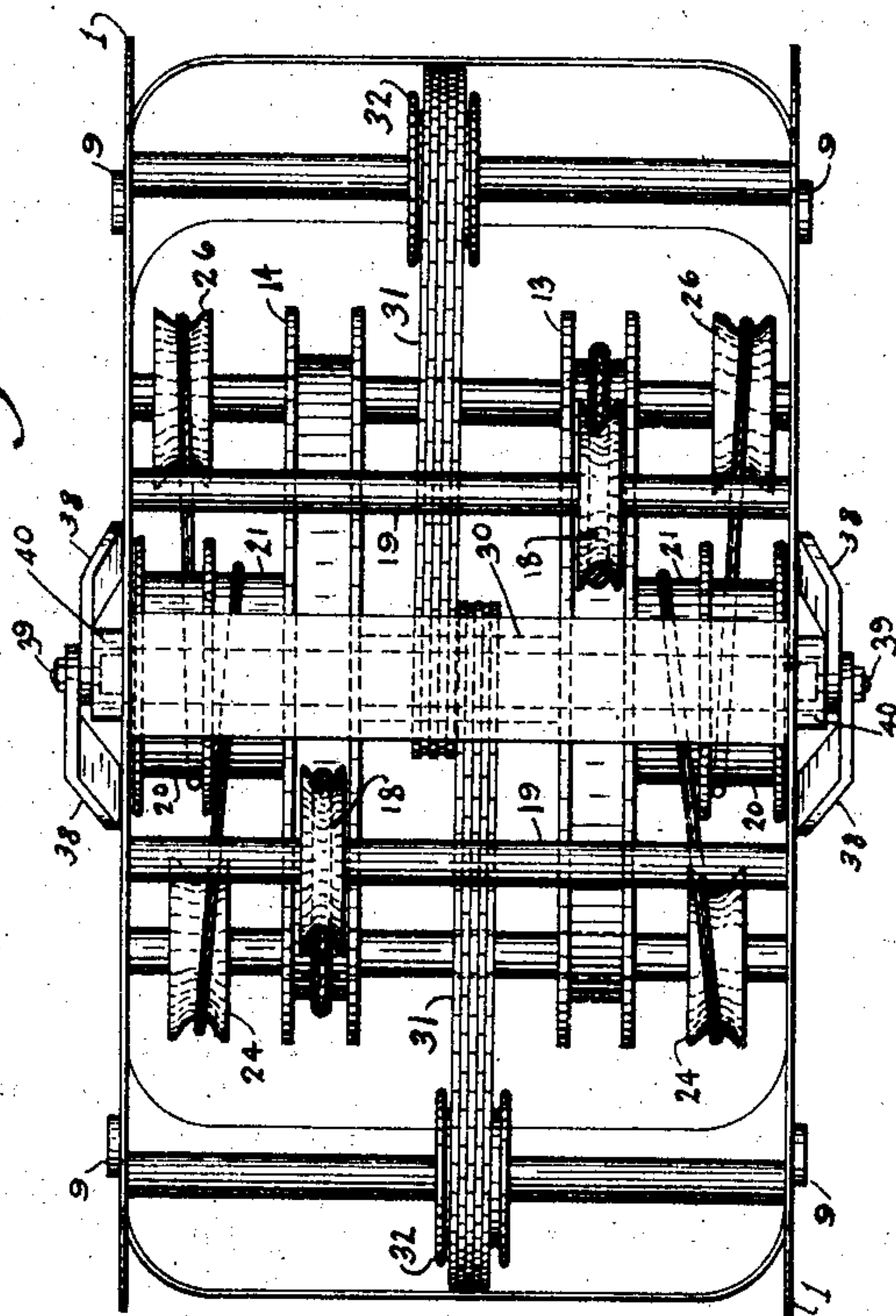


Fig. 4.



Witnesses

J. R. Keller  
G. C. Raymond

Inventor.

William S. Ferguson  
per Kay John Hunter  
Attorneys.



## UNITED STATES PATENT OFFICE.

WILLIAM S. FERGUSON, OF WILKINSBURG, PENNSYLVANIA.

## DIGGING OR DREDGING BUCKET.

SPECIFICATION forming part of Letters Patent No. 768,118, dated August 23, 1904.

Application filed July 28, 1903. Serial No. 167,298. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. FERGUSON, a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dig-  
 5 digging or Dredging Buckets; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to buckets for use in  
 10 digging ore, coal, and other substances, dredging, and like purposes.

The object of my invention is to provide a bucket for these purposes which will open quickly, so as to discharge the load in a narrow space or area, which is then capable of  
 15 being opened very wide, so as to scrape over a large area, and thus obviate the necessity of digging deeply in order to fill the bucket, which is so constructed that in closing the  
 20 scoops or blades will approach each other on a comparatively straight line, so as to diminish the amount of power necessary to close the same, which is provided with guiding means whereby the edges of the scoops when closed  
 25 will be brought into exact contact with each other, and also to provide a bucket of this character wherein the power is multiplied, so as to get a very powerful action.

The invention also consists in certain details  
 30 of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side view showing the bucket open and showing in dotted lines the path of movement in  
 35 opening and closing. Fig. 2 is a side view showing the bucket closed. Fig. 3 is an end view of the bucket. Fig. 4 is a plan view thereof. Fig. 5 is a detail horizontal section on the line 5 5, Fig. 3, showing the guide for the toggle-links; and Fig. 6 is a detail view  
 40 showing the means for connecting the scoop-suspending links to the frame.

My bucket comprises a suitable suspending-frame in which the operating mechanism is  
 45 mounted and from which the scoops are suspended. This frame comprises two side plates 1 and suitable cross-connecting means, such as the top bar or casting 2, and other cross-connecting means, which also serve as rope-  
 50 guards, these being shown at 4, 5, and 6. The

cross-shafts also serve to some extent to unite the two frames. The scoops or blades are shown at 7 and 8, and these may be of the usual or any desired construction. Preferably, however, their bottom portions are compara-  
 55 tively straight for some distance from the scraping edge, as shown. These scoops are suspended from the side frames by means of links 9, which are attached near the outer ends of the scoops, as shown, and also to the outer  
 60 projecting portions of the side plates 1. The latter are made sufficiently wide, so that they project slightly beyond the outer ends of the scoops when closed, as shown in Fig. 2, thus  
 65 guarding and protecting said scoops when the bucket is being raised up through a shaft or hatch. The side plates 1 are rounded at their upper sides, so as to guide the bucket and prevent it from getting hung when coming  
 70 through a hatch or mine-shaft.

In the side plates 1 is mounted a power-wheel shaft 12, having secured thereto or mounted thereon two power-wheels 13 and 14, around each of which is wound a rope or cable. On the power-wheel 13 is wound the holding-cable  
 75 15, from which the bucket is suspended when it is desired to open the same. Around the power-wheel 14 is wound the hoisting-cable 16, which is tightened when it is desired to close the bucket and by means of which the  
 80 bucket is carried when loaded or closed. These two cables are each attached to a winding-drum on a crane, derrick, or the like in the well-understood manner. The cables are  
 85 guided at the top of the frame by means of suitable guide-sheaves 18, mounted on shafts 19, extending between the side frames or suspended from the top bar or casting 2. Also secured to the shaft 12, or at least to the  
 90 power-wheels 13 and 14, are a pair of drums 20 and 21, one such drum being on each side of the bucket. On these drums are wound the closing-cables 22 and 23, two pair of these cables being employed, as shown, one on each side of the bucket. The cables 22 pass from  
 95 their drums around sheaves 24 on the scoop 7 and have their ends connected to the scoop 8, as at 25. The cables 23 pass from their drums around sheaves 26, mounted on the scoop  
 100 8, and have their ends connected to the scoop



7 at 27. The cables 22 and 23 are wound around their drums in the same direction, while the cables 15 and 16 are wound around the power-wheels 13 and 14 in opposite directions. Consequently when the cable 16, which is the closing-cable, is pulled upon the power-wheels and drums are rotated in a direction to wind the cables 22 and 23 upon their drums, and this through the arrangement shown causes the scoops to be drawn toward each other and closed. The power-wheel 14 is of a much larger diameter than the drums 20 and 21, so that the power exerted on the closing-cable 16 is multiplied a number of times, equal to the ratio of the diameters of the closing-drums to the power-wheel 14. Furthermore, the cables 22 and 23, passing as they do around a sheave on one scoop and having their ends attached to the other scoop, are practically double, so that the power of the winding-drums is again practically doubled by this arrangement of the closing-cables. In this manner a double multiplication of the power is secured, the first multiplication being due to the difference in the diameters of the closing power-wheel 14 and the winding-drums 20 and 21 and the second multiplication being due to the doubling of the closing-cables 22 and 23. Also secured to the shaft 12 or to the power-wheels 13 and 14 is a smaller drum or spindle 30. Wound on this in a direction opposite to that in which the cables 22 and 23 are wound on their drums are a pair of opening cables or chains 31, which pass outwardly around guide-sheaves 32, mounted on shafts 34, extending between the side frames and having their outer ends secured to the scoops 7 and 8 at the rear outer ends of the latter. Preferably these members 31 will be flat link chains, as shown, forming, in effect, a flexible metallic belt. When the drums 20 and 21 are being rotated in such a direction as to wind the closing-cables 22 and 23 thereupon, the opening-chains 31 are being slackened or paid out, thus permitting the closing of the buckets; but when the closing-cable 16 is slackened a strain is put upon the holding-cable 15, the power-wheels 13 and 14 and drums connected thereto are rotated in the opposite direction, thus causing the unwinding of the closing-cables 22 and 23 and the winding up of the opening-chains 31, the latter serving to pull the scoops out to the dotted-line position 35 shown in Fig. 1.

By reason of the suspension of the scoops on links connected to them near their outer ends they can be drawn very wide open, as shown in Fig. 1, thus giving a very wide reach to the bucket, so that it will not have to dig deep in order to fill the same. Furthermore, by reason of the difference of diameter between the winding-drums 20 and 21 and the spindle 30 the closing-cables 22 and 23 will be wound up in the closing of the bucket much more rapidly than the opening-

chains 31 are unwound. Furthermore, when the scoops are opened the sheaves 24 and 26 are almost opposite each other, and consequently the closing-cables will pull practically straight across the device. As a result of these arrangements the first effect of the closing movement is to cause the front end of the scoops to swing inwardly very rapidly, the blade of the bucket making the sharp curve indicated at 36, so that thereafter in the further inward movement of the scoops they will move on a comparatively straight line, so that their digging or scraping action is very much easier than if they moved in the arc of a circle.

When the scoops are fully closed, the closing-cables 21 and 22 are practically doubled around the sheaves 24 and 26, respectively, and as a consequence in opening the bucket as soon as the hoisting-rope 16 is slackened the meeting edges of the scoops will swing down quickly to the dotted-line positions indicated at 37, this being due to the fact that a slight slackness in the ropes 22 and 23 by reason of their leads of doubled condition enables them to materially straighten out, while the opening-chains 31 during the first part of their action pull in a substantially straight line upwardly. This causes a quick tilting of the scoops without opening them very wide, thus permitting the material to be discharged from the same and in a comparatively small area.

In order to guide the scoops 7 and 8 and bring their meeting edges into contact with each other, I connect to each scoop on each side of the bucket a toggle-link 38, these links being preferably connected to the scoops at the points 25 and 27 before mentioned. The upper ends of these toggle-links are connected to sliding heads 39, which move in vertical ways or guides 40, formed on the side plates 1. The use of these toggle-links insures the two scoops moving toward each other in exact unison, so that they meet at the central line of the bucket and in the same horizontal plane when the bucket is closed, thus preventing the spilling of material out between the scoops. The heads 39 are preferably free to move up and down in the guides, so that the links in no manner interfere with the opening and closing movements of the bucket.

The links 9 are connected to the plates 1 by means of bolts 41, each having an enlarged head on one end and provided with an enlarged bearing portion 42 fitting in the opening in the plates 1 and having another bearing portion 43 for the links 9 and being provided outside of said links with a nut 44. This same construction preferably is employed in connecting the links to the scoops and may also be employed for connecting the toggle-links 38 to the scoops.

The operation of my bucket is substantially the same as that of buckets now in use. The hoisting and holding cables 16 and 15, as be-



fore stated, are connected to suitable drums on a crane or derrick. When the bucket is open, it is suspended from the holding-cable 15, and when fully opened the scoops are in the position shown in Fig. 1. In this position it can be carried to any destination—such, for instance, as a bed of ore or pile of coal or earth or any other material—and is then lowered down upon the same, or the bucket may be carried and lowered in closed condition by suspending it by the hoisting-cable 16 and can then be opened by slacking said cable and holding onto the cable 15. By reason of the connection of the scoops 7 and 8 to the frame by means of the links 9 said scoops can be drawn very wide open, thus giving an extensive reach to the bucket. The open bucket is lowered down upon the pile or bed of ore or other material and then the holding-cable 15 is slackened and the closing or hoisting cable 16 is tightened. This throws the entire weight of the bucket on this one cable, causing a rotation of the power-wheels and drums in such a direction as to wind the closing-cables 22 and 23 onto their respective drums and unwind the opening-chains 31 from their spindle. By reason of the greater diameter of the drums over the spindle the closing-cables will be drawn up much more quickly than the opening-chains will be paid out, and as a consequence the first effect is to cause the scoops to swing sharply inward and to then continue their closing movement in a comparatively straight line. During the first part of this movement the upper ends of the toggle-links 38 move up very quickly in the guides 40, and thereafter they move up more slowly.

The entire closing movement of the bucket is gotten by merely continuing to wind up the hoisting-cable 16, this serving, by means of the connections described, to draw the scoops together until their meeting edges come into contact. During this movement they are guided accurately by the toggle-links 38, and inasmuch as they move on a comparatively straight line a very powerful action is secured. Furthermore, the double multiplication of power above described adds materially to the digging action of the blades, so that an extremely powerful action is secured.

When the bucket is fully closed, the further winding up of the hoisting-cable 16 merely serves to elevate the bucket with its contents, and in this condition it can be carried to the point of discharge. When the latter is reached, the hoisting-cable 16 is released and the holding-cable 15 is held tight. This causes the power-wheels 13 and 14 and their connected drums to rotate in the opposite direction from that in which they rotated in closing the bucket. The effect of this is to quickly slacken the closing-cables 22 and 23 and to begin winding up the opening-chains 31. As soon as the cables 22 and 23 are slightly slackened by reason of their peculiar connection with the scoops

and the fact that the latter are suspended near their outer ends the meeting ends of these scoops drop down very sharply, thus discharging the load in a comparatively small area. The further rotation of the power-wheels in the direction specified causes the winding up of the opening-chains 31, thus drawing the scoops fully outward to the extreme position shown in Fig. 1.

The bucket described is comparatively simple, secures a very wide opening of the bucket and an extremely powerful closing thereof. The arrangement is such that the discharge of the load is accomplished very quickly and in a small space, and the closing movement thereof is on a comparatively straight line, thus greatly aiding the digging action thereof. The scoops, furthermore, are so guided that they move inwardly in unison and meet accurately, thus preventing the spilling of material between the same.

All the movable or working parts of the device are well housed in the frame, and the scoops when closed are also guarded or protected by the projecting frame, so that the bucket is admirably adapted for use in shafts or hatches.

What I claim is—

1. In a digging-bucket, the combination with a suspending-frame, of a pair of scoops hinged at their outer ends to said frame, a power-drum mounted in said frame, a pair of closing-cables wound on said drum and one connected directly to each of said scoops, and toggle-links connected to said scoops and having their knuckles guided in vertical ways on said frame.

2. In a digging-bucket, the combination with a suspending-frame, of a pair of scoops hinged at their outer ends to said frame, a power-drum mounted in said frame, a pair of closing-cables wound on said drum and one connected directly to each of said scoops, a vertical guideway on said frame, a sliding head in said guideway, and links having one of their ends connected to said sliding head and their opposite ends connected to said scoops.

3. In a digging-bucket, the combination with a suspending-frame, of a pair of scoops, links hinged to the outer ends of said scoops and to the frame, a power-drum mounted in said frame, a pair of cables each passing around said drum and around a guide on the one side of the device and having its end attached to the scoop on the other side of the device, and toggle-links connected to said scoops and having their knuckles guided in vertical ways on said frame.

4. In a digging-bucket, the combination with the suspending-frame, of a pair of scoops, links pivotally connected to the outer ends of said scoops and to the frame, a power-drum mounted in said frame, a pair of cables each passing around said drum and around a sheave on one scoop and having its end attached to



the other scoop, a pair of toggle-links having their free ends connected to said scoops, and a vertical guideway on the frame for guiding the knuckle-joint of said toggles.

- 5 5. In a digging-bucket, the combination with a frame, of a power-drum mounted therein, a spindle mounted to rotate with said drum, scoops suspended from said frame by means of links, closing-cables wound on said drum and connected to said scoops, and opening-chains connected to the rear ends of the scoops and passing over guide-sheaves located in the frame over the rear ends of the scoops and wound on said spindle.
- 15 6. In a digging-bucket, the combination with a suspending-frame, of a power-drum mounted therein having portions of different diameters, scoops suspended from said frame by means of links, closing-cables connected to said scoops and wound on the portion of the drum of larger diameter, and opening-chains wound in the opposite direction on the portion of the drum of smaller diameter and connected to the outer ends of the scoops.
- 25 7. In a digging-bucket, the combination with the suspending-frame, of a power-drum mounted therein and having portions of different diameters, scoops suspended from the frames by means of links, closing-cables wound on the portion of the drum of larger diameter, passing around sheaves on one scoop and having their ends connected to the other scoop, and opening-chains wound in the opposite direction on the portion of the drum of smaller diameter and connected to the outer ends of said scoops.
- 35 8. In a digging-bucket, the combination with the frame, of buckets suspended therefrom, a pair of power-wheels mounted in said frame, hoisting and holding cables wound on said power-wheels in opposite directions, a winding-drum of smaller diameter than said power-wheels and mounted to rotate therewith, and a pair of closing-cables wound on said winding-drum, each cable passing over a sheave on one scoop and having its end attached to the other scoop.
- 45 9. In a digging-bucket, the combination with a frame, of scoops suspended therefrom, a cross-shaft mounted in said frame, power-wheels on said shaft, a closing-drum also on said shaft and of smaller diameter than said wheels, hoisting and holding cables wound on the power-wheels in opposite directions, and a pair of closing-cables wound on the drum and each passing over a guide on one side of the device and attached to the scoop on the other side of the device, whereby a double multiplication of power is obtained.
- 55 10. In a digging-bucket, the combination with a suspending-frame, of a power-drum

mounted therein and having portions of different diameters, scoops suspended from the frame by means of links, closing-cables connected to the scoops and wound on the portion 65 of the drum of larger diameter, opening-chains wound in the opposite direction on the portion of the drum of smaller diameter and connected to the outer ends of the scoops, a pair of toggle-links having their free ends 70 connected to said scoops, and a vertical guide on the frame for the knuckle of said links.

11. In a digging-bucket, the combination with a suspending-frame, of a power-drum mounted therein and having portions of different diameters, scoops suspended from the frame by means of links, closing-cables wound on the portion of the drum of larger diameter and each passing over a sheave on one scoop and having its ends attached to the opposite 80 scoop, opening-chains wound in the opposite direction on the portion of the drum of smaller diameter and passing over guide-wheels in the frame and connected to the outer ends of the scoops, a guide-link connected to each 85 scoop, and a vertically-guided movable block to which the opposite ends of said links are connected.

12. In a digging-bucket, the combination with a frame, of scoops suspended therefrom 90 by means of links, a pair of power-wheels mounted in said frame, hoisting and holding cables wound on said wheels in opposite directions, winding-drums of smaller diameter than the power-wheels mounted in said frame 95 to rotate therewith, closing-cables wound on said drums and connected to said scoops, a spindle of still lesser diameter mounted in the frame to rotate with the power-wheels, and opening-chains connected to said spindle and 100 to the outer ends of said scoops.

13. In a digging-bucket, the combination with a frame, of scoops suspended therefrom by means of links, a pair of power-wheels mounted in said frame, hoisting and holding 105 cables wound on said wheels in opposite directions, drums of smaller diameter than said power-wheels mounted in said frame to rotate therewith, a pair of closing cables wound on said drums and each passing over a sheave on 110 one scoop and having its end attached to the opposite scoop, a guiding-link pivoted to each scoop, and a vertically-guided movable block to which the opposite ends of said links are connected. 115

In testimony whereof I, the said WILLIAM S. FERGUSON, have hereunto set my hand.

WILLIAM S. FERGUSON.

Witnesses:

G. H. RANKIN,  
ROBT. D. TOTTEN.