April 1, 1958 G. C. CORLEY 2,828,870

HOIST

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Fig. 1.

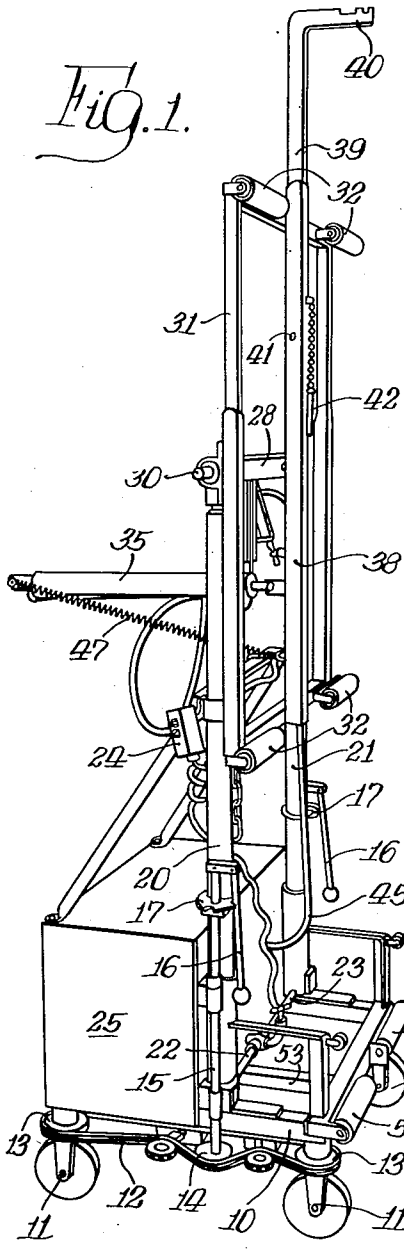


Fig. 2.

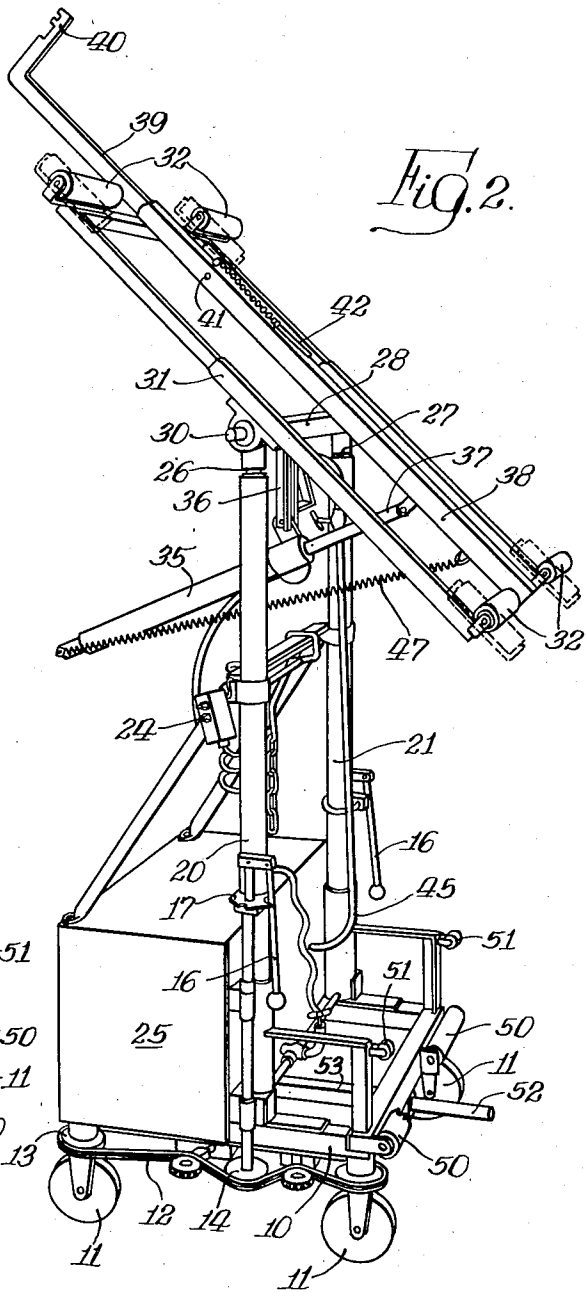
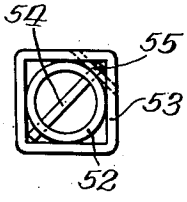


Fig. 5.



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Fig. 4.

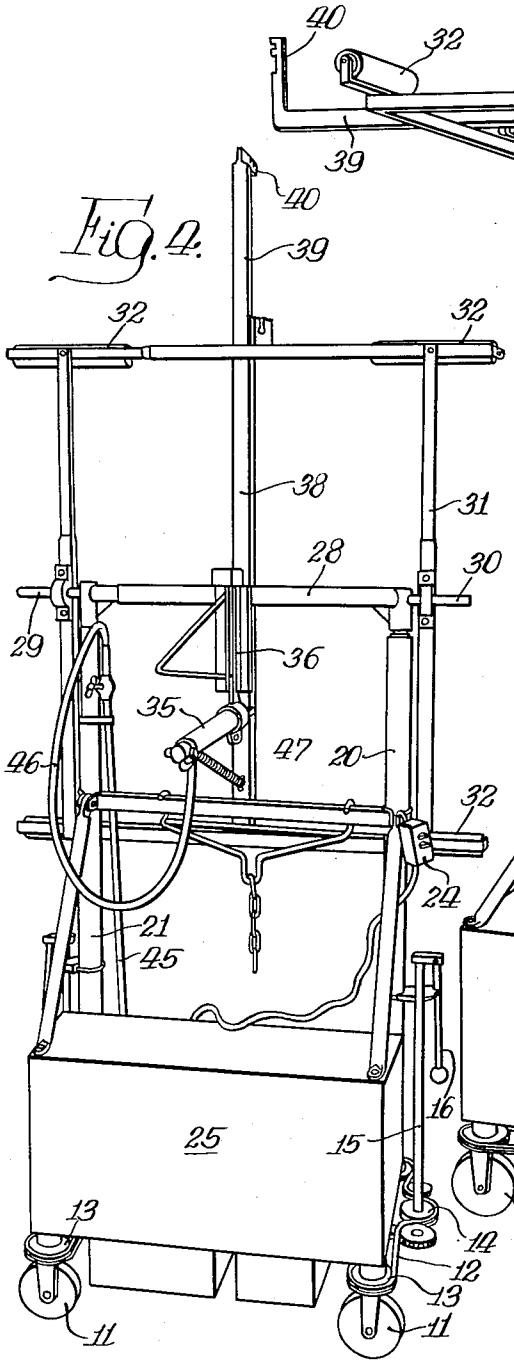
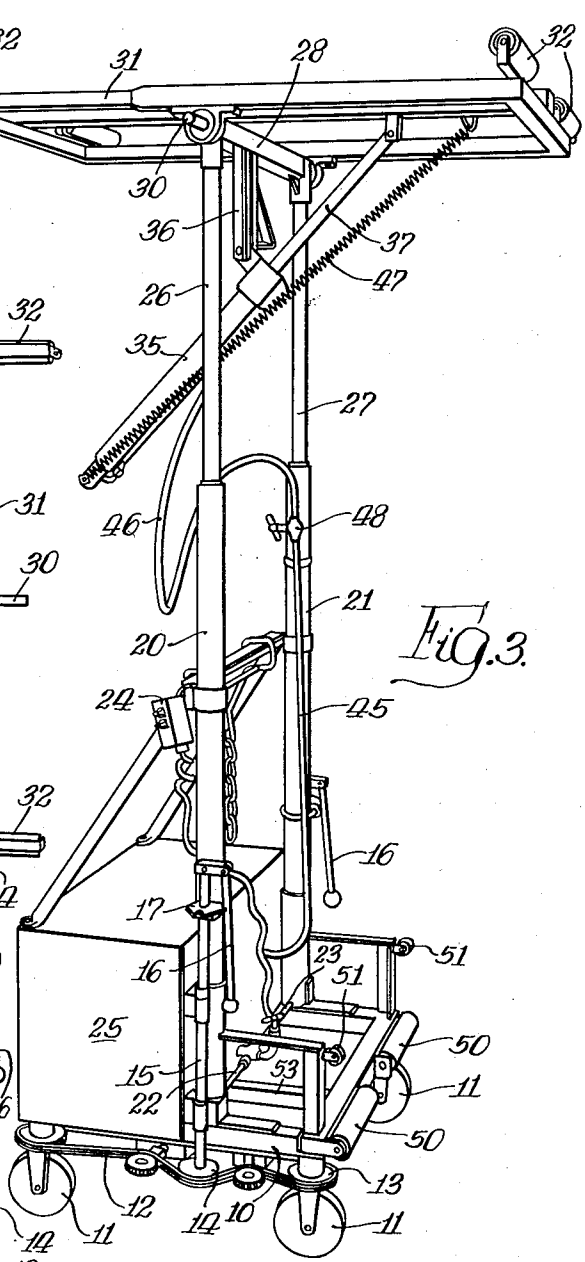


Fig. 3.



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HOIST

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Application October 5, 1955, Serial No. 538,595

13 Claims. (Cl. 214—1)

This invention relates generally to the hoists, and more particularly to a portable hoist for handling large panels used in the construction of pre-fabricated buildings.

In the construction of pre-fabricated buildings, it is desired to use large panels or sections to hold to a minimum the work required in assembling the building. Several men are required to handle such sections and very hard work is involved. In my copending application Serial No. 282,504 filed April 15, 1952, title, Building Construction, a hoist for raising and positioning large panels or sections is disclosed and claimed. This hoist has been found to be very helpful in assembling pre-fabricated buildings, but because this hoist is entirely mechanically operated it is relatively slow and considerable time is required to position a number of panels as required in assembling buildings. The present invention is directed toward a hydraulically operated hoist which provides much more rapid and easy operation.

It is therefore, an object of the present invention to provide an improved hoist for handling large pre-fabricated building panels.

A further object of the invention is to provide a hoist for building panels which can be easily operated by one man and which is highly stable.

Another object of the invention is to provide a portable hoist for building panels including a self contained power source for lifting and/or turning a panel on the hoist.

A feature of the invention is the provision of a hoist for handling building panels including a swinging frame for supporting a building panel which is pivotally mounted on a support secured to hydraulic cylinders so that the frame can be raised and tilted to position the panel at a desired spot.

A further feature of the invention is the provision of a hoist for large panels having a rectangular base frame with casters thereon, and having guiding means for controlling the direction of the casters to thereby control the movement of the hoist over a supporting surface.

Another feature of the invention is the provision of a panel hoist having a rectangular swinging frame having rollers at the edges of the frame which may be parallel to the axis of movement thereof, and with a hydraulic cylinder for controlling the tilt of the frame.

Still another feature of the invention is the provision of a hydraulically controlled lifting and tilting hoist including a hydraulic pump driven by an electric motor energized from a storage battery, with the battery, motor and pump supported on the base of the structure to increase the weight thereof and provide a stable unit.

Further objects, features and the attending advantages of the invention will be apparent from a consideration of the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a perspective view of the hoist with the swinging frame in the vertical position;

Fig. 2 illustrates the hoist with the swinging frame tilted at an angle;

Fig. 3 illustrates the hoist with the swinging frame lifted and in a horizontal position;

Fig. 4 is a perspective view from the back of the hoist with the frame in the position shown in Fig. 1; and

Fig. 5 is a detail of the counterbalance extension for the hoist.

In practicing the invention, there is provided a portable hoist for handling large panels or sections of prefabricated buildings. The hoist is of relatively light weight so that it may be moved from one building site to another, but has the weight concentrated near the base to provide a stable unit. The hoist has a rectangular base frame with casters at the corners thereof, and with a steering arrangement for the casters for controlling the direction of movement of the hoist over a flat surface. A storage battery, electric motor and hydraulic pump are provided in a housing on the base frame and operate to control the hydraulic cylinders of the hoist as will be described. The hoist includes two vertical hydraulic cylinders with the pistons thereof interconnected by a cross frame. A rectangular swinging frame is pivotally mounted near the center thereof on the cross frame. A hydraulic cylinder secured to the cross frame has the piston thereof connected to the swinging frame at a point displaced from the axis for pivoting the swinging frame between horizontal and vertical positions. A supporting bracket adapted to engage a panel extends from the side of the swinging frame which is uppermost as the frame is pivoted to a vertical position. Rollers are provided on the swinging frame and on the base frame of the hoist which engage the panel as it is moved by the hoist to prevent marring of the same. Electrical controls are provided for operating the hydraulic system so that the cross frame may be raised and lowered and the swinging frame may be pivoted with respect to the cross frame by simple controls.

Referring now to the drawings, Figs. 1 to 4 inclusive all show the same structure with the structure being shown from different angles and with the frame thereon being moved to different positions. The base frame **10** is formed by heavy square tubing and has four casters **11** supported at the corners thereof. For controlling the angular positions of the casters, a chain **12** is provided which extends about pulleys **13** connected to the casters, and a pulley **14** provided on control shaft **15**. The control shaft has an operating arm **16** pivotally connected to the top thereof, and an indexing plate **17** having notches therein is provided to receive the arm **16** so that the shaft **15** remains in fixed position. The casters on the two sides of the hoist are each controlled by a separate control arm and may be set independently of each other. It will be noted that the casters **11** are not offset with respect to their pivotal mountings as is the case with self following casters. The steering arrangement provided facilitates positioning of the hoist and makes it possible to move the same very close to walls or the like.

Extending vertically from the base frame **10** are hydraulic cylinders **20** and **21** having movable pistons **26** and **27**. A cross frame **28** is supported on the pistons **26** and **27** of the hydraulic cylinders and has axles **29** and **30** extending from the ends thereof to which a swinging frame **31** is pivotally mounted. The frame is of rectangular configuration as best shown in Fig. 4 and has rollers **32** mounted at the corners thereof. The rollers normally have their axes extending parallel to the pivotal axis of the swinging frame but are mounted so that they may be rotated through an angle of 90° so that the axes will be perpendicular to the pivotal axis of the swinging frame. This latter position is shown by dotted lines in Fig. 2 and is used to move a panel across the hoist in a transverse direction.

The cylinders **20** and **21** are operated by hydraulic pressure applied through lines **22** and **23** respectively which are controlled by a switch on the control head **24**. A housing **25** is provided on the frame **10** within which

is supported a pump for the hydraulic fluid, an electric motor for driving the pump, and a storage battery for energizing the motor. One of the switches on the control head **24** operates an electrically controlled valve for applying hydraulic fluid into the cylinders **20** and **21** to raise the pistons **26** and **27** of the cylinders **20** and **21** respectively. The control head **24** is provided on a long cable so that it can be controlled by an operator who may be some distance from the hoist to better observe the operation thereof. The housing **25** also serves as a platform for the operator to step on as may be desired in operating the hoist. The weight of the plungers, cross frame and swinging frame are sufficient to return the pistons **26** and **27** when the hydraulic pressure is released.

For controlling movement of the swinging frame **31** a third hydraulic cylinder **35** is provided. This cylinder is pivotally mounted on support **36** extending downwardly from the cross frame **28**. The piston **37** of the cylinder **35** is connected to the frame **31** being pivotally connected to the center member **38** thereof. As the connection to the swinging frame is displaced from the pivotal axis thereof, movement of the piston **37** causes the frame to pivot about its axis. The center member **38** may be made of square tubing and have a support member **39** in sliding relation therein. The member **39** has a projecting finger portion **40** for connection to a building panel. The position of the support member **39** may be adjusted by aligning openings **41** in the member **38** with openings in the arm **39** and fixing the relative position thereof by pin **42**.

The supply of hydraulic fluid to the hydraulic cylinder **35** is applied through an electrically operated valve controlled by a switch on the control panel **24**, with the fluid being supplied through the tube **45** which extends from the housing **25** and through flexible tube **46** connected to the cylinder **35**. A valve **48** controls the speed of operation of the cylinder **35**. A spring **47** returns the plunger of the hydraulic cylinder when the fluid therein is allowed to return.

It will be noted that additional rollers **50** are provided at the base of the hoist and extend beyond the casters thereof to hold a panel supported on the hoist clear of the casters. Rollers **51** supported at a higher level than rollers **50** engage the panel as the frame is raised to lift the panel from the floor. The panel thereafter is engaged by the rollers **32** so that it may be lifted and/or turned from one position to another. The panel will be held in a stable condition by the rollers and will not be marred by the engagement with the hoist.

As shown in Figs. 2 and 5, a telescoping counterbalance extension **52** may be provided in the member **53** of the base frame. This extension may be a round tube provided in the square tube frame member **53**. A pin **54** may be provided in the tube **52** to prevent it from rotating, and a pin **55** may be provided in the square tubing frame member **53** which is engaged by the pin **54** so that the extension cannot be removed completely. The extension may be used to hold weights so that the panel hoist will not tip when handling large panels, or the operator may step on this extension to prevent tipping of the hoist.

Considering now the operation of the hoist, the hoist may be rolled on a surface, such as the floor of a prefabricated building, and the finger **40** may be attached to a building panel. The cylinders **20** and **21** may be operated to raise the panel from the floor. The panel may then be moved from one position to another while held vertically or may be tilted by tilting the frame **31** as shown in Fig. 2. The panel may be moved to a horizontal position and lifted further as shown in Fig. 3, as it may be desired to position ceiling panels. By control of the direction of the casters **11** by arms **16**, the desired movement of the hoist over a supporting surface is made easier. The position of the support member **39** may be changed as required for handling panels of different sizes.

Although the structure has been illustrated as powered by hydraulic cylinders, it will be apparent that other driving means may be used. Pneumatic cylinders might be substituted for the hydraulic cylinders, and racks or screws driven by electric motors might also be used. The construction of the base frame vertical uprights and swinging frame disclosed provides a balanced unit which remains substantially balanced when supporting a panel thereon to provide a stable unit. It is to be pointed out that large panels up to 24 feet in length may be handled and there is a substantial possibility of the hoist tipping. By providing the balanced structure having substantial weight on the base frame the danger of tipping is greatly reduced and the unit has been found to be quite stable. The counterbalance extension provided may be used to prevent tipping when required.

I claim:

1. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, hydraulically operated telescopic means secured to said base structure and having a portion movable vertically with respect thereto, a rectangular swinging frame pivotally secured to said movable portion of said telescopic means, roller means positioned along opposite edges of said swinging frame, said swinging frame being pivoted along an axis intermediate said opposite edges and being rotatable from a substantially horizontal position to a substantially vertical position, extensible actuating means supported at one end on the movable portion of said telescopic means and having another end connected to said swinging frame and operable upon expansion to move said swinging frame between vertical and horizontal positions, and support means secured to said swinging frame and extending from the edge thereof which is uppermost as said frame is moved to the vertical position for supporting a building section therefrom, said roller means engaging the building section in response to pivotal movement of said swinging frame.

2. A hoist for handling large flat building sections including in combination, a base structure, a plurality of casters secured to said base structure to permit movement thereof over a horizontal surface, steering means coupled to said casters for controlling the direction of movement thereof, vertically extending telescopic means secured to said base structure and having a portion movable vertically with respect thereto, a rectangular swinging frame pivotally secured to said movable portion of said telescopic means, roller means positioned along opposite edges of said swinging frame, said swinging frame being pivoted along an axis intermediate said opposite edges and being rotatable from a substantially horizontal position to a substantially vertical position, extensible actuating means supported at one end on movable portion of said telescopic means and having another end connected to said swinging frame and operable upon expansion to move said swinging frame between vertical and horizontal positions and support means secured to said swinging frame and extending from the edge thereof which is uppermost as said frame is moved to the vertical position for supporting a building section therefrom, said roller means engaging the building section in response to pivotal movement of said swinging frame.

3. A hoist for handling large flat building sections including in combination, a base rectangular structure, a caster at each corner of said base structure to permit movement of the hoist over a horizontal surface, steering means coupled to said casters for controlling the direction of movement thereof, said steering means including pulleys attached to said casters, chains about the pulleys on each side of the base structure and a control means

including a pulley in engagement with each chain and a control arm connected to each pulley of said control means, vertically extending telescopic means secured to said base structure and having a portion movable vertically with respect thereto, a rectangular swinging frame pivotally secured to said movable portion of said telescopic means, roller means positioned along opposite edges of said swinging frame, said swinging frame being rotatable from a substantially horizontal position to a substantially vertical position, and support means secured to said swinging frame.

4. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, first and second vertically extending telescoping means secured to said base structure and each having a vertically movable portion, a cross frame secured to said movable portions, a rectangular swinging frame pivotally secured to said cross frame, third telescoping means supported on said cross frame and having a movable portion connected to said swinging frame, means to expand and contract said third telescoping means for controlling pivoted movement of said swinging frame, roller means positioned at opposite edges of said swinging frame and having axes parallel to the pivotal axis of said swinging frame, and support means secured to said swinging frame and extending therefrom for engaging a building section, said roller means engaging the building section in response to pivotal movement of said swinging frame.

5. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, first and second vertically extending hydraulic cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons, a rectangular swinging frame pivotally secured to said cross frame, a third hydraulic cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means positioned at opposite edges of said swinging frame, and support means secured to said swinging frame and extending therefrom for engaging a building section, said roller means engaging the building section in response to pivotal movement of said swinging frame.

6. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, first and second vertically extending cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons, a rectangular swinging frame pivotally secured to said cross frame, a third cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means positioned at opposite edges of said swinging frame and having axes parallel to the pivotal axis of said swinging frame, said roller means engaging the building section in response to pivotal movement of said swinging frame, support means secured to said swinging frame and extending therefrom for engaging a building section, and control means for applying fluid to said cylinders for moving said pistons thereof, said control means including electrically operated valve means and switch means for controlling said valve means.

7. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement of the hoist over a horizontal surface, steering means for said caster means for controlling the direction of movement of the hoist, first and second vertically extending cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons, a rectangular swinging frame pivotally secured to said cross frame, a third cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means positioned at opposite edges of said swinging frame, said roller means engaging the building section in response to pivotal movement of said swinging frame, support means secured to said swinging frame and extending therefrom for engaging a building section, and control means for applying fluid to said cylinders for moving said pistons thereof, said control means including electrically operated valve means and switch means for controlling said valve means.

8. A hoist for handling large flat building sections including in combination, a rectangular base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, rollers secured to said base structure on one side thereof, first and second vertically extending cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons and extending substantially parallel to said one side of said base structure, a rectangular swinging frame pivotally secured to said cross frame, a third cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means positioned at opposite edges of said swinging frame, and support means secured to said swinging frame and extending therefrom for engaging a building section, said roller means on said base structure and on said swinging frame engaging the building section supported on said support means in various positions of said swinging frame.

9. A hoist for handling large flat building sections including in combination, a rectangular base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, hydraulically operated telescopic means secured to said base structure and having a portion movable vertically with respect thereto, a rectangular swinging frame pivotally secured to said movable portion of said telescopic means, roller means positioned at opposite edges of said swinging frame, said swinging frame being pivoted along an axis intermediate said opposite edges, hydraulic means for rotating said swinging frame from a substantially horizontal position to a substantially vertical position, support means secured to said swinging frame and extending from the edge thereof which is uppermost as said frame is moved to the vertical position for supporting a building section therefrom, said roller means engaging the building section in response to pivotal movement of said swinging frame, a housing secured to said base structure, operating means within said housing including a hydraulic pump, an electric motor for driving said pump, and a battery for energizing said motor, and electric control means for controlling the operation of said operating means.

10. A hoist for handling large flat building sections including in combination, a rectangular base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, first and second vertically extending hydraulic cylinders secured to said base structure and each having a piston movable vertically with respect thereto, a cross frame secured to said pistons, a rectangular swinging frame pivotally secured to said cross frame, a third hydraulic cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for rotating the same from a substantially horizontal position to a substantially vertical position, roller means positioned along opposite edges of said swinging frame, support means secured to said swinging frame and extending from the edge thereof which is uppermost as said frame is moved to the vertical position for supporting a building section therefrom, said roller means engaging the building section in response to pivotal movement of said swinging frame, operating

means for supplying hydraulic fluid to said cylinders including a hydraulic pump, an electric motor for driving said pump, and a battery for energizing said motor, and electric control means for controlling the operation of said operating means, said electrical control means including a control head secured to a cable so that the control head is movable with respect to the hoist.

11. A hoist for handling large flat building sections including in combination, a base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, first and second vertically extending hydraulic cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons, a rectangular swinging frame pivotally secured to said cross frame, a third hydraulic cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means mounted on opposite edges of said swinging frame and being rotatable from a position in which the axes thereof are parallel to the pivotal axis of said swinging frame to a position in which the axes are perpendicular to the axes of said swinging frame, and support means secured to said swinging frame and extending therefrom for engaging a building section, said roller means engaging the building section in response to pivotal movement of said swinging frame.

12. A hoist for handling large flat building sections including in combination, a rectangular base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, rollers secured to said base structure on one side thereof, first and second vertically extending cylinders secured to said base structure having vertically movable pistons, a cross frame secured to said pistons and extending substantially parallel to said one side of said base structure, a rectangular swinging frame pivotally secured to said cross frame, a third cylinder supported on said cross frame and having the piston thereof connected to said swinging frame for controlling pivotal movement thereof, roller means mounted on opposite edges of said swinging frame and being rotatable from a position in which the axes thereof are parallel to the pivotal axis of said swinging frame to a position in which the axes are perpendicular to the axis of said swinging frame, and support means secured to said swinging frame and extending therefrom for engaging a building section, said roller means on said base structure and on said swinging frame engaging the building section supported on said support means in various positions of said swinging frame.

13. A hoist for handling large flat building sections including in combination, a rectangular base structure, caster means secured to said base structure to permit movement thereof over a horizontal surface, telescopic means secured to said base structure and having a portion movable vertically with respect thereto, a rectangular swinging frame pivotally secured to said movable portion of said telescopic means, roller means positioned at opposite edges of said swinging frame, said swinging frame being pivoted along an axis intermediate said opposite edges, means for rotating said swinging frame from a substantially horizontal position to a substantially vertical position, support means secured to said swinging frame and extending from the edge thereof which is uppermost as said frame is moved to the vertical position for supporting a building section therefrom, said roller means engaging the building section in response to pivotal movement of said swinging frame, a housing secured to said base structure, operating means within said housing for energizing said telescoping means and said rotating means, and counterbalance means on said base structure having an extensible portion for supporting a weight to hold said hoist stable.

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