Nov. 18, 1924. 1,516,428

G. HANDLEY

ELEVATOR, DREDGER, EXCAVATOR, AND THE LIKE

Filed Sept. 19, 1922 2 Sheets-Sheet 1

Fig. 1.

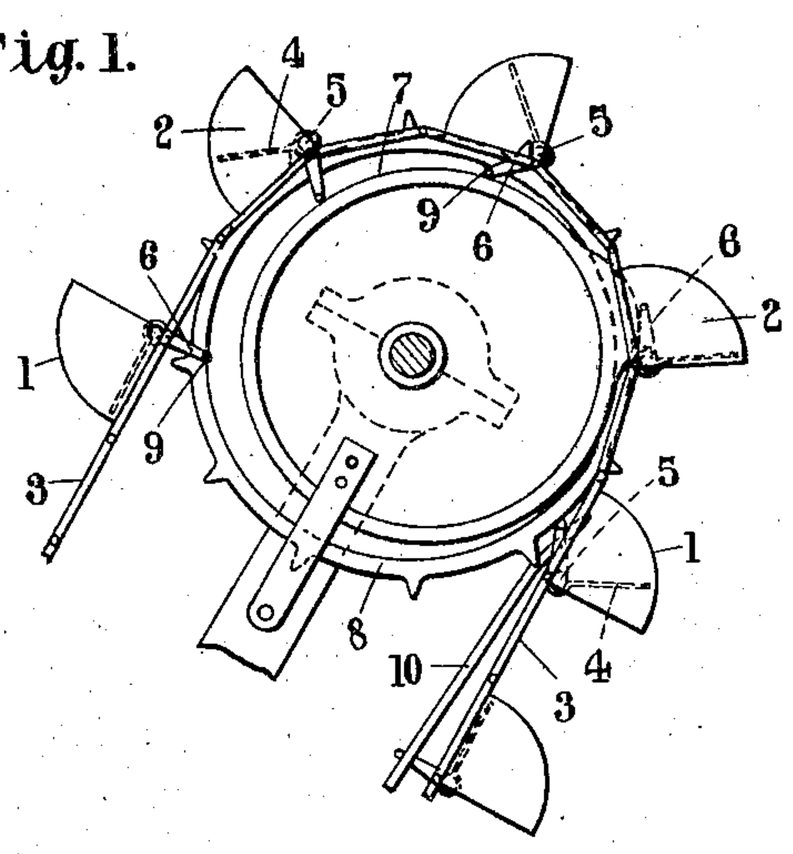

Fig. 2.

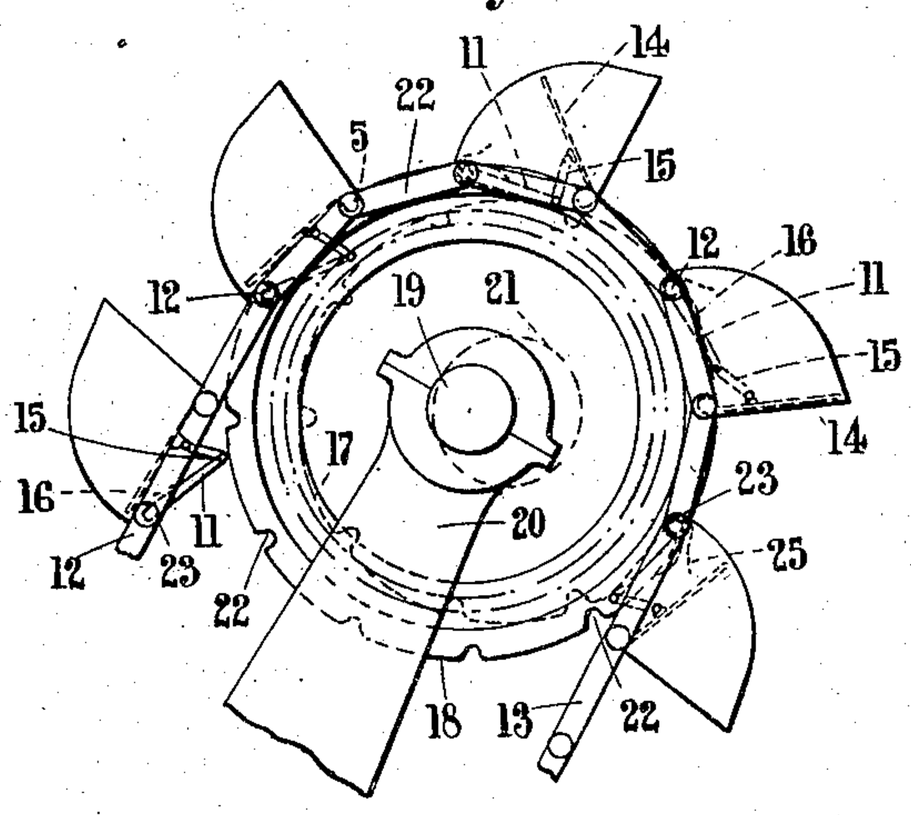

Fig. 3.

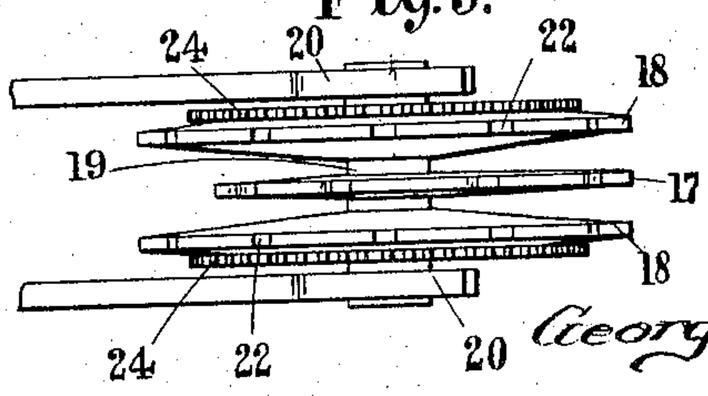

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Fig. 4.

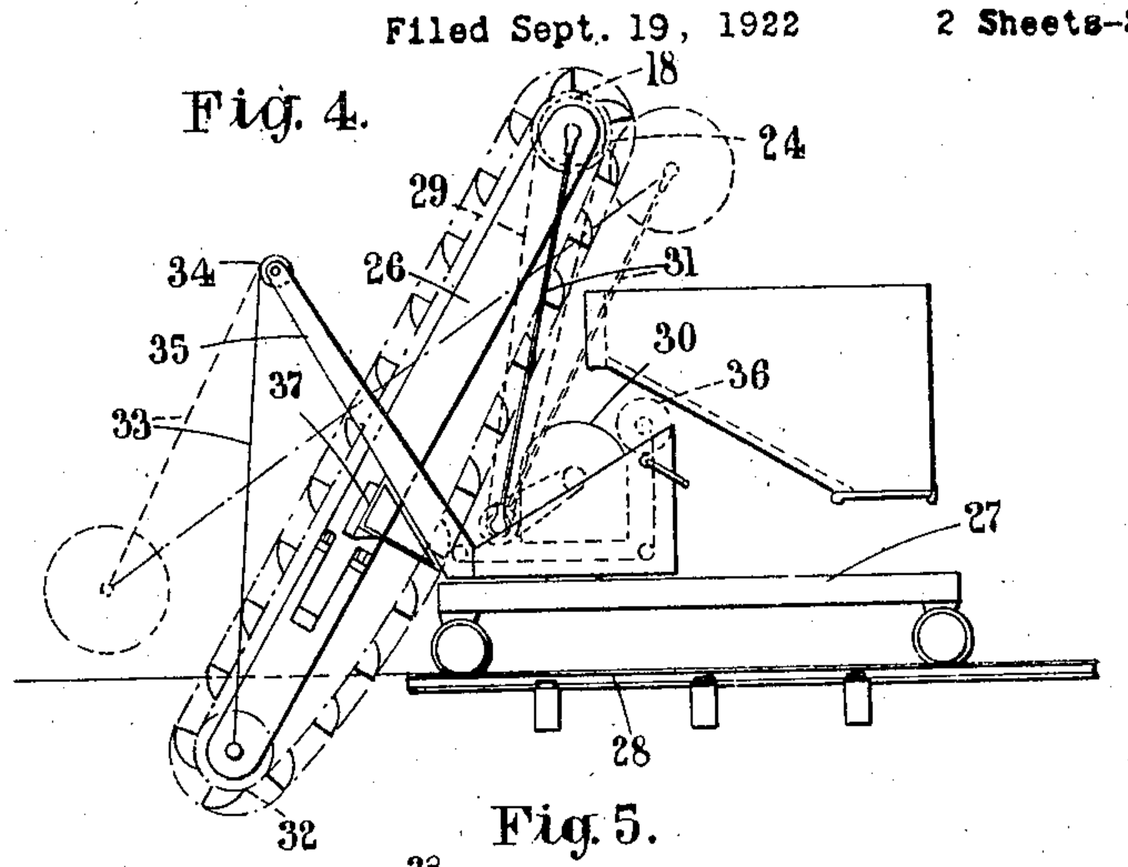


Fig. 5.

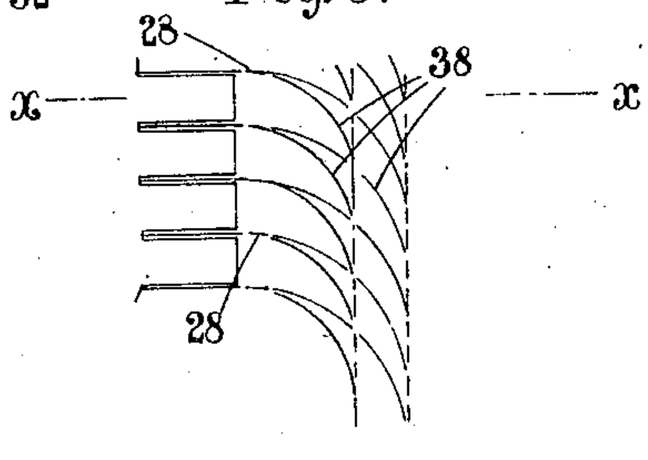


Fig. 8.

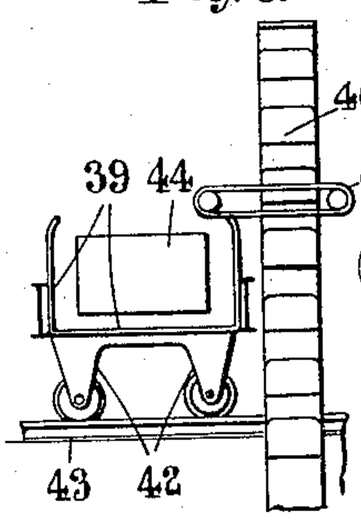


Fig. 6.

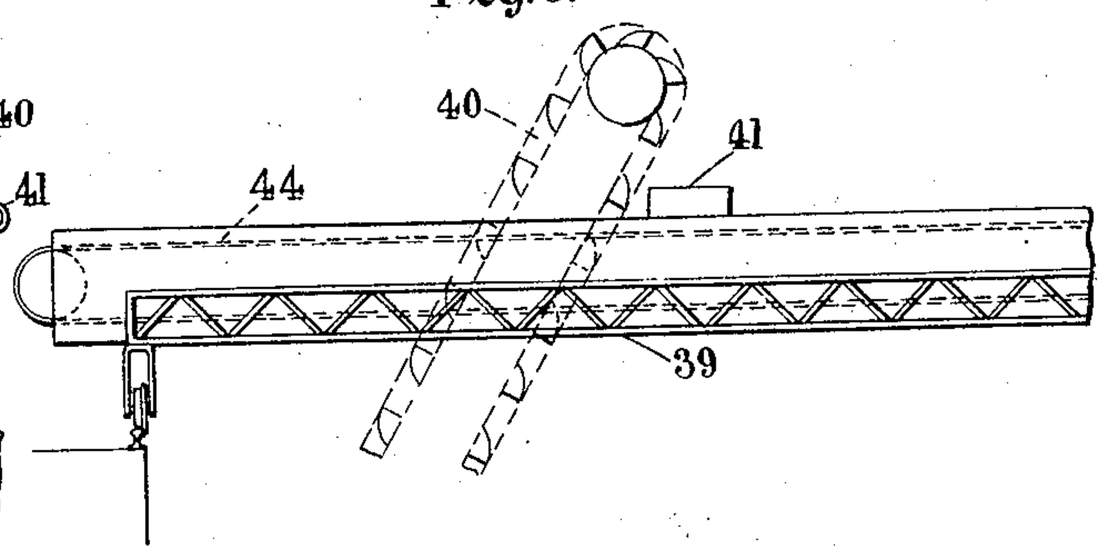
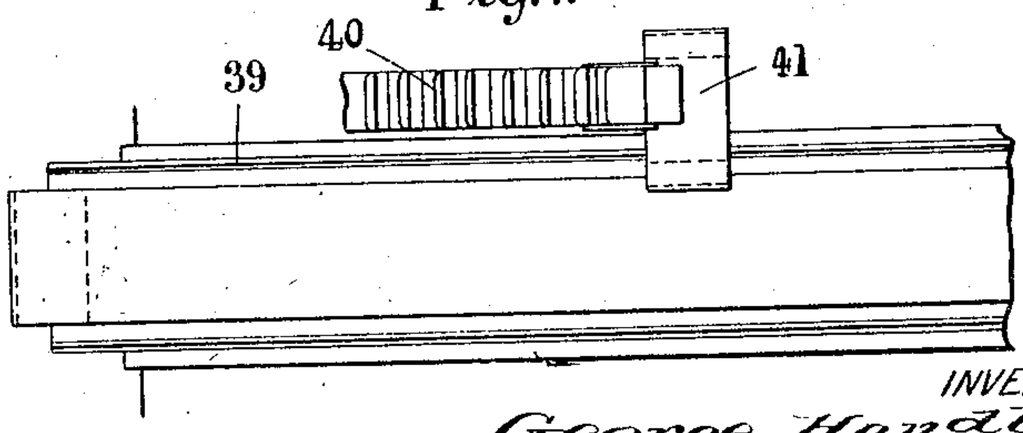


Fig. 7.



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Patented Nov. 18, 1924. 1,516,428

UNITED STATES PATENT OFFICE.

GEORGE HANDLEY, OF PALMERS GREEN, ENGLAND.

ELEVATOR, DREDGER, EXCAVATOR, AND THE LIKE.

Application filed September 19, 1922. Serial No. 589,191.

To all whom it may concern:

Be it known that I, GEORGE HANDLEY, a subject of the King of Great Britain, residing at Palmers Green, in the county of Middlesex, England, have invented new and useful Improvements in and Relating to Elevators, Dredgers, Excavators, and the like, of which the following is a specification.

This invention relates to buckets for elevators, dredgers, excavators and the like, and provides an improved construction of bucket which when in use, can be caused positively to eject material loaded therein, on the bucket being brought to any predetermined position by the movement of the belt or chain to which it is attached.

According to this invention, the bucket comprises front and side walls rigidly secured to the belt or chain and a back wall hinged to the side walls, or to the belt or chain, so that it can be turned like a door or gate between the side walls to sweep out the entire contents of the bucket. The said back wall is provided with an arm or lever extending therefrom so as, in one convenient arrangement, to engage a fixed surface which as the arm or lever is carried along it by the travel of the belt or chain moves the said arm or lever in such a manner that the back wall is moved to empty the bucket or this wall is moved to the position which it occupies when the bucket is ready to receive a load. In another arrangement the arm or lever is carried on a pivot fixed with respect to the front and side walls of the bucket, and is connected to the back wall by a link.

In the accompanying drawings:—

Figure 1 is a side view of a bucket elevator constructed in accordance with this invention.

Figure 2 is a similar view to Figure 1 illustrating a modified construction.

Figure 3 is a plan view of chain wheels and a cam or eccentric comprised in the arrangement shown in Figure 2.

Figure 4 is a side view of an elevator in accordance with this invention, mounted on a truck.

Figure 5 is a plan view of an arrangement of track rails for the elevator truck shown in Figure 4.

Figure 6 is a diagrammatic side view of a travelling bridge having the improved elevator arranged in combination therewith.

Figure 7 is a diagrammatic plan, and

Figure 8 a diagrammatic end view of the arrangement illustrated in Figure 6.

As shown in Figure 1, the improved bucket comprises a front wall 1, and side walls 2 secured to a belt or chain 3 in such a manner that the leading edges of these walls can be effectively used for digging into or scraping off the material which the bucket is required to remove, or secured to the belt in such a manner that the bucket at a selected point in its path of movement is in position to receive material poured or loaded into it, for example, when the bucket forms part of an elevator used to convey material from one to another position. The bucket is provided with a back wall 4 hinged at 5 to the side walls 2, or to the belt or chain 3, so that it can be turned like a door or gate between the said side walls to sweep out the entire contents of the bucket, and in order to permit or ensure this, the front wall 1 is curved to a substantially cylindrical shape corresponding to the path along which the outer edge of the back wall 4 can move. Stops, not shown in the drawing, may be provided on the front wall or the side walls to prevent the hinged back wall from passing out of the space between these parts.

The back wall may be moved by means of an arm or lever 6 projecting therefrom so as to be brought by the movement of the belt or chain 3 into contact with a fixed cam or like surface 7 provided as shown, adjacent to a head wheel 8 over which the belt or chain passes. This cam is arranged to move the arm or lever 6 and thereby to move the back wall of the bucket also, so as to sweep out the entire contents of the bucket as the latter passes around or off from the said wheel. The arm or lever 6 may conveniently be provided with an antifriction roller 9 to engage and travel on the surface of the cam 7.

The said cam or the like may be extended or shaped to provide a part operating to move the lever and back wall so as to effect a return movement of these parts whereby the bucket is restored to a condition in which it is ready to receive a fresh charge. In Figure 1 a separate cam or like surface 10 is provided for this purpose. In some instances it is sufficient to leave the back wall

free to be pushed back by the material collected by or fed into the bucket.

In the arrangement shown in Figures 2 and 3, instead of the arm or lever 6, an arm 11 is mounted at one of its ends on a pivotal support 12 carried by the belt or chain 13 so that this support is fixed with respect to the front and side walls of the bucket, and the other end of this arm 11 is connected to the hinged back wall 14 by a link 15. A spring 16, preferably of the rat trap or torsion type, is provided to move the said arm so that it extends rearwardly from the bucket, as shown at the left hand side of Figure 2, and thus draws in the back wall so that the bucket is opened to receive a load. The arm 11 is moved towards the bucket, so as to cause the hinged back wall to make its bucket emptying movement, by the knuckle joint between the arm 11 and link 15 coming into contact with the surface of a rotary cam or wheel 17 mounted eccentrically with respect to the wheels 18 round which the buckets pass. This joint may be provided with an antifriction roller.

The hinged back walls 4 and 14 are preferably made with hollowed or concave faces on their inner sides, that is to say, the sides in contact with material in the bucket, so that in the ejecting movement of these walls there is a tendency for the material in the bucket to be thrown towards the centre of the bucket and not to be wedged outwardly against the front and side walls.

The belt or chain wheels 18 are mounted on a shaft or spindle 19 carried by frame parts 20, and the cam or wheel 17 is mounted between them on an eccentric 21 arranged so that at one side the peripheral surface of the cam or wheel 17 is in line with corresponding parts of both wheels 18. Grooves 22 are provided in the peripheries of these wheels 17, 18 to accommodate hinge pins or hinge parts 23 connecting together parts of the belt or chain, or connecting together the buckets, the grooves in all the wheels being spaced apart at distances corresponding to the distances between the said hinge pins or hinge parts 23 which thus serve as driving connections so that when the wheels 18 are moved, driven by sprocket wheels 24, motion is transmitted to the belt or chain of buckets and to the wheel 17, these parts moving synchronously.

The hinge pin at the forward end of each bucket may serve as a hinge pin for the hinged back wall 14 as well as for the hinge pin of the bucket chain elements, and the hinge pin at the trailing end of each bucket may serve as the pivotal support of the arm 11. The spring 16 may be extended to provide a spring abutment or cushion 25 against which the back wall of the bucket is brought to rest by the said spring as the arm 11 passes off from the eccentric wheel 17, or a separate spring or abutment may be provided for this purpose.

In Figure 4 the improved construction of bucket is shown applied to an elevator or dredger suitable for use in emptying settling or decanting tanks, and to adapt the elevator to this purpose, the chain wheels 18 are carried on a swivelling frame 26 mounted on a truck 27 travelling on a rail track 28. This frame 26 is supported on the truck so that the lower end of the bucket chain can be lifted above the rail track 28 to allow the elevator to be moved from one track to another. The bucket chain is moved by the sprocket wheel 24 actuated by a driving chain 29 driven by a motor 30, and a radius bar 31 is provided to prevent movement of the frame 26 from interfering with the operation of the driving chain 29. The lower bucket chain wheel 32 is supported by a chain or cable 33 passing over a pulley 34 on a jib 35 to a winch 36, and a bracket 37 is provided on the truck 27 against which the frame 26 has a bearing when lowered to bring the bucket chain into its working position. The rails 28 forming tracks for the truck 27 may be arranged as in Figure 5 so that a single rail may be paired with the rail on either side of it to form a track, suitable points or switches 38 being provided to direct the truck 27 carrying the elevator, from one track to another.

The elevator may be associated with a travelling bridge 39 arranged to span a tank, reservoir or the like, as indicated diagrammatically in Figures 6, 7 and 8. In this arrangement the elevator bucket chain 40 is carried on the side of the bridge 39 and the buckets are arranged to deliver on to a short conveyor belt 41 which deposits the material received from the buckets on to a conveyor belt 44 running from end to end of the bridge. The elevator is movable along the bridge and the latter is carried at each end on a truck 42 travelling on rails 43 so that the elevator can be moved over the entire area of the tank. The improved bucket is particularly applicable for handling stiff mud, clay, chalk slurry, china clay and like solid or semi-solid material which on account of its consistency will not readily fall out of the bucket by gravity, as well as for handling coal or like granular or lumpy material, or slack or breeze and other powdery material, which may adhere to the walls of the bucket or become wedged therein.

What I claim is:

1. An elevator bucket comprising a conveyor chain, a front wall and side walls rigidly mounted upon said conveyor chain, a back wall hinged to move between the said side walls, means for mechanically moving the back wall to entirely sweep out material contained in the bucket, and means

for mechanically moving the back wall to a position in which the bucket is ready to receive a new load.

2. An elevator bucket comprising a conveyor chain, a front wall and side walls rigidly mounted upon said conveyor chain, a back wall hinged to move between the side walls, an arm connected to the movable back wall, and means acting through the said arm to move the back wall in opposite directions between a position providing a maximum load receiving space in the bucket and a position in which the material contained in the bucket is entirely swept out by the said back wall.

3. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, a back wall hinged to move between the said side walls, an arm carried by a pivotal support spaced apart from the hinge supporting the back wall and fixed with respect to the front and side walls, and a link connecting the said arm to the hinged back wall.

4. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, a back wall hinged to move between the said side walls, an arm carried by a pivotal support spaced apart from the hinge supporting the back wall and fixed with respect to the front and side walls, a link connecting the said arm to the hinged back wall, and a spring arranged to urge the said arm in one direction.

5. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, and a hinged back wall, an arm carried by a pivotal support spaced apart from the hinge supporting the back wall and fixed with respect to the front and side walls, a link connecting the said arm to the hinged back wall, chain wheels supporting the said chain, a cam mounted to rotate eccentrically to said wheels and to engage the joint between the said arm and link as each bucket in turn is carried past the said cam.

6. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, and a hinged back wall, an arm carried by a pivotal support spaced apart from the hinge supporting the back wall and fixed with respect to the front and side walls, a link connecting the said arm to the hinged back wall, chain wheels supporting the said chain, a cam with a grooved periphery mounted eccentrically to the chain wheels, and parts carried by the said chain of buckets to engage in the grooves in the cam so that the latter is rotated synchronously with the chain wheels.

7. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, and a hinged back wall, means for mechanically moving the said back wall entirely through the bucket in both directions, a truck, and a swivelling frame supporting the said chain of buckets mounted on the said truck.

8. In an elevator, a chain, buckets each comprising a front wall and side walls rigidly mounted upon said chain, and a hinged back wall, means for mechanically moving the said back wall entirely through the bucket in both directions, a truck, a swivelling frame mounted on the truck, chain wheels at the upper and lower ends of the frame, a radius bar between the upper end of the frame and a driving spindle carried on the truck, and a chain attached to the lower end of the frame for raising and lowering the latter.

GEORGE HANDLEY.

Witnesses:
ELSIE A. BAKER,
CHAS. F. MURPHY.