Dec. 15, 1942. C. R. SMITH 2,305,202

HOIST

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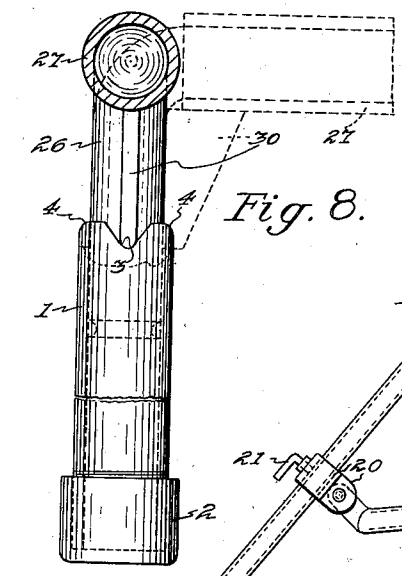


Fig. 8.

Fig. 1.

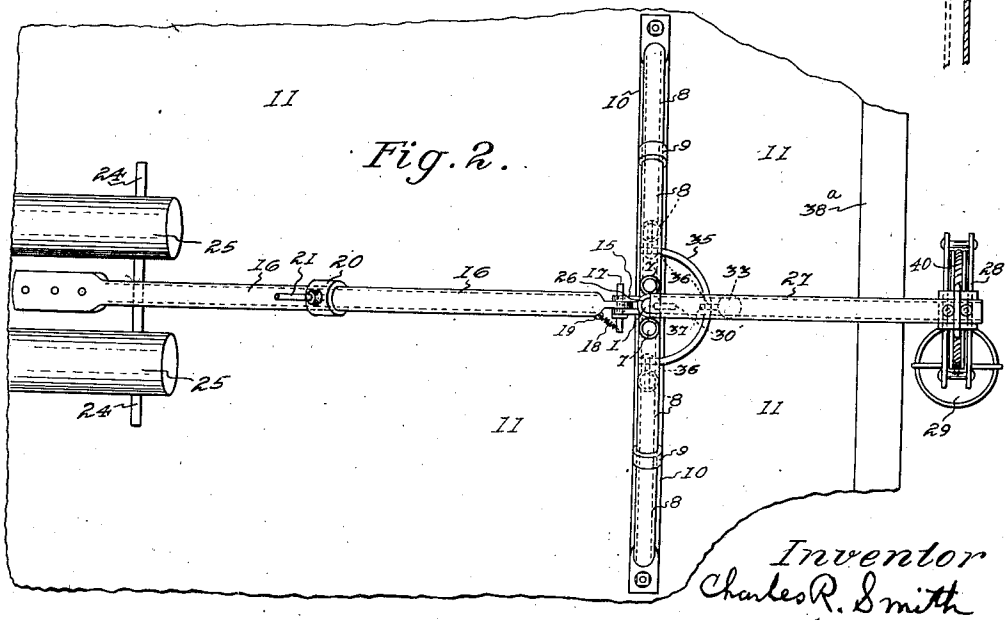


Fig. 2.

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Fig. 5.

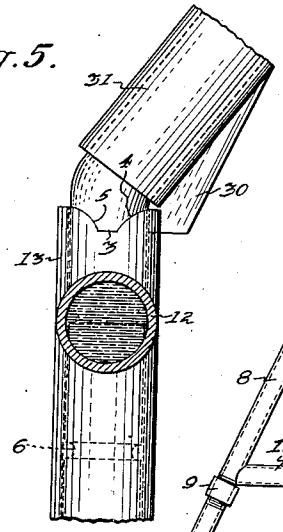


Fig. 3.

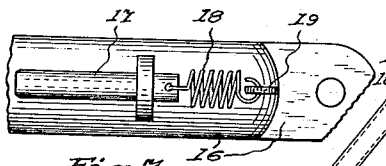


Fig. 7.

Fig. 6.

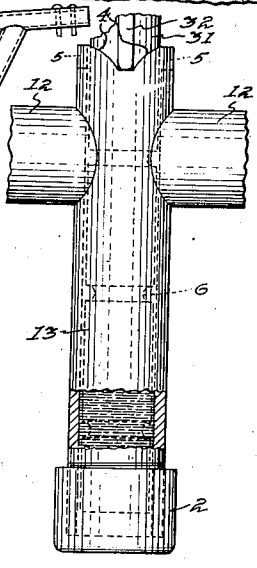


Fig. 4.

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HOIST

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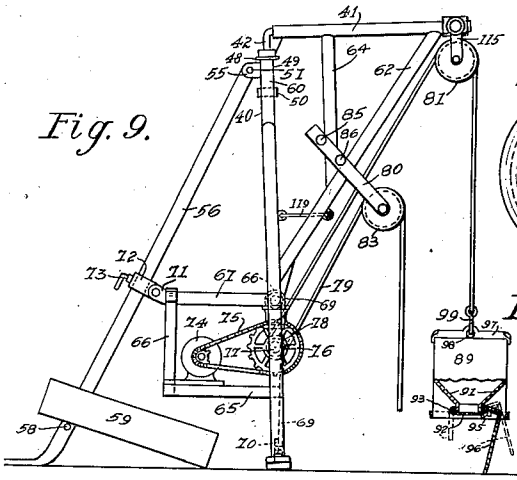


Fig. 9.

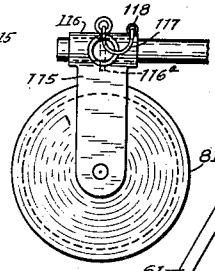


Fig. 16.

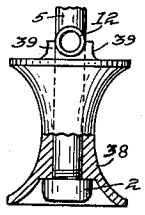


Fig. 17.

Fig. 18.

Fig. 10.

Fig. 13.

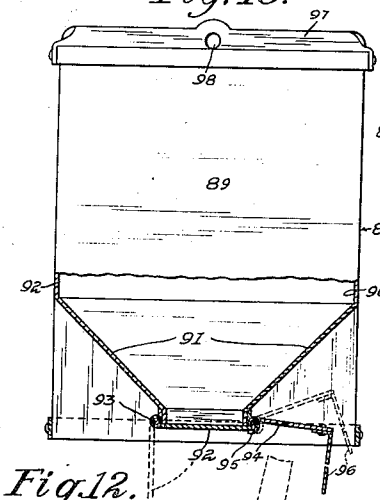


Fig. 12.

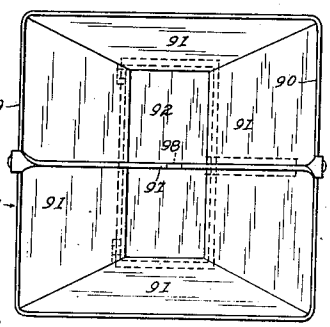
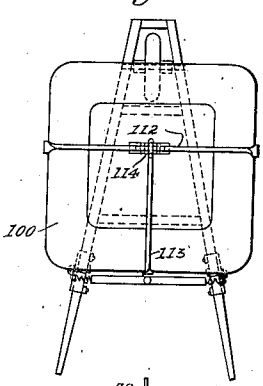


Fig. 11.



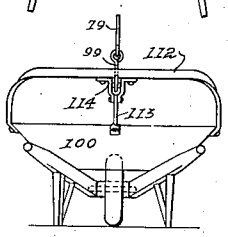


Fig. 14.

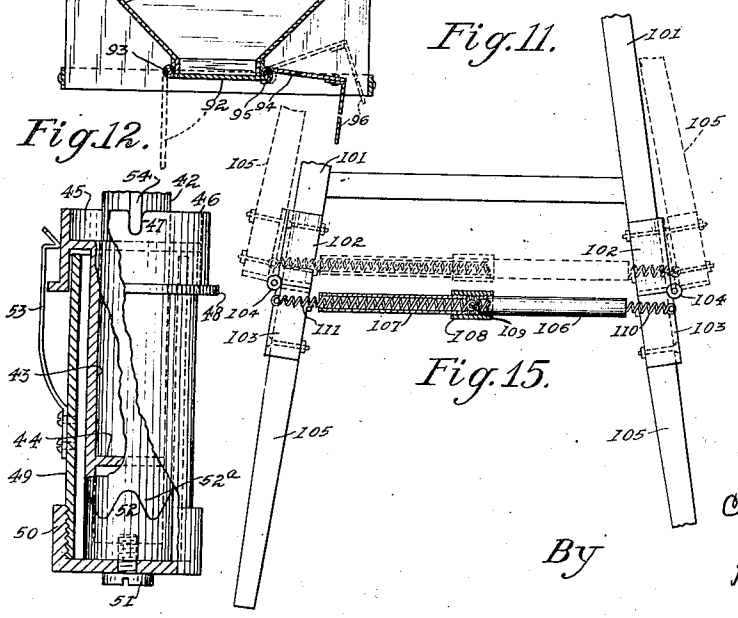


Fig. 15.

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Patented Dec. 15, 1942

2,305,202

UNITED STATES PATENT OFFICE

2,305,202

HOIST

Charles R. Smith, Chicago, Ill.

Application July 3, 1940, Serial No. 343,805

7 Claims. (Cl. 212—61)

This invention relates to improvements in hoisting apparatus and more particularly to traversing hoists adapted particularly for roofers' or builders' use and the like, although capable of a variety of other uses. One object is to provide hoisting apparatus adapted for use upon the roofs of buildings and at similar points of elevation for raising and lowering material with speed and facility. A further object is to provide hoisting apparatus that is of light weight, of few parts, readily assembled and dismantled so that it is capable of almost instant installation or removal from a point of operation and that may be readily serviced by one man from a position either upon the roof or on the ground.

A further object is to provide light weight instantly portable means for raising and lowering light loads by man power or for raising and lowering very heavy loads by motive power. A still further object is to provide a hoist of this character wherein the parts are so assembled that a very considerable load may be raised or lowered with safety and with a relatively small expenditure of power. A still further object is to provide a hoist of this type that is durable in use, efficient in operation and inexpensive to manufacture.

With the foregoing and other objects in view the invention consists in the combination and arrangement of parts to be hereinafter fully described, pointed out in the claims and illustrated in the accompanying drawings, in which—

Fig. 1 is a side view illustrating the application and use of the hoist.

Fig. 2 is a top plan view of Fig. 1.

Fig. 3 is a rear view of Fig. 1, the dotted lines denoting altered positions of certain adjustable parts.

Fig. 4 is a side view of the hoist illustrating a further adjustment of the same.

Fig. 5 is an enlarged fragmentary view illustrating a joint connection in the hoist assembly.

Fig. 6 is an enlarged fragmentary view, partly in section, of the hoist.

Fig. 7 is an enlarged detail view showing a locking feature.

Fig. 8 is an enlarged detail view, partly in section, of a frame coupling or tubular socket and boom end.

Fig. 9 is a side view of another form of the hoist adapted for raising and lowering heavy loads by power.

Fig. 10 is a front view of Fig. 9.

Fig. 11 is an enlarged top plan view of a trip bucket employed for heavy loads.

Fig. 12 is a view partly in elevation and partly in section of a frame coupling employed and is a modification of the structure shown in Figs. 5, 6 and 8.

Fig. 13 is a top plan view of a special construction of wheelbarrow used with the power hoist.

Fig. 14 is a view of Fig. 13 in rear elevation.

Fig. 15 is an enlarged fragmentary view of Fig. 14 illustrating the folding handles and connections.

Fig. 16 is an enlarged view of a pulley employed.

Fig. 17 is an enlarged view partly in section of a winch employed.

Fig. 18 is a view of Fig. 11 in side elevation and partly in section.

Like reference characters denote corresponding parts throughout the several views.

Referring now to Figs. 1 to 8 and 17, the hoist in one form consists of four readily assembled and dismantled sections thus providing a readily portable structure, three of the sections being adapted to fold together when not in use and the fourth being instantly detachable so that the device will occupy a very small space when being transported or stored. The reference numeral 1 denotes a tubular socket, the lower end thereof being threaded exteriorly to receive a threaded cap 2, the upper end of said socket being formed with the three V-shaped notches 3 located substantially ninety degrees apart about the socket mouth, each notch having sides 4, 5. The socket is formed upon its inner face with a plurality of horizontal semi-circular or annular depressions 6 well spaced apart, or if preferred said depressions may be formed only in the pipe or tube to be described hereinafter. The socket is packed with a hard lubricant.

Welded, or otherwise secured, to opposite sides of the socket are the straight upper ends of the lateral legs 7, 8, the leg portions diverging from the ends 7 and being of two-piece formation, the two sections being threaded and releasably secured together by the threaded collars 9, the lower ends of the lower leg sections being preferably flattened and secured to a flat or angular rail 10 that serves as a base and that is preferably loosely disposed upon the roof 11. The socket is slightly longer than the straight portions 7 of the legs 7, 8 with its notched end disposed slightly thereabove and its capped end slightly therebelow. A brace 12 connects the leg portions 8, 8 just abcve the collars 9 and firmly supports a hollow tubular bearing 13 similar in every respect to the socket 1. The socket 1, lateral

legs 7, 8, cross brace 12 and bearing 13 form one complete unit of the hoist. Spaced lugs 15 carried by the socket 1 receive between them the flattened end of the rear leg 16, perforated, as also are said lugs, to receive the pin 17 connected by the coil spring 18 to an ear 19 carried by said leg, said spring serving to yieldingly retain said pin in engaged relation with said lugs and leg.

The lower end of the leg 16 is flattened and perforated to permit it to be secured to the roof. A collar 20 adjustably arranged upon the leg 16 carries a set screw 21 for releasably securing it in any adjusted position, said collar being pivotally connected to a link 22 that carries a second pin and coil spring 17, 18 for releasably securing it to spaced lugs 23 carried by the brace 12. When not in use the collar 20 and link 22 may be manually moved upwardly or toward the socket 1 to permit the rear leg 16 to be moved inwardly into a position substantially parallel with said socket. The leg 16 forms a second unit and the link 22 a third unit of the hoist, said three units forming the hoist frame. Should it not be desired to fasten the leg 16 to the roof by nails or like means, a rod 24 extending transversely through the leg 16 may serve as a rest for the raised ends of the weights 25, which weights may consist of rolls of roofing paper or other weighty matter that may be handy and which may serve to anchor the leg in position.

Freely and rotatably disposed in the upper open end of the socket 1 is the downturned slightly reduced end 26 of the boom 27 that at its outer or free end carries the pulley 28 for raising and lowering the material, or other load, 29. Secured to the boom and to the reduced end thereof is the tapered tongue 30 adapted to ride over the notched end of the socket 1 when the boom end 26 is in position in said socket as said boom is moved laterally. Extending obliquely downward from a point located inwardly from the outer free end of the boom is the brace 31, said brace being received in the open notched end of the bearing 13, said brace being provided with a tongue 32 adapted, as said brace moves laterally with the boom, to ride over the notched mouth of said bearing. A support 33 connects said boom and the brace 31 to provide strength and rigidity. The boom with the brace 31 and support 33 provide a fourth unit of the hoist. An ear 34 carried by the support 33 serves as a means of attachment for another pulley, not here shown, when used. Pivotally secured to the lateral legs 7, 8 is a semicircular collar 35 formed along its inner or lower edge with three notches 36, spaced apart approximately ninety degrees, for engagement, in one position of the collar, with a notched boss 37 upon the brace 31 to retain the same together with the boom in adjusted position. Preferably three notches are provided in the collar to accomodate the boom in its three positions which positions are substantially ninety degrees apart. Freely arranged upon the bearing 13 and extending from the brace 12 to the cap 2 is a spool 38 retained in position by said cap, said spool being formed upon one end with the spaced upstanding lugs 39, 39 that snugly receive between them the braces 12 and prevent rotation of the spool. In operation the hoist is assembled upon the roof quite close to the fire wall 38a with the free end of the boom projecting over and beyond the same. A man upon the ground may place the load 29 upon the pulley rope 40 and raise the load manually by pulling upon the rope in the usual manner and then still by means of the pulley rope he may move the boom laterally until the load is moved over the fire wall to be deposited upon the roof. The pivotal points of the boom which are the lubricant filled socket 1 and bearing 13 insure lubrication at all times for the members riding therein.

The weights 25 bearing upon the bar 24 passing through the rear leg 16, and the inclined brace 31 bearing upon the member 13 well inward from the boom end prevent any possibility of the load overbalancing the hoist. Instead of moving the boom by cable one man upon the roof may grasp the brace 31 and move the boom laterally, or by means of the cable he may raise or lower the load. To lower a load a person upon the roof secures the load 29 to one end of the cable 40 and passes the same once or twice about the winch 38 while retaining the free end of the rope or cable in his hand, that is, that part of the cable upon the opposite side of the pulley with respect to the load. By paying the cable out slowly the load may now be gradually lowered, the winch serving as a steadying means and preventing the load from travelling downwardly at too great a speed or from getting out of control.

To disengage the boom and brace 31 from the socket and bearing member it is but necessary to lift said boom and brace free from said members. When the collar 35 is manually moved in an anticlockwise direction out of engagement with the boss 37 it may assume the position shown dotted in Fig. 3. It is not always necessary to use the collar as the boom will yieldingly retain any of its three positions outlined. By loosening the set screw 21 the collar 20 may be adjusted upon the leg 16 to position the legs 7, 8 in a perpendicular plane or to either side of the perpendicular. Two positions of the same are denoted in Fig. 4. The position of the legs 7, 8 with respect to the perpendicular has a direct reflection in the ease of movement of the boom and this adjustment can be made to suit the work in hand. In Fig. 4 the frame is tilted rearwardly with the legs 7, 8 incilned rearwardly, while in Figs. 1 and 2 the legs stand substantially perpendicular.

Referring now to Figs. 9 to 18 inclusive, except Fig. 17, another form of the hoist is shown. In this form the hoist is of the power operated type and is designed primarily for use in raising and lowering quite heavy loads although capable of light lifts also.

The frame proper is provided with dustproof bearings so that unnecessary friction and wear from dust and dirt are prevented and well lubricated trouble free operation is positively provided. The boom 41 is formed with the reduced downturned end 42 that extends into the tubular body portion 43 of the bearing almost to an inner partition 44 therein. The upper end of the body portion of the bearing is extended to form a cap having the inner annular portion 45 terminating in the crown 46 formed with a single V-shaped peripheral indentation 47 with a square base and a lower terminal flange 48, said cap enclosing the upper end of the jacket 49 that encloses said bearing body portion, the lower end of said jacket being threaded exteriorly to removably receive the interiorly threaded base cap 50 through which a screw 51 extends into the lower closed end of a ratchet 52 having a regular undulating or round-toothed upper peripheral edge to snugly receive the lower complementarily formed serrated annular edge 52a of said bearing. It will be noted that the crown 46 of the cap snugly receives the upper end of the jacket 49 but that said cap may rotate and move freely longitudinally of said

jacket, the latter remaining stationary. A flat spring 53 secured at one end to said jacket has its body portion bent outwardly and its free end notched and in frictional engagement with the crown of said cap to prevent it from being moved longitudinally of the jacket out of engagement therewith. A tongue 54 connecting the boom 41 and its end 42 is disposed in the indentation 47 of said crown so that rotary movement of said boom will impart such movement to the cap and bearing body portion 43, a longitudinal movement of said body portion with respect to said jacket being set up due to the complementarily formed inter-engaging edges of the ratchet and bearing body portion. This bearing assembly is compact and dirt and dust proof and when packed with a suitable lubricant provides needed lubrication indefinitely.

The jacket 40 is formed with ears 55 between which the upper flattened end of the rear leg 56 is snugly received upon the pin 57 connecting said ears, the lower twisted and flattened end of said rear leg resting freely upon the roof and carrying a transverse rod 58 upon which one or two weights 59 may rest to steady the hoist frame. Opposed lateral legs each having a short straight upper portion 60 welded to the jacket 49 and having an inclined portion 61 have their lower flattened ends disposed upon the roof or upon a strip base upon the roof. An inclined brace 62 connects the forward end of the boom to the upper end of a bearing of the exact assembly as that shown in Fig. 12 which is supported by the brace 63 connecting the inclined portions 61 of the legs 60, 61. A short drop brace 64 connects the boom 41 and inclined brace 62.

An auxiliary frame including a platform 65, rear braces 66, top braces 67, front braces 68 that terminate in supporting legs 69 that rest upon a base 70, are connected by a link 71, collar 72 and set screw 73 to the rear leg, said platform supporting the motor 74 connected by chain 75 to the sprocket wheel 76 fast upon one end of the shaft 77 fast upon which is the winch 78 about which the cable 79 is manually passed two or three times, said cable passing therefrom in one direction beside the frame of a clamp bracket 80 up and over the pulley 81 to the load 82 to be raised and lowered, said cable passing from the winch in the opposite direction over a pulley 83 carried by the clamp bracket downwardly to the operator, said pulley serving to keep the cable 79 free of the fire wall of the structure. The side members of the clamp bracket pass upon opposite sides of the drop brace 64 and inclined brace 62, said side members being connected by the pins 85, 86 so that bracket is thereby retained in adjusted position. When the motor 74 operates a slight manual pull upon one end of the cable will take the slack out of the cable and tighten the same sufficiently upon the winch to cause the same to raise a very heavy load readily. The same load is readily lowered by like manual manipulation of the cable upon the winch.

A locking pin 87 carried by the front braces 68 is adapted to enter a small perforation in the face of the sprocket wheel 76 so that, when the motor is not running, the said wheel may be locked against rotation to permit a heavy load to be lowered without operation of the winch, said winch then remaining stationary while the cable slips around it. The load carried by the cable 79 may be carried in a bucket 88 that is formed with side walls 89 and end walls 90, the end walls being flush with the side walls at the top of the bucket but extending downwardly only to the top of an inner hopper 91 so that manual access to said hopper below the lower ends of the end walls is possible, said hopper terminating in a discharge end disposed slightly above the lower termination of the side walls and normally closed by a door 92 connected to the hopper by the hinge 93 and normally or releasably secured in closed position as shown in full lines in Figs. 9 and 18, by the latch 94 hinged to the hopper and formed with the keeper 95 that directly engages said door, said latch having a trip bar 96 bolted thereto which bar normally projects well below the lower end of the bucket so that as the bucket is lowered upon a wheelbarrow or like container or upon the ground or roof the bar 96 will be automatically tripped to move into dotted line position and release the hinged door which will then drop into its dotted line position due to the weight of the load which will then be released. If desired the bucket may be manually emptied by the operator raising the trip bar to its dotted line position. The top edges of the end walls of the bucket are connected by a handle 97 formed with a perforation 98 that is engaged by the hook 99 carried by the cable 79.

Instead of the bucket a special type of wheelbarrow 100 may be employed which is provided with folding handles that include the usual bars 101 which at their outer ends are provided with sectional sleeves 102, 103 connected together by the hinge 104, said section 103 receiving and retaining a handle end or grip bar 105, the hinges 104 so connecting the sleeves that the relatively movable sleeves 103 may be manually moved outwardly or away from each other against the sleeves 102 to shorten the handles so that they will be in an out of the way position when a load is raised beside the wall of a building.

Two open ended sectional tubes 106, 107 have their adjacent ends threaded exteriorly so that they may be connected by the threaded coupling 108, a pin 109 extending between said tubes and through said coupling so that hooks at the meeting ends of a pair of coil springs 110, 111 may engage said pin, said springs extending in opposite directions through said tubes and therebeyond and their relatively remote ends being secured to the opposed hinge straps to yieldingly retain the folding handles in operative position in line with the said bars 101, said springs also serving to yieldingly retain said handles in folded, dotted line, position. A bail 112 has its ends secured to the sides of the wheelbarrow while a bar 113 secured to the rear wall of the wheelbarrow is connected by a bracket 114 to the bail 112, said bracket including a spacer connecting the bracket sides and receiving a pin passing through said sides, said spacer being engaged by the hook 99 at the end of the cable to permit raising and lowering of the wheelbarrow by said cable.

Referring again to the pulley 81 the same is carried by a pulley bracket 115 depending from a tubular crosshead 116, the tubes thereof being disposed at right angles to each other and either one being adapted to receive the free end of the boom 41 to mount the pulley, said boom having a small perforation adapted to receive a locking pin 116a adapted to pass through a like perforation in the crosshead to removably secure said pulley in position, said pin 116a being connected by a link 117 to an eye 118 carried by said crosshead. Obviously the pulley may be disposed

parallel to the boom or at right angles thereto depending upon which tube of the crosshead receives the boom end.

The boom with its pulley and load may be manually moved from its position midway between the legs **60**, **61** either to the right or left by an operator upon the roof or beside the boom grasping the inclined brace **62**, or it may be moved by a pull to the right or left upon the cable **79**. The boom operation is so smooth and frictionless that a slight pull in one direction will cause the boom to travel the full distance in that direction or until it contacts a leg **60**, **61** or until this movement is restrained by the chain **119** releasably connecting it to one of said legs.

When a load is to be raised from the ground or from a truck to the roof of a structure the bucket is filled by a workman upon the ground or truck, the door of the hopper being in closed position. With the motor running a slight pull upon the cable will tighten it slightly about the winch causing the same to readily lift the load to the desired height. The slight manual pull upon the cable is then diminished and the boom may be swung to the right or left, as previously described, and the cable permitted to slack gradually thus permitting the bucket to move downwardly into gentle contact with the roof or wheelbarrow when the bucket will be automatically opened and the load discharged. When the bucket is emptied the boom may be returned to intermediate position and the bucket permitted to descend for another load, or while upon the roof it may be filled, the hopper door being closed, and a return load brought down. Frequently it is desired to remove old paper, gravel or debris from the roof in this manner. The attention of but one operator is required to raise, lower, fill or dump the bucket or wheelbarrow when this hoist is used, the other workmen upon the job being able to give their time to other matters.

What is claimed is:

1. In a hoist, a socket, lateral legs fixedly secured to said socket, a rear leg adjustably and removably secured to said socket, a brace connecting said lateral legs, a link adjustably connecting said rear leg and brace, said rear leg being movable into inoperative position toward said lateral legs in one position of said link, a bearing carried by said brace, and a boom adjustably and detachably secured to said socket and bearing.

2. In a hoist, a bearing having a tubular body portion terminating at one end in peripheral serrations and at the opposite end in a cap formed with a peripheral indentation, a jacket for said body portion, a base cap for said jacket, a ratchet within said jacket having peripheral serrations cooperating with said body portion serrations, and a screw connecting said base cap and ratchet.

3. In a hoist having a boom, a bearing having a tubular body portion terminating at one end in peripheral serrations and at the opposite end in a cap formed with a peripheral indentation for engagement with said boom, a jacket encompassing said body portion having one end disposed between the same and said cap, a base cap for one end of said jacket, a ratchet within said jacket having peripheral serrations cooperating with said body portion serrations, a screw connecting said base cap and ratchet, and a spring carried by said jacket for frictional engagement with said first named cap.

4. In a hoist, a main frame including lateral legs and a boom, a bearing, cross braces connecting said bearing and lateral legs, a brace connecting said boom and bearing, a drop brace connecting said boom and brace, a pulley carried by said boom, a pulley carried by said brace and drop brace, a winch removably carried by said bearing, lugs upon said winch engaging said cross braces to anchor said winch, an auxiliary frame carried by said main frame, a motor carried by said auxiliary frame, a winch operatively carried by said auxiliary frame and connected to said motor, and a cable passing about said pulleys for selective detachable engagement with said winches.

5. In a hoist, a laterally swinging boom, lateral supporting legs therefor, a rear supporting leg, a collar adjustable upon said rear leg, and connection between said collar and lateral legs whereby movement of said collar will dispose said lateral legs into and out of the perpendicular.

6. In a hoist, a laterally free swinging boom, lateral supporting legs, a rear supporting leg, a collar adjustable upon said rear leg, a brace connecting said lateral legs, and a link connecting said brace and collar.

7. In a hoist, a main frame including a boom, an inclined brace, a drop brace connecting said boom and inclined brace, a bracket connecting said drop brace and inclined brace, a pulley carried by said bracket, a pulley carried by said boom, an auxiliary frame carried by said main frame, a motor carried by said auxiliary frame, a winch connected to said motor, and a load-engaging cable passing about one of said pulleys to and removably about said winch and then about said second pulley.

CHARLES R. SMITH.