

W. B. GERVAIS.
HOISTING MECHANISM.
APPLICATION FILED OCT. 20, 1915.

1,237,323.

Patented Aug. 21, 1917.

2 SHEETS—SHEET 1.

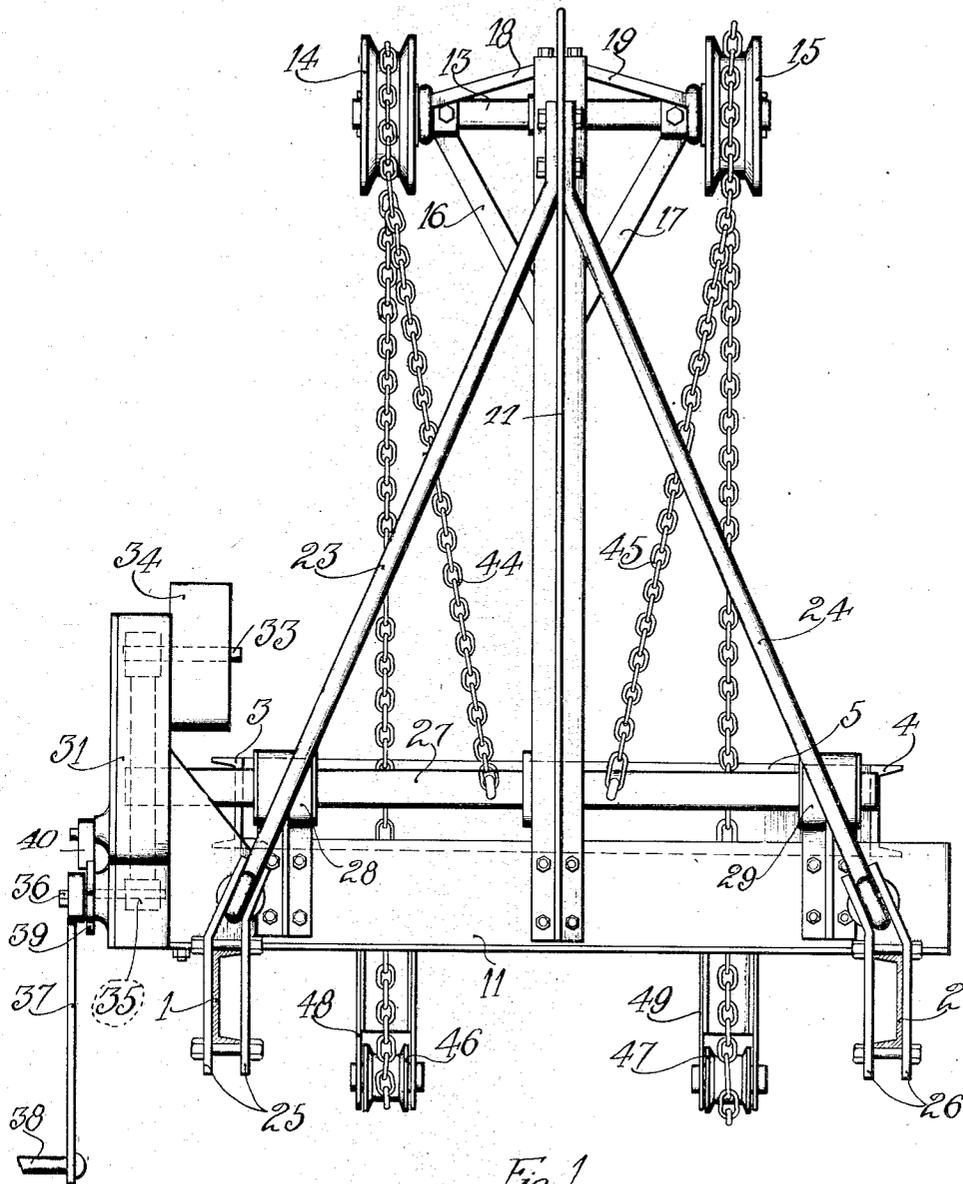


Fig. 1

Inventor
Warrington B. Gervais
By Brown, Hanson & Boettcher
Attys.

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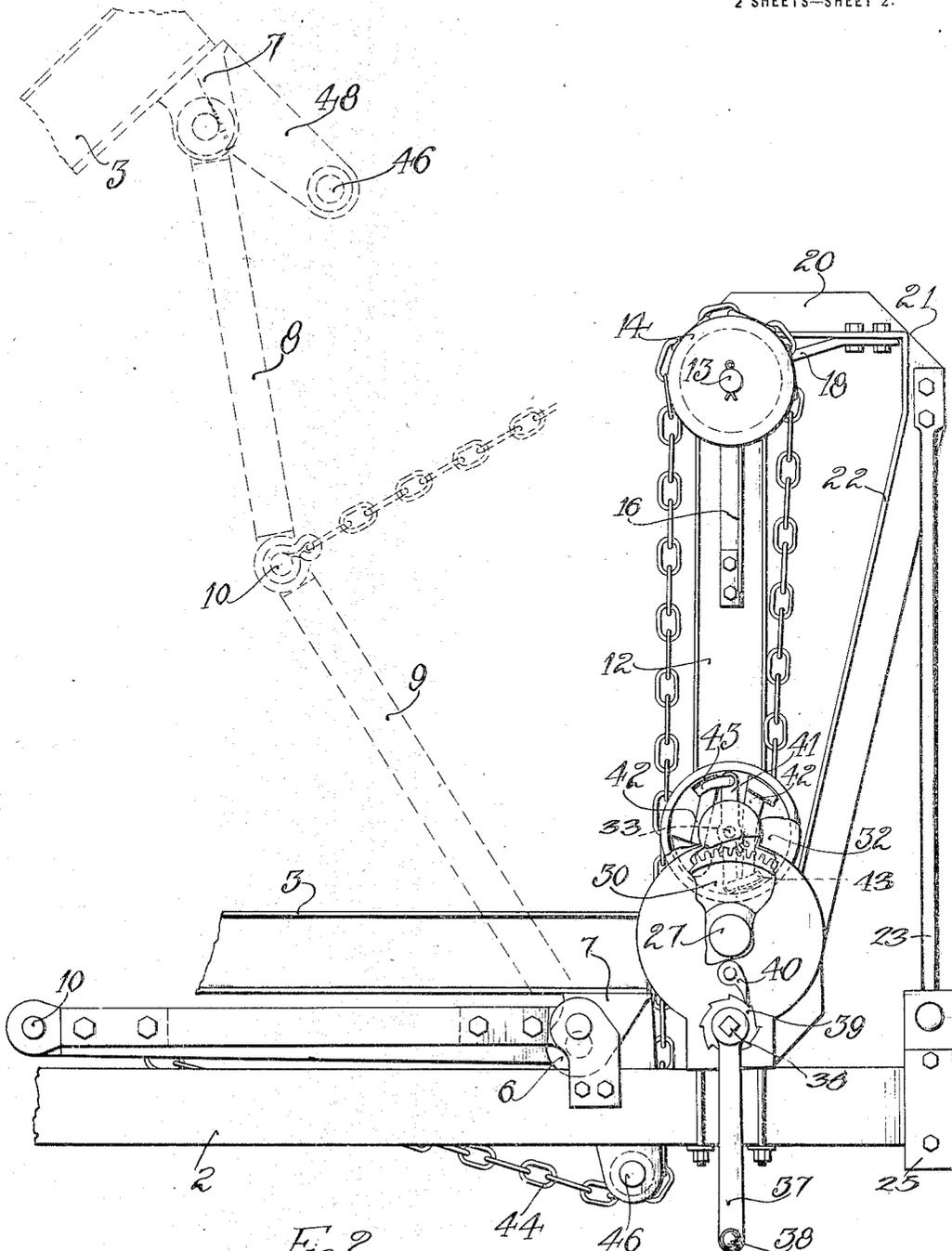


Fig 2

Inventor
Wainwright, B. Gervais
By Brown, Haun & Boettcher
Attys.

UNITED STATES PATENT OFFICE.

WAINWRIGHT B. GERVAIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO VARIETY MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HOISTING MECHANISM.

1,237,323.

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To all whom it may concern:

Be it known that I, WAINWRIGHT B. GERVAIS, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Hoisting Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to hoisting mechanism more particularly for use with self-dumping trucks and the like.

The problem of hoisting the end of a self-dumping truck or the like has always presented serious mechanical difficulty as it is necessary to have a powerful mechanism for hoisting or raising the one end of the body to dump the same and it is desirable, after dumping has been performed, to restore the parts to the normal condition as quickly as possible. The use of screw-jacks or the like demands that almost as much time be consumed in lowering the body after dumping has been performed as in raising the same. A number of devices have been proposed for disconnecting the lifting or hoisting apparatus when it is desired to lower the body, but this in general has proved undesirable and unsuccessful first, because it is often desired to dump only a part of the load and then restore the body to normal condition. A second difficulty arises in that the mechanism required to lower the body usually depends upon some cushioning device for stopping the movement of the body as it lowers and these devices generally prove unreliable and are subject to breakage and damage upon the first use.

It is with the difficulties of the prior art in mind that I have devised the present invention, the object of which is to provide a powerful hoisting mechanism which will be able readily and easily to hoist a powerful load through a given distance and to allow rapid lowering of all or part of the load without excessive jarring. In the accompanying drawings, which form a part of the present specification I have illustrated one form of mechanism in which my invention may appear. The particular mechanism chosen is applied to the frame of a truck

and is employed in raising and lowering one end of the truck to accomplish dumping of the contents thereof.

Figure 1 is a front elevation of the same and Fig. 2 is a side elevation of the same.

According to my invention the body that is to be dumped is raised by a back-gear windlass operated by a handle or other suitable means, the mechanism thereof being geared to a powerful centrifugal brake. The movement of the body which is being hoisted is so slow during the hoisting period that the centrifugal brake does not interfere materially with the movement and no extra work is necessary to raise the body. During the downward movement of the body hoisted, the movement is so rapid that the centrifugal brake is put in operation and prevents more than a predetermined speed of lowering. The mechanism is so arranged that the windlass is operated more rapidly as the body to be hoisted comes nearer to its normal position so that the brake has a far greater effect at the end of the movement of the body in approaching its normal position.

The frame of the truck is shown as composed of the channel beams 1 and 2 which form the side bolsters of the supporting structure of the body, a part of which is shown as the channels 3 and 4 connected by the channel 5 to form the front end of the tilting body. The tilting body which is not shown rests upon and is secured to the beams 3, 4 and 5, the beams 3 and 4 being pivoted at a suitable point to the under frames 1 and 2. The beams 3 and 4 normally rest upon the cast iron brackets 6 which are secured to the main frames, 1 and 2 and serve as pivots to the toggle mechanism later to be described. A suitable bracket member 7 is secured to the beams 3, 4 and 5 on each side of the dumping body and a pair of toggle links 8 and 9 connect the brackets 6 and 7. The links 8 and 9 are connected together at their inner ends and are pivoted upon a suitable shaft 10. A heavy angle bar 11 is laid across the main channel beams 1 and 2 and is bolted thereto to support the windlass or hoisting mechanism. A mast 12 which may be formed of I-bars or other suitable structural shape is secured to the cross-beam 11 and bears at its upper end the cross-shaft 13, a pair of pulleys 14 and 15 being secured

to the free ends of said shaft and rotatable therewith. The ends of the shaft 13 are braced by suitable struts or supporting members 16 and 17 and tension members 18 and 19. A piece of T-bar 20 is secured to the top of the mast and is bent at 21 to form a suitable brace or strut 22 which in turn is secured to the cross-bar 11 at its lower end. The strut 22 is supported by the two anchor rods 23 and 24 that are secured by suitable clamps 25, 26 to the beams 1 and 2. The mast 12 is thus braced and the pulleys or sheaves 14 and 15 are supported in proper position for raising and lowering the body of the truck as will be described.

The main windlass shaft 27 has suitable bearings in the brackets 28 and 29 which are bolted to the cross-bar 11. These bearings are preferably provided with anti-friction rollers to make the operation thereof easier.

The outer left-hand end of the shaft 27 bears a gear 30 which is inclosed in a suitable gear-case 31. The gear 30 meshes with a pinion 32 secured to the shaft 33 of the centrifugal governor 34. The casing of the centrifugal governor 34 is secured to the gear case 31 which surrounds the pinion 32 and also a pinion 35 which is mounted upon the driving or operating shaft 36. The outer end of the operating shaft 36 is squared, as shown in the drawing, and a suitable crank 37 provided with a handle 38 fits on said outer squared end. A ratchet wheel 39 is secured to the shaft 36 and a suitable pivoted pawl 40 engages the teeth of said ratchet wheel to prevent retrograde movement while the body is being hoisted. The shaft 33 of the centrifugal device has a pair of arms 41 secured thereto. These arms 41 bear upon their outer end inertia members 42 which are pivoted to the outer end of the arms 41 and are provided with suitable brake shoes 43 which engage the inner cylindrical surface of the casing of the centrifugal device 34. The main windlass shaft 27 has a pair of chains 44 and 45 secured thereto. The chain 44 passes over the pulley 14 and thence down and under a small pulley or sheave 46 which is rotatably mounted in a suitable bracket 48 secured to the bottom of the dumping body. The other end of the chain 44 is secured to the shaft 10 which forms the connecting pivot between the toggle arms 8 and 9. The chain 45 is similarly trained over the pulley or sheave 15 and thence under a pulley 47 carried in a bracket 49 mounted similarly to the bracket 48 on the dump body. The chains 44 and 45 cooperate in a manner which will readily appear. The operation of the device will now be described.

When the body to be hoisted is in the position shown in Fig. 2, the chains 44 and 45 will in effect pull directly upward upon the

outer end of the tilting body. As the body passes upward in such position where the pull of the chains 44 and 45 would be too nearly in line with the pivot to be effective in raising the body, the toggle formed by the arms 8 and 9 comes into action, completing the raising operation, as shown in dotted lines in Fig. 2. In this manner the direct lift and the toggle lift supplement each other and make it possible to raise the load a considerable distance above the mast 12 which it is desirable to keep as low as possible for obvious reasons. When the load has been dumped by tilting of the body, as above indicated, it is desired that the body be lowered as quickly as possible and since the load at this time is not excessive, it is desirable that a quick descent be made. To accomplish this the pawl 40 is disengaged from the ratchet 39 and the handle 37 is released. The body descends rather swiftly and in so doing operates the centrifugal brake 34, the brake shoes 43 rubbing against the inside of the drum and preventing too rapid descent. When the toggle arms 8 and 9 have swung considerably to the left in Fig. 2 the pulley 46 will engage the chain 44 and will give a direct pull thereupon. The result of this is a tendency to rotate the shaft 27 rapidly and the brake 34 becomes effective to prevent the same.

A very important action occurs in the diminution of the effective diameter of the shaft 27 when the body approaches normal position. The chains 44 and 45 being wound upon the shaft 27 very rapidly increase the effective radius thereof and the lifting power would be considerably reduced except for the fact that the toggle 8, 9 comes into play in the latter part of the action. But the self-same action secures a highly beneficial effect in allowing of a rapid descent of the body during the first part of its fall and a slower rate of descent during the latter part of its fall due to the decreased diameter of the winding drum 47 caused by unwinding of the chains 44 and 45 therefrom. Thus it can be seen that a given drop of the body spins the windlass shaft 27 more rapidly when the body approaches the normal position. As a consequence the brake 34 causes a slower rate of descent of the body as it approaches the normal position.

While I have described my invention with reference to the details of construction of a particular embodiment, it is to be understood that my invention is capable of being embodied in a variety of forms and with numerous modifications and changes as will at once suggest themselves to those skilled in the art. All of these I consider to come within the spirit and scope of my invention.

What I claim is:

1. In combination, a frame, a body to be

hoisted, a mast secured to said frame, a pair of toggle arms secured to said body and to said frame, flexible hoisting means secured to said toggle and passing under said body to be hoisted and a windlass secured to said mast, said windlass being connected to said flexible hoisting means.

2. In combination, a frame, a mast secured to said frame, a windlass secured to said frame and having a flexible hoisting cable passing over the end of said mast, a body to be hoisted, toggle members connecting said body and said frame, a projection secured to said body and passing below said toggle, said flexible hoisting means being secured to said windlass and to said toggle and passing under the projection on said body.

3. In combination, a frame, a mast secured to said frame, a pulley rotatably mounted adjacent the top of said mast, a body to be hoisted, toggle members connecting said body and said frame, a bracket on said body, said bracket projecting below the attaching point of said toggle members, a windlass, a centrifugal governor geared to said windlass and a flexible hoisting cable secured to said windlass and to said toggle, said cable passing over said pulley adjacent the top of said mast, and under the bracket secured to said body.

4. In combination, a frame, a body to be tilted, pivotally secured to said frame, toggle arms connected between one end of said body and said frame, a projection on said body adjacent the connection of said toggle, a windlass, a centrifugal brake secured to said windlass and a hoisting cable secured to said windlass passing under said projection and secured to said toggle members.

5. The combination with a frame, a body on said frame to be raised, a hoisting drum, an automatic retarder therefor, and driving means for the drum, of a standard disposed adjacent one end of the body, pulleys on said standard, a pair of toggles connecting said frame with said body, a pair of flexible

hoisting elements anchored to the drum to be wound thereupon and over said pulleys and having their free ends connected to the center joints of said toggles, whereby upon starting a hoisting operation, the intermediate portion of the hoisting element will engage beneath the free end of the body and near the end of a hoisting operation the toggles will be caused to straighten and complete the raising operation.

6. In a hoisting mechanism, the combination with a base frame and a body thereon to be raised, of a hoisting drum and a flexible hoisting element wound thereon, a toggle formed of two hinged sections connected to the frame and body, the flexible hoisting element extending beneath the end of the body and having its free end connected to the junction of the hinged sections, said hoisting element acting directly upon the body at the beginning of a hoisting operation; and upon said toggle near the end of a hoisting operation.

7. In a hoisting device, the combination with a base frame and a body thereon to be hoisted, of a hoisting drum and a flexible hoisting element to be wound thereupon, a toggle interposed between the frame and said body, the free end of the hoisting element being connected to the toggle joints, and means on the adjacent end of the body to engage the intermediate portion of the hoisting element, whereby at the start of a hoisting operation, action of the hoisting element will be directly upon the body and at the end of a hoisting operation the stress will be developed at the toggle joint, to expand the same and raise the body to a point higher than the point from which the flexible element exerts its force and thereby complete the raising operation.

In witness whereof, I hereunto subscribe my name this 15th day of October A. D. 1915.

WAINWRIGHT B. GERVAIS.