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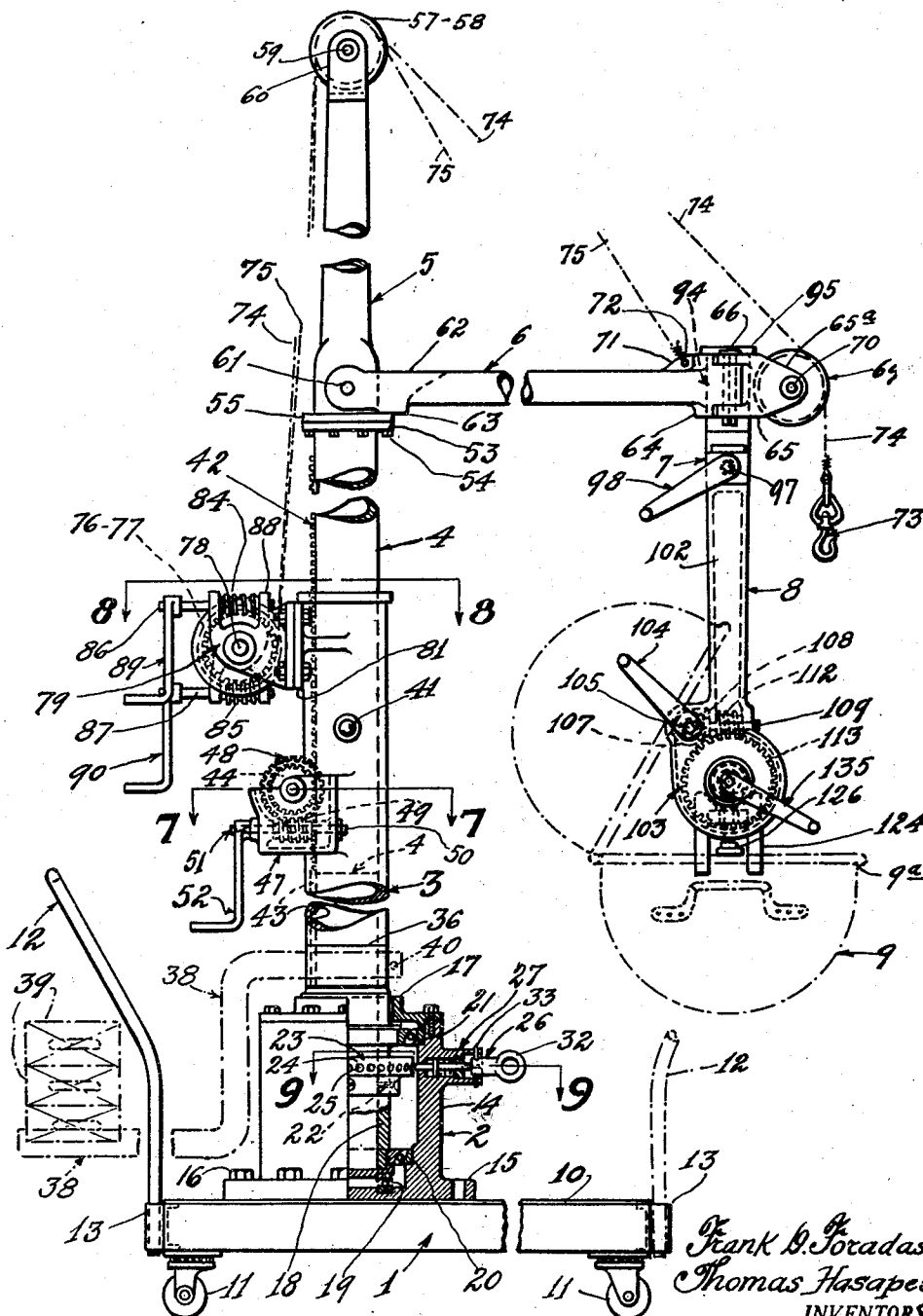
F. D. FORADAS ET AL

1,824,339

HOIST

Filed Sept. 29, 1930

3 Sheets-Sheet 1



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Fig. 1

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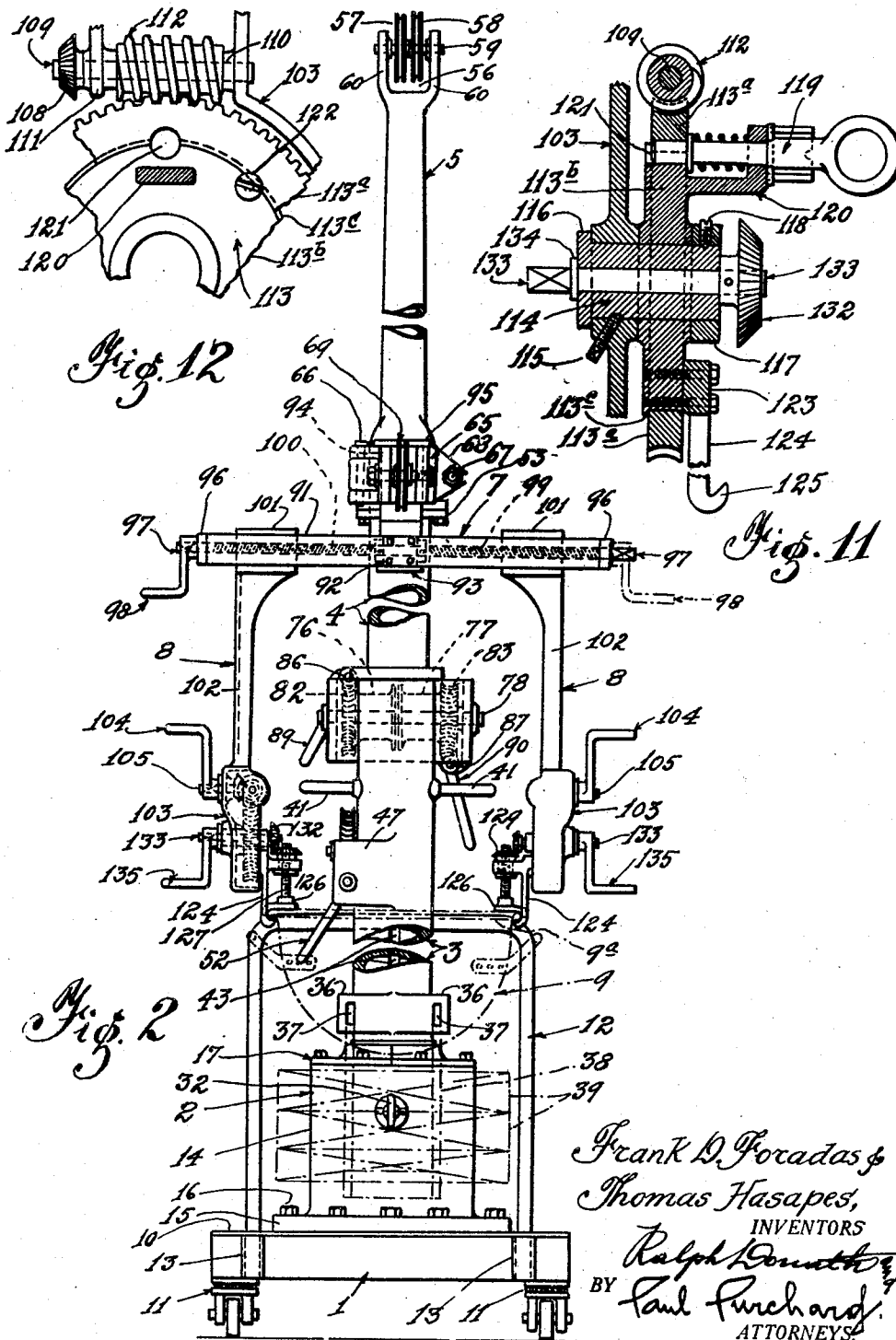
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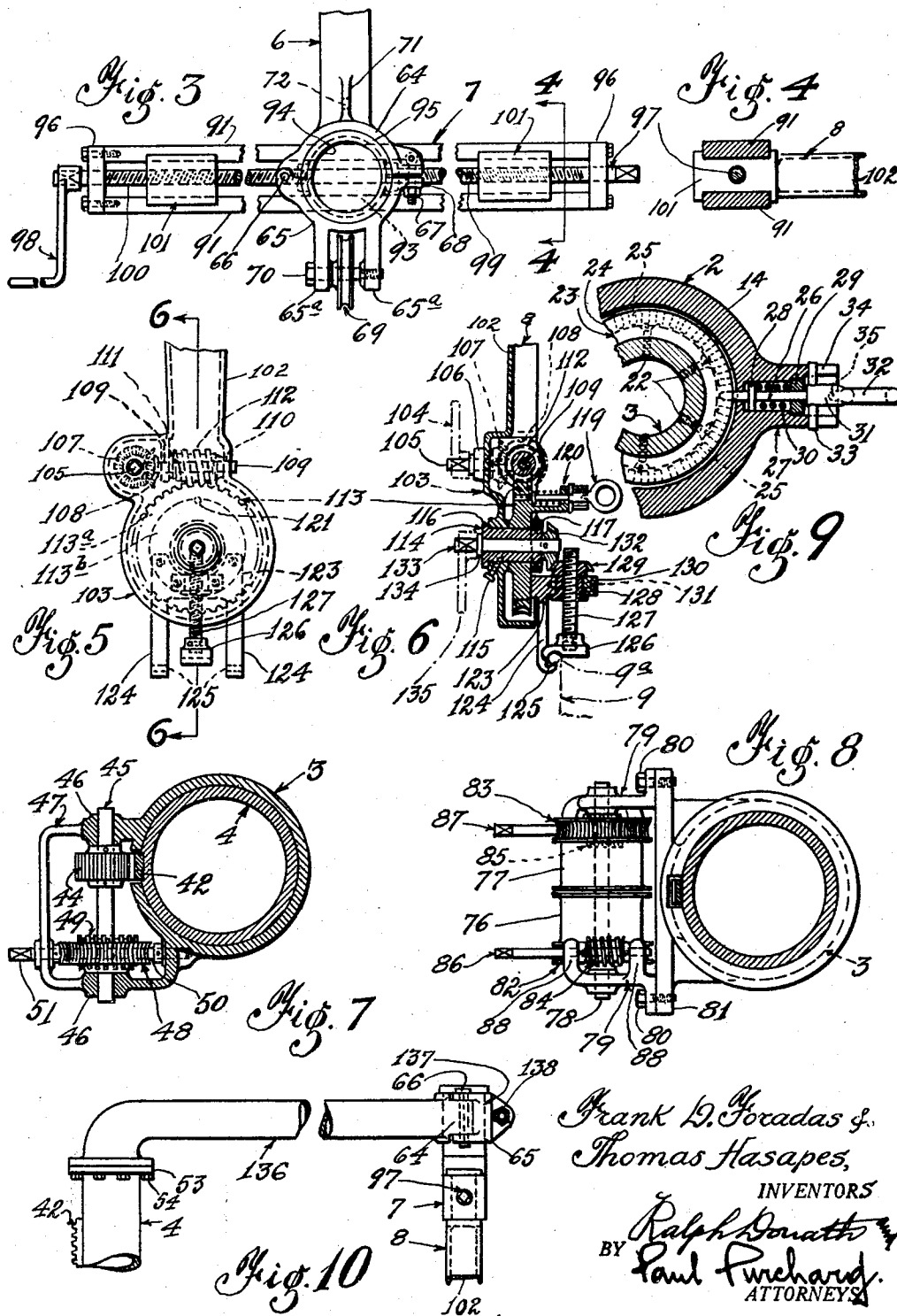
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HOIST

Application filed September 29, 1930. Serial No. 485,057.

This invention relates to hoists and more in particular to kettle hoists mounted on trucks, for use in candy factories.

One of the main objects of this invention is to provide a hoist adapted to handle the various sizes of kettles used in candy factories for cooking or melting sugar and other ingredients. Another object is to provide means whereby the various sizes of kettles may be tilted and locked in any desired angular position to pour out the contents thereof on the work tables. A further object is to provide such a hoist having means whereby the kettles may be raised or lowered, and turned around in horizontal and vertical planes, as required. Yet another object of this invention is to provide a portable hoist which may be easily transformed into a general utility derrick for the purpose of handling boxes, barrels and so forth. A still further object of this invention is the provision of a hoist in which all the load handling means are provided with self-locking mechanisms adapted to hold the load automatically in any desired position.

Additional features and advantages of this invention will appear in the course of the following description considered in connection with the accompanying drawings forming part of this application and in which similar reference numbers indicate corresponding parts in the various figures of the drawings.

In the drawings:

Fig. 1 is a side elevation, partly in section, of our invention provided with a boom derrick.

Fig. 2 is a front elevation of Fig. 1.

Fig. 3 is a fragmentary top view showing the operating mechanism for the lifting arms of the device.

Fig. 4 is a sectional view taken on line 4—4 in Fig. 3.

Fig. 5 is an end view showing the kettle gripping and tilting mechanism.

Fig. 6 represents a cross section taken on line 6—6, in Fig. 5.

Fig. 7 shows a cross-section taken substantially on line 7—7 in Fig. 1.

Fig. 8 is a similar view taken on line 8—8, Fig. 1.

Fig. 9 shows another cross-section taken on line 9—9, also in Fig. 1.

Fig. 10 is a side elevation of a modified, fixed, boom for supporting the kettle lifting arms of the device.

Fig. 11 is a fragmentary sectional view, on an enlarged scale, through part of the kettle tilting mechanism.

Fig. 12 is a fragmentary end view of Fig. 11.

Reference being had to the drawings, the kettle handling device comprises the following principal parts: the truck 1, the hoist-base 2 in which is rotatably mounted the hollow column 3 slidably engaged by the post 4 having removably secured at the top the derrick-mast 5, to which is hingedly mounted the boom 6 at whose end is rotatably secured the slide-frame 7 which supports the two lifting arms 8 on which the kettle 9 is suspended.

The truck 1 may be of any desired and suitable type, and in the present embodiment it has been assumed to be hand operated. It comprises a platform 10 mounted on anti-friction casters 11, of any commercial type and preferably provided with locking means, not shown, to hold the truck at any desired place. This truck is also assumed to have a removable push-bar 12, securable at either end of the truck; suitable holding sleeves 13 being provided thereon for that purpose.

The hoist-base 2 comprises a cylindrical shell 14 having a flanged bottom 15 secured to the truck-platform by means of bolts 16. On the base is bolted a split cover 17 to prevent the entrance of dirt, etc., within the shell.

The lower portion 18 of the column is inserted within the shell and is rotatably supported therein by the antifriction ball thrust bearing 19 and the annular ball bearing sets 20 and 21, of usual commercial types, respectively located adjacent the bottom and the top of the shell. Upon this lower column portion is secured by means of screws 22, or otherwise, a flange-ring 23 in the rim 24 of which are drilled numerous radially directed and evenly spaced holes 25. These holes may be engaged by the inner end of a lock-pin 26 slidably mounted in a centrally bored hub 27

provided laterally on the shell 14. This pin has a collar 28 and it is guided for longitudinal movement by a centrally bored bushing 29 screwed, or otherwise secured, in the hub 27. Intermediate the collar and the bushing is placed about the pin a coil-spring 30 the tendency of which is to force the pin inwardly into engagement with one of the holes 25. The outer portion of the pin is enlarged, as at 31, and terminates with an eye 32 whereby the pin may be pulled outwardly. In the enlarged portion there is driven a cross-pin 33 extending at both sides thereof and adapted to engage either one of two sets of rectangularly disposed diametral slots 34, 35, cut on the rim of the hub 27. The slot 34 is deeper and allows the lock-pin to penetrate within the holes 25, whereas the slot 35 is shallow and serves to hold said lock-pin in inoperative position.

Adjacent the upper end of the column portion 18 there are provided on both sides of the column enlargements 36 having through apertures 37 in which may be removably inserted the free ends of a bracket 38 upon which sectional counter-weights 39 may be piled up to counterbalance the device when used as a derrick for lifting relatively heavy loads, which might otherwise cause the overturning of the hoist, on account of the restricted dimensions of the truck, necessary to make traveling in the rather narrow aisles between the work tables in a candy factory possible. The bracket 38 is held on the column against accidental displacement by a removable pin 40.

On the column are also suitably secured handles 41 by means of which the column may be turned around.

The post 4 is slidable within the column and may be moved up or down therein by means of a gear and rack mechanism detailed especially in Fig. 7. As shown therein, a rack 42 is secured in any desired and suitable manner to the post and engages a suitable groove 43 (Figs. 1, 2) provided in the column to prevent the post from rotating within the former. The rack is in mesh with a gear 44 secured on a shaft 45 rotatably mounted in bearings 46 provided in a housing 47 cast integrally with the column 3. Upon this shaft is also secured a worm-gear 48 which is rotated by a worm 49 keyed on a shaft 50 also rotatably mounted in said housing and having a squared outer end 51 which receives a removable crank 52. The worm and worm-gear are of the single thread type to produce a self-locking drive mechanism.

The top of the post 4 has a flange 53 to which is removably secured by bolts 54 the flange 55 at the foot of the derrick-mast 5. The upper end of which is bifurcated, as at 56, to accommodate the two pulleys or sheaves 57, 58, freely rotatable on a pin 59 secured in both legs 60 of the bifurcation.

On the mast is hingedly mounted by means of the pin connection 61 the boom 6, the inner end of which is suitably bifurcated, as at 62, to accommodate the mast and afford a maximum upward swing of the boom. The downward swing of the latter is preferably limited to a horizontal position by means of stop lugs 63 formed near the bifurcated end of the boom and adapted to bear on the flange 55 of the mast.

At the outer end of the boom 6 there is a clamp comprising a stationary half 64 formed on the boom and a cap 65 hingedly secured thereto by a pin connection 66 and held in place by means of the clamping eyebolt 67 hingedly mounted on the stationary half and adapted to engage a slot provided in the ear 68 of said cap. Upon the latter are cast the two spaced and parallel brackets 65^a between which is placed a sheave 69 rotatably mounted upon an arbor 70 one end of which is screwed into one of said brackets. At the rear of the stationary half there is provided on the boom 6 a rib 71 having a hole 72.

When used as a derrick, the load is applied to a swivel hook 73, or any other suitable hitching means, secured at the free end of the load lifting chain or cable 74, running over the sheaves 69 and 58, for instance. Another chain or cable 75 has its outer end passed through the hole 72 in the rib 71 and secured thereto; it serves to raise and lower the boom.

The cables or chains 74, 75 are wound respectively on the winch drums 76 and 77 (Fig. 8) rotatably and freely mounted on a common shaft 78 supported in brackets 79 secured by bolts 80 to a base 81 cast on the column 3. At one end of the drums are secured in any desirable manner the worm gears 82, 83 which are engaged by their respective single-thread and self-locking worms 84 and 85 mounted on the shafts 86, 87, running in bearings 88 supported in the brackets 79, and the outer ends of which are squared to receive the removable crank 89, 90, by means of which the load-winches and the boom-winches are respectively operated.

The slide-frame 7 comprises the two parallel slide-rails 91 secured at the middle by bolts 92 to a block 93 having at the upper side a journal 94 provided at the top with a retaining collar 95 and adapted to be rotatably clamped between the clamp halves 64, 65. The slide-rails are held at their outer ends by the end-blocks 96 which are centrally apertured to rotatably support the spindle 97 extending beyond both end-blocks and provided with squared ends to receive a crank 98. This spindle serves to move the two lifting arms simultaneously and equally toward and away from each other; it is pro-

vided for this purpose with the right and left hand threads 99 and 100.

The lifting-arms 8 consist each of a sliding-head 101 provided with lateral grooves to fit the slide-rails 91 and centrally apertured and threaded to suit the corresponding threads on the spindle 97. Depending from the sliding-heads are the lifting arms 102, proper, which are preferably of channel-shaped cross-section and which have at their lower ends suitably formed flanged enlargements which act as protective housings 103 for the kettle tilting and clamping mechanisms.

The kettle tilting mechanism consists of an operating crank 104 removably engaging the squared end of a shaft 105 rotatably mounted in a bearing 106 produced on the housing 103. At the inner end of this shaft is keyed, or otherwise secured, a bevel-gear 107 meshing with another bevel gear 108 secured on the worm-shaft 109 rotatably mounted in suitable bearings 110 and 111 also positioned in the housing. Upon this worm-shaft is fastened a worm 112 adapted to rotate the worm-gear 113.

This worm-gear consists of a worm gearing 113^a mounted for free rotation on a central hub 113^b (Figs. 11, 12) freely rotatable on a stationary arbor 114 secured to the housing 103 against rotation by a set-screw 115. This arbor has an outer flange 116 and carries on its inner end a collar 117 secured thereto by a set-screw 118, for the purpose of freely retaining the gear-hub 113^b in place.

The gear-ring 113^a and its hub 113^b may be held rigidly together by means of a spring actuated lock-pin 119, similar in design and operation to the pin 26 above described, and guided by a bracket 120 positioned on the gear-hub. When this pin engages the aperture 121 drilled through the line of contact between the gear-ring and its hub, these two parts will work as a unit. When the lock-pin is pulled out and held in inoperative position, the gear-hub may be rotated independently of its gear-ring. The latter is held on the hub 113^b against axial displacement on one side by a bead 113^c provided circumferentially on the hub and on the other side by the large, flat heads of screws 122, also secured on the hub.

On the inner face of each gear-hub 113^b is bolted a plate 123 having depending parallel grip-fingers 124 terminating with upwardly directed hooks, or claws, 125 adapted to engage the underside of the beading, or roll, 9^a formed on the rim of the kettle 9.

This kettle is clamped to each tilting mechanism by means of a rim-clamp 126 swivelly secured at the lower end of a pressure screw 127 engaging the suitably threaded hub 128 of a horizontal bevel gear 129 rotatably mounted in a bearing formed on the

plate 123 and having a bearing-cap 130 held by bolts or screws 131.

The bevel-gear 129 meshes with another bevel-gear 132 secured on a shaft 133 freely rotatable in the stationary arbor 114 and having a collar 134. The outer end of this shaft is also squared and accommodates a removable crank 135.

It will be noted that the rotation of this crank in the proper direction will cause the rim-clamp 126 to bear upon the top of the rim of kettle, and thus enable a strong clamping of the latter between said clamp and the claws 125, to prevent any shifting of the kettle, when in tilted position. The pressure-screw 127 being of the single-thread type, provides also a substantially self-locking clamping mechanism for the kettle.

The reason for making the gear-rings and hubs of the worm-gears 113 independently rotatable, is to enable a person to tilt the kettle by turning but one of the operating handles 104, if necessary on account of local space conditions. If, for instance, the tilting is to be performed from the right side of the kettle, the lock-pin 119 on the left side is first pulled out into inoperative position, to permit the left hand gear-hub 113^b to rotate independently of its gear-ring 113^a, since the latter cannot be turned, except by rotating its corresponding worm 112, on account of the self-locking nature of this drive.

When the device is to be used exclusively as a kettle hoist, i. e. not as a derrick, the mast 5, the load and boom winches with their co-operating cables and sheaves, and the lifting arm mechanism may be eliminated. In this case, the boom 6 need not be hinged and may be replaced by a stationary boom 136, Fig. 10, bolted to the flange 53 of the post 4. The clamping device for the slide frame 7 positioned at the outer end of this boom is substantially like the one already described, except that the cap 137 is provided with shorter bolt-lugs 138, instead of the sheave-carrying brackets 65^a.

From the above description, the operation of the kettle-hoist will be readily understood and may be succinctly described as follows: Assuming that a kettle is ready to be taken from the fire to have its contents of melted sugar, for instance, poured on a work table, the operator pushes the truck in proper position to place the kettle substantially halfway between the lifting arms. The grip-fingers 124 are then brought into engagement with the underside of the roll 9^a of the kettle by suitably manipulating the rack-crank 52 and the crank 98 on the slide-frame. The rim-clamps 126 are then forced down on the rim by turning the cranks 135, to hold the kettle tightly in place. This done, the loaded truck is moved to the desired work table and either one of the tilting-cranks 104 is operated, due care having been taken to unlock the worm-

gear drive 113 on the opposite lifting-arm, and the melted sugar is then poured on the work table, wherever needed. Since the tilting mechanism is self-locking, the kettle will remain in any inclined position as long as required, without the workman having to concern himself with the tilting-crank.

While we have illustrated and described herein the present embodiment of our invention, it may be found desirable after continued experience to make slight changes in the construction and arrangement of the details of our invention, and we wish to include in this application all such changes as fall within the scope of the appended claims.

We claim:

1. In a hoist of the character described, a column; a post longitudinally movable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms, and means to vary the distance between said arms.

2. In a hoist of the character described, a column; a post longitudinally movable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms, and unitary means to vary the distance between said arms.

3. In a hoist of the character described, a column; a post longitudinally movable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms, and screw-threaded means in cooperative engagement with the lifting arms adapted to move same toward and away from each other.

4. In a hoist of the character described, a column; a post longitudinally movable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms, and means to rotate said gripping means and load in a vertical plane.

5. In a hoist of the character described, a column; a post longitudinally movable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms; means to rotate said gripping means and load

in a vertical plane, and means to hold the same automatically in any selected inclined position.

6. In a hoist of the character described, a column; a post longitudinally moveable therein; a boom secured to said post; clamping means positioned at the free end of the boom; a horizontal slide-frame rotatably supported in said clamping means; lifting arms depending from said frame; load gripping means positioned on the lifting arms, and unitary self-locking means to rotate and hold said gripping means and load in any selected position.

7. In a hoist of the character described, a pair of load gripping means adapted to grip the load at substantially diametrically opposite points; unitary self-locking means positioned on each gripping means to rotate same and the load thereon in a vertical plane, and means to unlock either one of said self-locking means to tilt said load by the other self-locking gripping means.

8. In a hoist of the character described, a pair of load gripping means adapted to grip the load at substantially diametrically opposite points; self-locking means to rotate said gripping means and load in a vertical plane; said self-locking means comprising a worm and a worm-gear consisting of an outer gear-ring and an inner hub portion rotatable relatively to each other, and means to lock the gear-ring and hub portion to form a rigid unit.

9. In a hoist of the character described, a pair of load gripping means adapted to grip the load at substantially diametrically opposite points; self-locking means to rotate said gripping means and load in a vertical plane; said self-locking means comprising a worm and a worm-gear consisting of an outer gear-ring and an inner hub portion rotatable relatively to each other; means to hold said gear-ring and hub portion in co-planar rotatable relation, and means to lock said component parts of the worm gear to form a rigid unit.

10. In a hoist of the character described, a pair of load gripping means adapted to grip a load at substantially diametrically opposite points; self-locking means to rotate said gripping means and load in a vertical plane; said self-locking means comprising a worm and a worm-gear consisting of an outer gear-ring and an inner hub portion rotatable relatively to each other; and unitary means to selectively hold the component parts of said worm-gear in independent rotatable relation and in rigidly connected relation.

In testimony whereof we affix our signatures.

FRANK D. FORADAS.
THOMAS HASAPES.