UNITED STATES PATENT OFFICE.

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HOISTING AND DUMPING APPARATUS.

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To all whom it may concern:

Be it known that I, HENRY SANTROCK, a citizen of the United States, residing at Kensington, in the county of Smith and State of Kansas, have invented a new and useful Hoisting and Dumping Apparatus, of which the following is a specification.

The present invention relates to a hoisting and dumping apparatus of the character used in pit silos, and for similar uses, the present invention having for an object to provide an improved and simplified structure for raising a bucket when loaded with material, for automatically adjusting the bucket in alinement with a delivery chute, and to subsequently dump the bucket and deliver its contents to the chute.

Another object of the present invention is to provide a tower, or the like, of relatively large cross sectional area, to support the hoisting means for a bucket, and to admit of the lateral adjustment of the bucket to accommodate the work to which the mechanism is applied, and to also provide the tower with devices for engaging the bucket as it is raised, and for guiding the bucket to a delivery chute, the same devices also serving to dump the bucket over the chute, when it is raised to a predetermined height.

A further object of the invention is to provide a peculiar mounting for the hoisting drum, with respect to the tower, so as to insure the tight winding of the cable on the drum, and to cause the windings of the drum to lie closely together, without the provision of additional guiding means or tensioning devices.

The invention still further aims at the provision of a counter-weight for the bucket, and a peculiar connection between the cable and the counter-weight whereby the latter may be adjusted according to the depth of the pit into which the bucket is adapted to be lowered.

Other objects and advantages of this invention, as well as the above, will be more clearly brought out in the following detail description of the present preferred embodiment of the invention, the same being illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation of the improved hoisting and dumping apparatus, as applied to a pit, the bucket being shown in the bottom of the pit. Fig. 2 is a longitudinal vertical sectional view, taken through the tower and parts of the mechanism, the bucket being disclosed as being elevated and entering the guide leading from the delivery chute. Fig. 3 is a similar view, disclosing the bucket raised to its highest position, and showing the bucket swung forwardly about the pivot bearings at the inner end of the guide or throat. Fig. 4 is a horizontal section through the tower and the parts therein, taken on the line 4–4 of Fig. 2, the view showing the bucket entering the throat or guides, and being centered in the tower and in alinement with the delivery chute. Fig. 5 is a top plan view of the super-frame of the tower, showing the specific mounting of the hoisting drum. Fig. 6 is a detail perspective view of the bucket in upright position. Fig. 7 is a side elevation, showing in detail an enlarged view of the counter-weight, having the supporting cable therefor taken up partly, to shorten the same. Fig. 8 is a further enlarged detail, fragmentary view of the upper end of the counter-weight, showing the manner of securing the supporting cable thereto, and the adjusting devices for the same.

Referring to these drawings, wherein like parts are designated by similar numerals of reference throughout the several views, 10 designates a pit to which the present invention is shown as applied, the pit having the side walls 11, and the top or enclosing platform 12.

The tower, which supports the hoisting and dumping apparatus, comprises a base supported upon beams 13, arranged above the platform 12 in any suitable manner. The base, as may be best seen from Figs. 1 and 4, is made up of side bars 14, and forward and rear cross bars 15 and 16, respectively. Rising from the corners of the base are uprights or standards 17, which converge upwardly, and are secured at their upper ends to, and support, a super-frame.

This super-frame, as shown in detail in Fig. 5, is made up of upper side bars 18 and 19, and forward and rear cross bars 20 and 21. The tower is reinforced or strengthened by means of cross braces 22, arranged in pairs in the opposite sides and at the rear of the tower, the extremities of the cross braces being preferably secured at the opposite upper and lower corners of the tower, as shown.

In the forward side of the tower, and
spaced upwardly from the base thereof a distance equal substantially to one third the height of the tower, is a delivery chute 23, which is secured to the forward uprights 17, and projects outwardly and down from the same. This chute 23 comprises a substantially U-shape member, the upstanding flanges of which are provided adjacent their inner ends and against their opposite outer faces with angle lugs 24, one flange of each one of which projects outwardly and laps against the inturnd flanges of the uprights 17, the latter being also made of angle iron. Bolts 25 are secured through the overlapping flanges of the uprights 17 and the lugs 24 to secure the chute in proper position in the tower. It is, of course, understood that this chute may be adjusted to any height desired in the tower. It will be noted, from Fig. 4 in particular, that the base of the tower is relatively wide, as compared with the width and general size of a bucket 26, which is suspended upon a cable 27 within the tower. This difference in size is purposely provided to admit of the swinging of the bucket 26 laterally, beneath the tower into any desired corner or position of the pit 10, so as to admit of the easy handling of the bucket, and the more satisfactory use and operation of the device. It is, therefore, necessary to provide means for engaging this bucket and guiding it into alinement with respect to the chute 23, into which the bucket is adapted to deliver its contents. For accomplishing this purpose, the tower is provided with a pair of guiding members 28, which project inwardly, upwardly, and forwardly from the intermediate portions of the side bars 14 of the base to the rear edges of the upstanding flanges of the chute 23. These guiding members 28 are disclosed in the present instance, as being formed of metallic rods having their lower ends rolled over to provide attaching hooks 29, which pass outwardly beneath the side bars 14, and extend upwardly and backwardly over the horizontal flanges of the side bars 14, which latter are also preferably formed of angle iron. These guides 28 are curved gradually inwardly to converge toward the inner end of the chute 23, and provide for the chute a downwardly and centrally flaring throat, to find, receive, and guide the bucket 26, as the latter is drawn upwardly by the hoisting cable 27. The upper extremities of the guides 28 are provided with eyes 30 through which pass bolts 31, or other suitable fastening devices, for holding the eyes 30 flat against the flanges of the chute 23 and as shown in the drawings, against the inner sides of the chute adjacent the rear edges of the upstanding flanges of the same. These members 28 serve a double function, for, in addition to guiding and centering the bucket 26 into alinement with the chute 23, the members 28 provide means for automatically turning over or dumping the bucket into the chute, after it has been centered and guided into the proper position, with respect to the chute. To accomplish this second function, the members 28 are provided at their upper ends with upwardly looped or arched pivot bearings 32, formed by carrying the upper ends of the rods 28 beyond the bottom of the chute 23, and curving or rolling the said ends forwardly and downwardly to the attaching eyes 30, thus forming the hooks or loops, which provide pivot bearings about which the bucket is adapted to swing. It will be noted, from Figs. 1 and 2, that the upstanding sides or flanges of the chute 23 are recessed or undercut at their rear edges, as at 33, to register with the hooks 28, and provide for an uninterrupted transverse passage or opening across the rear end of the chute 23 and beneath the hooks 32. The bucket 26 is preferably reinforced by a strap 34 extending across the bottom of the bucket, and projecting upwardly at the opposite sides of the same. Hinged in the upper ends of the strap 34 is a bail 35, upon which the bucket 26 is hinged. The bail 35 is provided with a pulley 36 beneath which the hoisting cable 27 passes. Stops 37 project outwardly from the sides of the bucket 26 forwardly of the bail 35, and are adapted to normally rest thereagainst, in order to hold the bucket in upright position. It will be noted, from Fig. 2, that the strap 34 is located slightly in advance of the medial line of the bucket 26, so as to dispose the center of gravity rearwardly of the pivotal support of the bucket, and thus normally urge the bucket in a rearwardly swinging direction. Such an arrangement insures the engagement of the stops 37 against the bail 35, and at all times retains the bucket 26 in an upright position, whether loaded or unloaded. The forward side of the bucket is inclined downwardly and inwardly to provide a lip 38, over which the contents of the bucket is adapted to slide or pass, when the bucket is dumped. Pivot pins 39 project laterally from the forward corners of the bucket 26, the pivot pins 39 comprising preferably the rounded elongated ends of a bar 40 secured across the forward side of the bucket, and at the upper edge of the same. These pins 39 at all times lie in a vertical plane forwardly of the lower rear ends of the guide rods 28, so that when the bucket is raised, the pins 39 will always strike against the under sides of the guide rods 28, and will be automatically guided or directed into the pivot bearings 32, on the upper ends of the rods 28.

The bucket 26 is provided with improved means for raising and lowering the same in the tower, and in the pit 10. This improved
The shaft 44 is inclined with respect to the central line of the super-frame, for the purpose of inclining the coils of the hoisting rod 27 on the drum 43, to the line of draft of the hoisting cable so as to insure the binding tightly of the coils against one another on the drum, not only to utilize the entire surface of the drum, and thus admit of the reduction of the size of the same, but to also prevent subsequent slipping or settling of the cable 27 on the drum, when the bucket 26 has been raised to some extent. Usually, separate guiding devices are employed for uniformly distributing the cable 27 on the drum 43. These mechanisms, however, are done away with in this structure, by the peculiar arrangement or relation between the hoisting rope 27 and the hoisting drum 43.

The shaft 44 may be rotated in any desired manner, the same may be turned by a drive wheel 49 secured upon the outer end of the shaft 44, and having a crank handle 50 for turning the drive wheel. For the purpose of admitting of the operation of the hoisting drum from the bottom of the pit 10, the drive wheel 49 is provided with a peripheral groove or channel 51, to receive therein the upper loop of an endless operating rope 52 held normally taut by a weight 53, mounted, by means of a pulley or roller 54, upon the lower loop of the operating cable 52. This arrangement is particularly shown in Fig. 1 of the drawings, wherein, it will be noted that the weight 53 is disposed adjacent the bottom of the pit 10, and within easy reach of the operator, so that the operator, in the pit, is enabled not only to fill the bucket 26, but to also hoist the same, by pulling on the rope 52 to raise the bucket, and to also dump the bucket by the automatic means above disclosed. It is, of course, understood that the operating rope 52 may be of any desired length and construction to suit the different depths and uses to which the improved hoisting and dumping apparatus is applied.

For the purpose of adapting the device of the present invention to pits, or towers of different heights and depths, this invention provides an improved means for adjusting the counter-weight cable 48 upon the upper end of the counter-weight 49, and where-in the adjustment may be made directly upon the counter-weight itself. The upper end of the counter-weight 49, as shown particularly in Figs. 7 and 8, is provided with an upwardly extending stem 55, upon the upper end of which is mounted a spool 56. This spool 56 has at spaced apart points in the periphery thereof, and at the upper and lower edges of the spool, pairs of oppositely extending fingers 57 projecting upwardly and downwardly from the respective ends of the spool 56. The stem 55 projects up...
wardly beyond the spool 56 and carries upon its upper extremity a swivel-eye 58, the same lying substantially in a horizontal plane above the weight 49, to receive there through the depending end of the counter-weight cable 48. The lower extremity of the counter-weight cable 48, after passing through the eye 58, is secured to the spool 56, by tying the counter-weight cable 48, or otherwise fastening the same, as shown in Fig. 8. The cable 48 is drawn through the eye to the desired extent, and the slackened end of the cable is passed over and beneath the hooks 57 alternately up and down around the spool 56, so as to wind the slackened end of the cable on the spool and hold the same out of the way. It will also be noted that the hooks 57 are of sufficient strength to support the weight 49, as the cable 48 passes from one of the hooks 57 directly up through the swivel eye 58.

It will be noted that the drive wheel 49 is of a peculiar construction whereby the same may be of angle iron for economy in manufacture, and lightness in weight, this improved drive wheel 49 forming the subject matter of a co-pending application, filed of even date.

In operation, when it is desired to raise material out of the pit 10, the operator may descend into the pit and grasp and draw down upon one side of the operating cable 52, to unwind the hoisting cable 27 from the drum 43, and thus lower the bucket 26 into the pit. As the drum 43 unwinds the cable 27 the small drum 47 winds up the counter-weight cable 48, the latter cable being wound oppositely upon the small drum 47 to the winding of the cable 27 upon the drum 43. After the bucket 26 has been loaded, the operator now grasps and draws down upon the opposite side of the operating cable 53, and rotates the shaft 44 in an opposite direction, to turn the drum 43, and wind the hoisting cable 27 thereabout. As the hoisting cable 27 is wound upon the drum, the coils of the cable bind tightly together, owing to the inclined position of the drum 43, with respect to the line of draft of the cable. As the bucket 26 enters the tower, the guides 28 engage the sides of the bucket 26, and move the same centrally with respect to the tower, and at the same time move the bucket into registry with the delivery chute 23. As the bucket 26 is further moved upwardly, the pivot pins 39 strike against the forward sides of the guiding rods 28, the latter serving as guides or tracks to draw forwardly the pivot pins 39, and thus pull the bucket 26 over toward the rear end of the chute 23. As the bucket 26 further proceeds upwardly, the pivot pins 39 move up into the overturned hooks 32 of the rods 28, and are thus held from further upward movement, but are permitted a rotary movement in these hooks or bearings. Thus, as the hoisting cable 27 is further tightened, the bucket is raised above the chute 23, and as its forward end is vertically held in the hooks 32, the bucket 26 is swung forwardly within the bail 33, and caused to overturn or tilt, as shown in Fig. 3, in which position, the bucket delivers its contents to the chute 23. It will be noted, that when in this position, the pivotal support of the bucket lies rearwardly of the pivot pins 39, and of the chute 23, so that, when the hoisting cable 27 is slackened, or unwound, the bucket 26 will immediately drop back into its normal position within the tower, and will be held by the bail 33, from swinging forwardly and outwardly of the tower.

In adjusting the device to pits of different depths, or towers of different heights, the counter-weight 49 may be raised or lowered upon the counter-weight cable 48 by removing or winding up more or less of the slackened end of the counter-weight cable, which is carried about the spool 56, as above described.

Thus, the present invention provides a comparatively simple and durable apparatus, made up of very few parts, which parts are chiefly made of angle iron, and which may be easily and economically assembled. There is also produced a hoisting mechanism wherein the cable is closely and evenly wound upon the hoisting drum without the aid of a guide, or the like, which is usually employed. The invention also provides a device wherein the workman in the pit may control the entire operation of hoisting and lowering the bucket, and of dumping the same, and may also adjust, from his lowered position, the length of the counter-weight cable, so that, as the work proceeds, it is not necessary for the workman to come up out of the pit, until the work is completed. It will be noted, particularly from Fig. 3, that the top of the hoisting drum 43 is above the horizontal plane of the swivel eye 42, and that therefore, when the hoisting cable 27 is completely wound upon the drum, the cable inclines forwardly and downwardly, and thus provides for a means for advancing or feeding the bucket 26 forwardly over the chute 23. Thus, all of the movements or actions of the device are automatic, and such actions are produced by the very compact, and simple structure above described.

Various changes and modifications of the above specifically described embodiment of this invention are within the spirit of the present invention, and are restricted only by the scope of the following claims.

What is claimed is:

1. In a hoisting and dumping apparatus, a tower having side bars, a chute in the front of the tower above the side bars, a bucket
suspended in the tower, means for raising and lowering the bucket, and a pair of opposed guiding and dumping members comprising a pair of rods secured at their lower ends to the intermediate portions of said bars, said rods converging upwardly and forwardly to engage the bucket, when in either side of the tower and direct the bucket centrally within the tower, the upper ends of said rods being looped upwardly to provide pivot bearings for engagement with the forward end of the bucket, said rods also being adapted to guide the forward end of the bucket into said pivot bearings, and to hold the bucket therein during the operation of the hoisting means, whereby to swing the bucket about said bearings, and dump the contents of the bucket into the chute.

2. In a hoisting and dumping apparatus, a tower, a chute in one side of the tower, means for raising the bucket above the chute, a pair of guiding and dumping rods secured at their lower ends in the opposite sides of the tower and being curved inwardly upwardly, and forwardly from said sides to the inner end of the chute, said rods being arched upwardly at the inner end of the chute to provide pivot bearings, said rods being adapted to engage the opposite sides of the bucket and move the same into registry with the rear end of the chute, and outstanding pivot pins at the forward end of the bucket for engagement beneath said rods, and adapted to slide into said pivot bearings upon the upward movement of the bucket, said bucket when raised, being adapted to swing about said pivot pins.

3. In a hoisting and dumping apparatus, a tower having side bars, a bucket hung in the tower adapted to swing laterally therein, a chute in the forward side of the tower above said side bars, hoisting means for the bucket to raise the same above the chute, guides extending upwardly from the side bars to the inner end of the chute to receive said bucket therebetween, and guide the same into registry with the chute, means for dumping the bucket when in registry with the chute, and means for advancing the bucket forwardly over the chute during the dumping action.

4. In a hoisting and dumping apparatus, a tower having side bars, a chute in the front of the tower, a bucket hung to swing in the tower, hoisting means for the bucket, a pair of guide rods having hooks upon their lower ends for engagement over said side bars, said guide rods being curved inwardly and gradually, and extending upwardly and forwardly to the chute to provide a flaring throat for the chute, said rods being looped upwardly at their upper ends through the sides of the chute to secure the rods thereto, and pivot pins outstanding from the forward corners of the bucket and adapted to ride against the under sides of said rods during the hoisting of the bucket, and to engage in said loops to swing the forward end of the bucket downwardly during the hoisting of the bucket to dump the contents thereof into the chute.

5. In a hoisting and dumping apparatus, a frame, a hoisting rope secured to the forward side of the frame and extending downwardly therefrom, a bucket suspended upon the hoisting cable, a drum in the rear side of the frame to receive the opposite end of the cable, and bearings for the drum mounted in laterally offset relation to support the drum obliquely across the sides of the frame, and at an angle to the line of draft of the hoisting cable.

6. In a hoisting and dumping apparatus, a tower, a hoisting cable fixed at one end to the forward side of the tower, a drum at the back of the tower, and means for supporting the drum obliquely across the back of the tower, said drum being adapted to receive the opposite end of the hoisting cable, said drum lying at an angle to the line of draft of the hoisting cable to bind the coils of the cable close together on the drum.

7. In a device as specified, the combination with a bucket, means for hoisting the bucket, and a chute disposed laterally of the bucket, of a pair of rods arranged at the opposite sides of the bucket and converging inwardly and upwardly toward the chute to guide the bucket into registry with the chute, said rods having stops upon their upper ends adapted to engage the forward end of the bucket to hold the same from moving upwardly, and to admit the rotation of the forward end of the bucket about the stops to dump the bucket over the chute, as the bucket is hoisted.

8. In a hoisting and dumping apparatus, a base frame, uprights converging upwardly from the corners of the base frame, a super-frame supported upon the upper ends of the uprights, cross braces joining the base and super-frames, a V-shaped brace secured horizontally in the super-frame and having its angled portion projecting centrally and forwardly from the super-frame, a chute mounted between the forward uprights and beneath said projecting angled portion, a hoisting cable secured at one end to the projecting angled portion of the V-shaped brace, a shaft journaled in the rear end of the super-frame, a drum on the shaft receiving the opposite end of the hoisting cable thereover, a bucket suspended upon said hoisting cable, means for turning the shaft to rotate said drum, and a pair of guides rising forwardly from the base frame to the inner end of the chute for guiding the bucket to the inner end.
of the chute when the bucket is raised, and for holding the bucket thereat, said project-
ing angled portion of the brace being adapt-
ed to lead the bucket forwardly over the chute and to dump the bucket when raised into its highest position.

In testimony that I claim the foregoing as my own I have hereto affixed my signa-
ture in the presence of two witnesses.

HENRY SANTROCK.

Witnesses:

H. F. BALL,

J. H. BALL.