Nov. 16, 1937. R. T. ROMINE 2,099,078

STACK LIFTER

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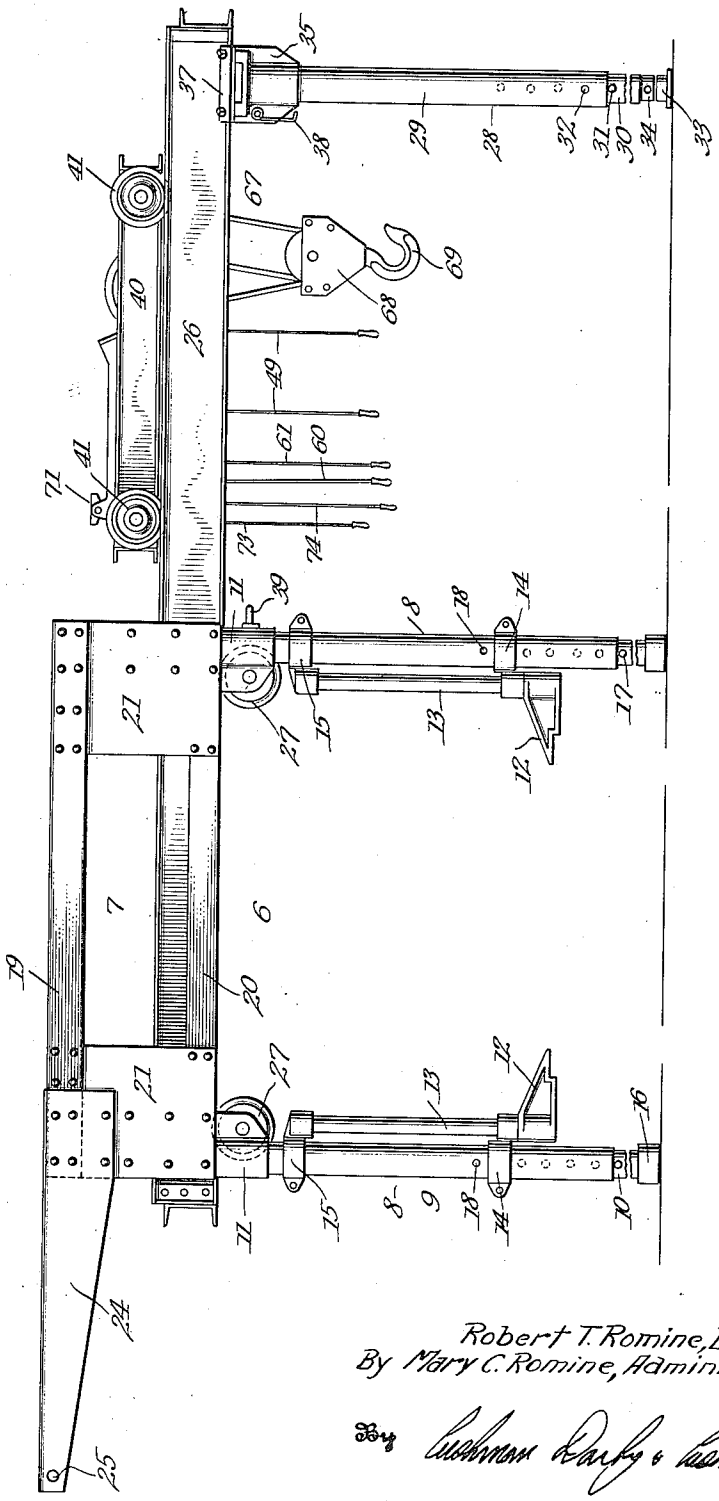


Fig. 1.

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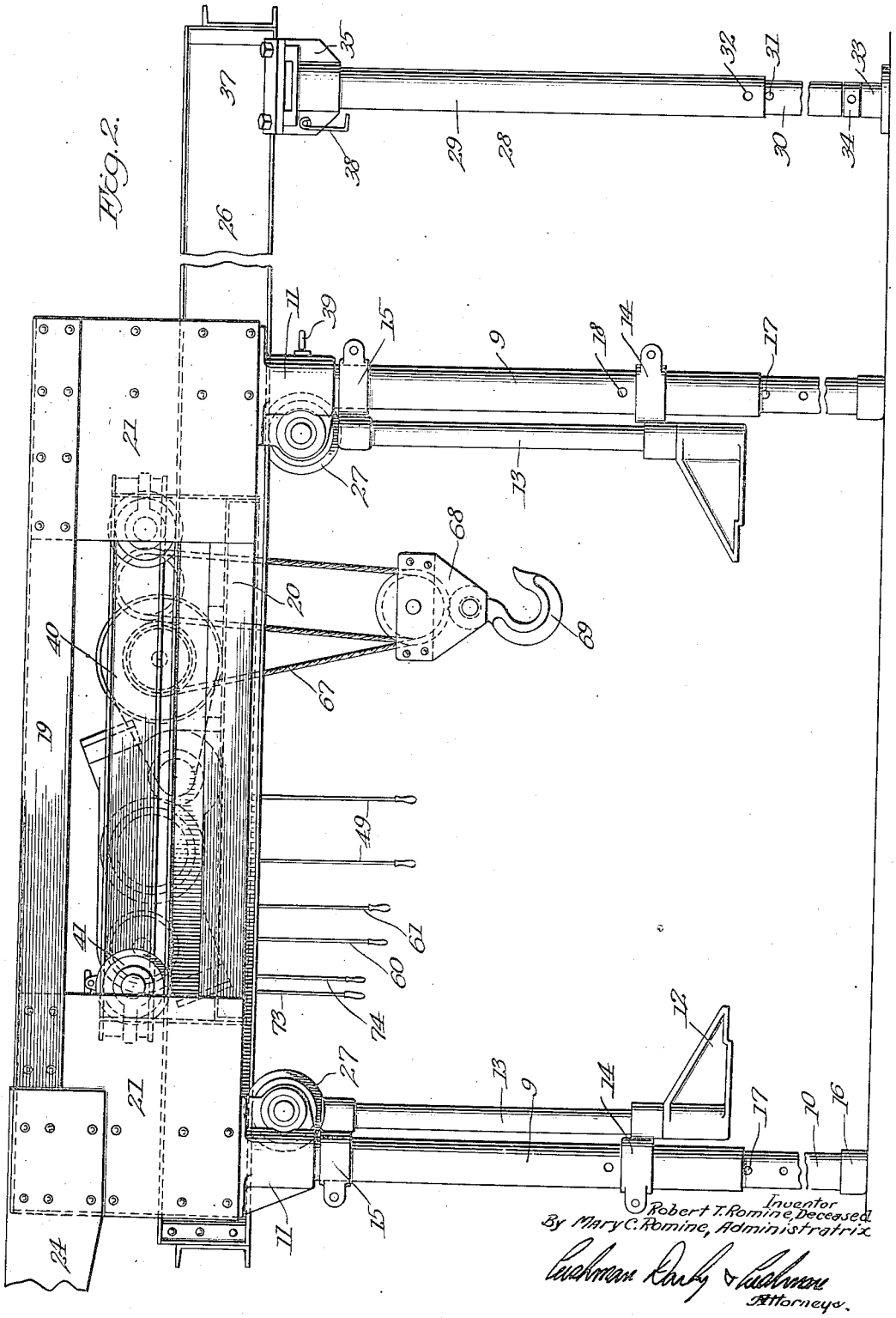
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STACK LIFTER

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Fig. 2.



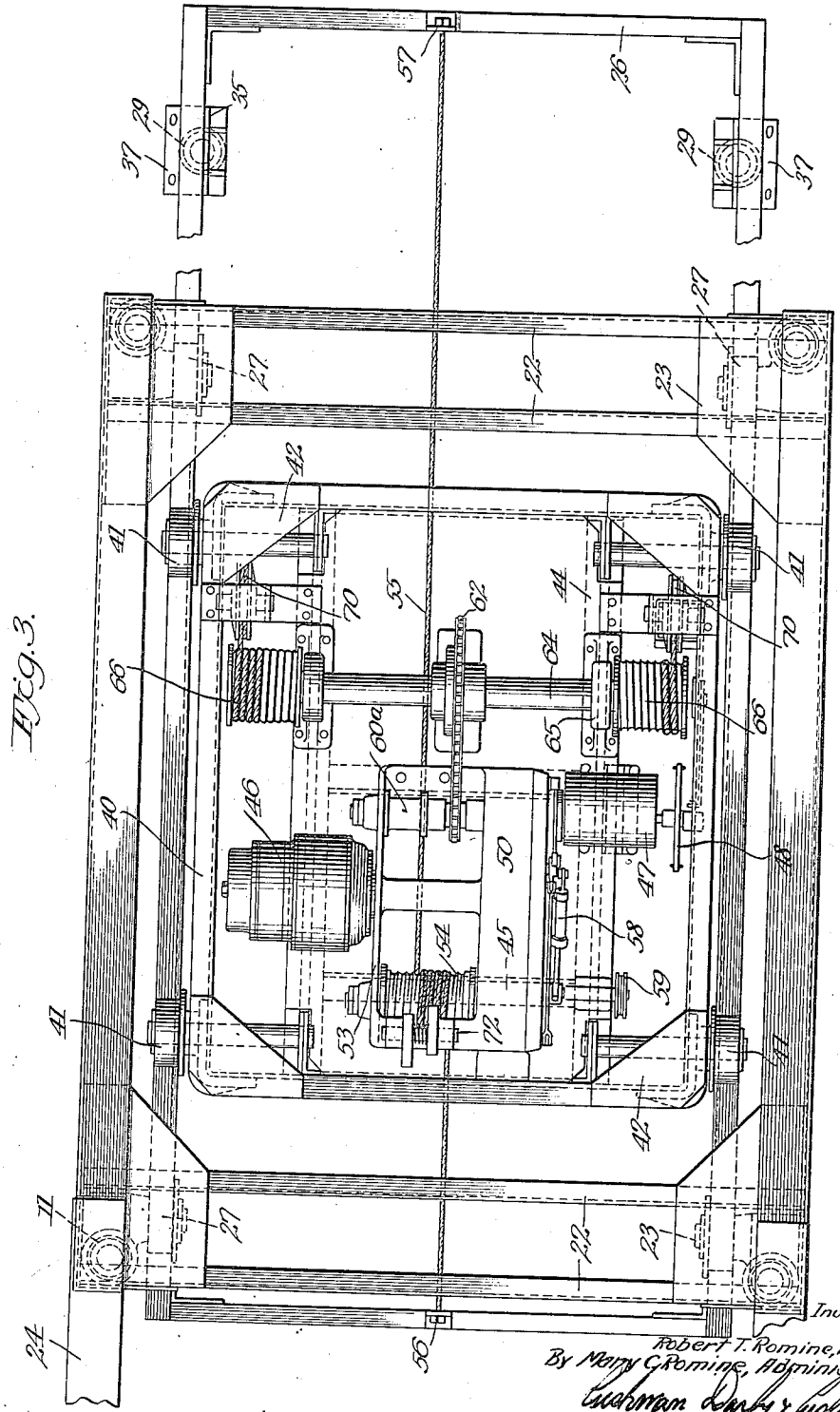
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Fig. 3.



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STACK LIFTER

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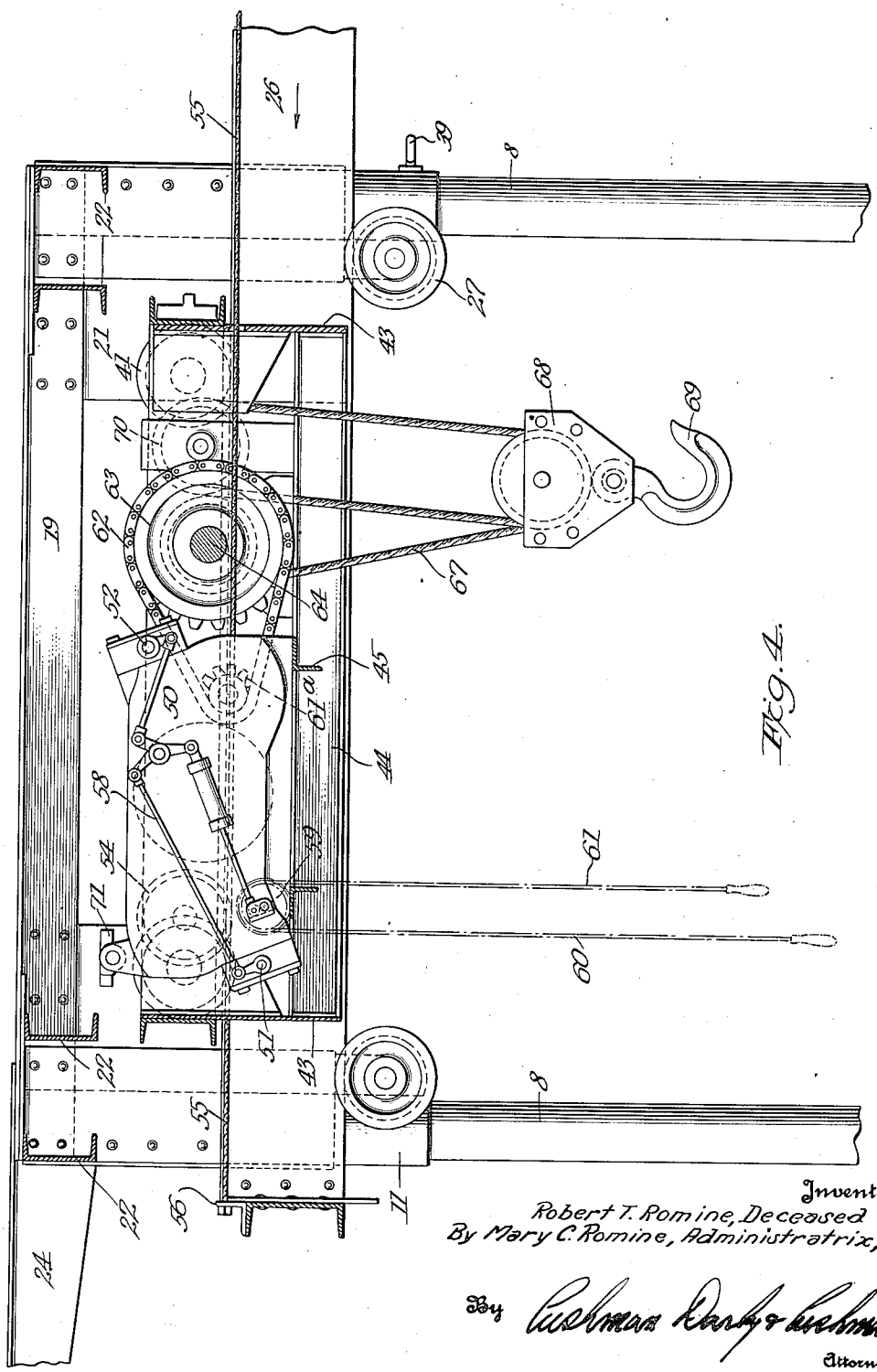


Fig. 4.

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Nov. 16, 1937. R. T. ROMINE 2,099,078

STACK LIFTER

Filed Jan. 14, 1935 5 Sheets-Sheet 5

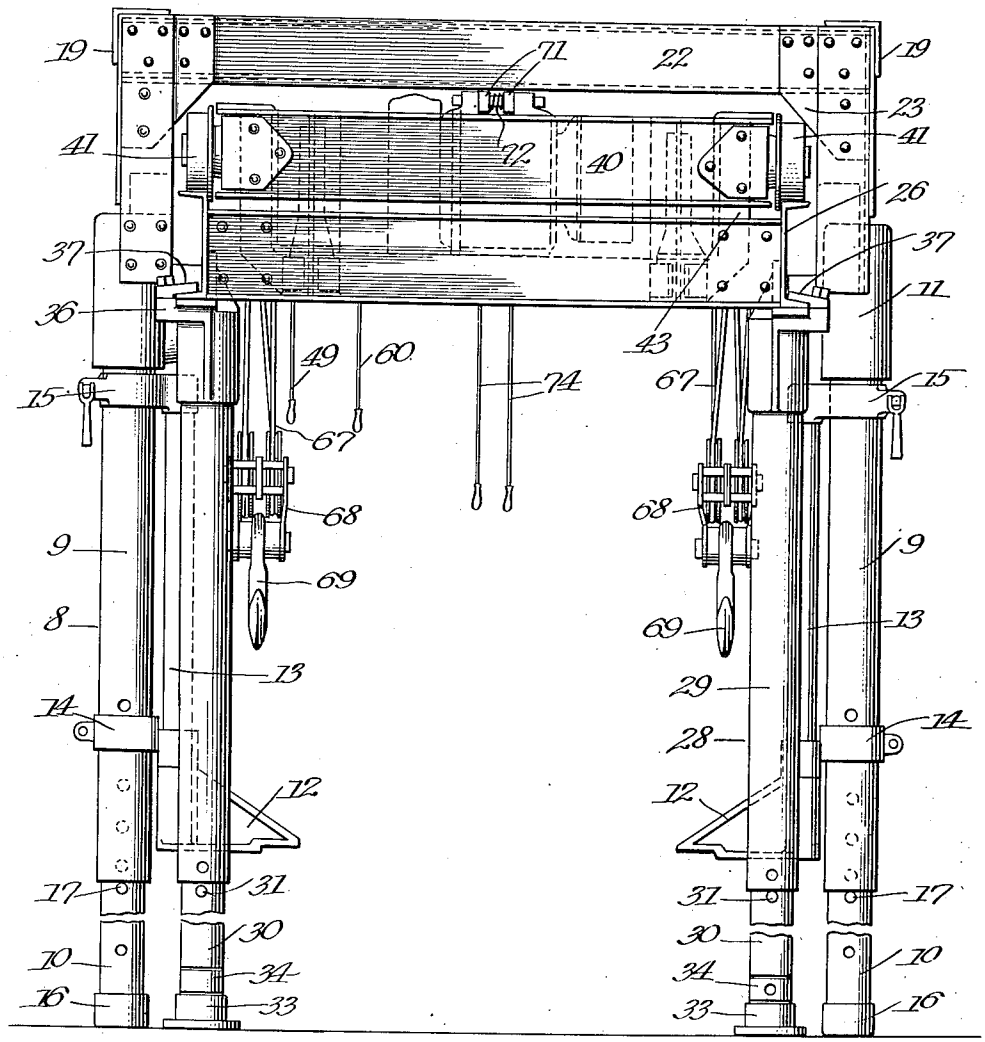


Fig. 5.

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UNITED STATES PATENT OFFICE

2,099,078

STACK LIFTER

Robert T. Romine, deceased, late of Macomb County, Mich., by Mary C. Romine, administratrix, Mount Clemens, Mich.

Application January 14, 1935, Serial No. 1,810

12 Claims. (Cl. 212—74)

This invention relates to new and useful improvements in cranes or stack lifters and more particularly to a portable or extensible type which can be readily conveyed to various points and is particularly adapted to the loading and unloading of stacks or bundles of sheet metal in and around railway rolling stock or in factories.

An important object of the invention is to provide a crane or stack lifter having an extensible frame or section which can be made to reach out or recoil by power operated means to form an extended trackway for the travel of an overhead load carrier mechanism which can be moved back and forth upon said extension frame to carry or engage an object for turning or conveying the same. Suitable supports are associated with this extension frame for supporting its outer end when extended. These supports are vertically adjustable for engaging supports at various elevations and together with those provided for the stationary frame of the crane, form a six-legged frame which may be elevated and transported by a truck as disclosed in my earlier patents.

Another important object of the invention is to provide a travelling carriage including hoist mechanism and power operated means therefor, which carriage is associated with the extension frame and the stationary frame in such a manner that the extension frame can be extended and withdrawn and the carriage can be moved upon the extension frame under power derived from the power operated means mounted on the carriage.

A further object of the invention is to provide means for anchoring the crane to prevent creepage due to vibration and accidental tilting of the crane when the extension frame is extended and carries a load.

A still further object of the invention is to provide readily accessible controls for the power operated mechanism on the hoist carriage within easy reach of an operator stationed upon the ground.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of the application and wherein like numerals are employed to designate like parts throughout the several views:

Fig. 1 is a side elevation of a crane or stack lifter with the extension frame extended;

Fig. 2 is an enlarged fragmentary side elevation of the same illustrating the extension frame partially recoiled;

Fig. 3 is an enlarged top plan of Fig. 2;

Fig. 4 is a fragmentary longitudinal section through the crane illustrating the clutch mechanism for operating the propelling drum and the hoist mechanisms; and

Fig. 5 is an end elevation of the crane.

Referring now more particularly to the drawings, the numeral 6 designates a stationary overhead crane or frame in its entirety which comprises a stationary substantially rectangular frame 7 supported at each of its corners by depending telescopically adjustable depending supports or legs 8. Each of these legs comprises outer and inner tubular telescopic sections 9 and 10 respectively, the former being secured in castings 11 suitably secured to the corners of the overhead frame. Slidably associated with each outer section 9 is an adjustable lifting foot 12 carried at the lower end of a rotatable stem 13 slidably projecting through an adjustable guide clamp 14. The upper end of each stem is capped with a clamp 15 slidably associated with the outer upper section of each leg. Suitable cam means are associated with the clamps 14 and 15 and by loosening the clamps 15, they can be slid longitudinally of the sections 9 to vertically adjust the lifting feet 12, or by securely clamping these clamps 15 about the sections 9, the lifting feet can be secured at the proper elevation for either inactivity or at such an elevation as to be engageable with a lifting truck which may be introduced from either side or either end of the crane as disclosed in my earlier patents for operation to engage beneath the lifting feet 12 to elevate the crane as an entirety for transporting the same. This lifting truck, as explained in my earlier patents, possesses an elevating platform which may be elevated into engagement with the inwardly turned feet 12 and lift the crane as a whole off the ground for any purpose, such as adjustment of the legs or transportation of the crane.

The lower section 10 of each leg is equipped with a foot 16 at its lower end and this section is telescoped within the upper section 9. The lower section is provided with a longitudinally arranged series of apertures through any one of which can be extended a pin 17 for engagement with the lower edge of the outer section 9 to support the same at the desired elevation. Each upper section 9 of the leg is provided with an aperture 18 through which the pin 17 may be inserted to pass through a registering aperture in

the section 10 for holding the lower section elevated from the ground when the crane is being transported from place to place upon the truck heretofore briefly described.

The overhead rectangular frame 7 is preferably constructed of structural iron or steel and is composed of horizontal, vertically spaced parallel upper and lower angle irons 19 and 20 respectively which are connected at their ends by side plates 21 which in turn are suitably secured, as by means of rivets, to the upper portions of the leg castings 11. At each end of this overhead frame is a pair of spaced parallel transverse channel bars 22 connecting the two sides of the frame. Gusset plates 23 connect these parallel channel bars to the sides of the frame.

Secured to the rear end of each side of the overhead frame is an elongated longitudinally extending overhanging arm 24 perforated as at 25 at its free end for the attachment of cables or any other suitable means for anchoring the crane to a stationary object.

In order to provide a mobile support for an extension frame 26, each leg casting 11 is provided with an inwardly and transversely extending axle for the mounting of a flanged roller 27. This extension frame 26 is substantially rectangular as best seen in Fig. 3, and its side and end members are composed of channel beams suitably bolted together and reinforced at their corners in the manner shown. The lower flanges of the two side beams of this extension frame are adapted to rest and roll upon the rollers 27 whereby it can be moved in horizontal plane longitudinally of the stationary frame to an extended position such as shown in Fig. 1, or to recoiled and intermediate positions longitudinally of the longitudinal dimension of the stationary overhead frame.

Adjustably associated with the outer end of the stationary frame 26 is a pair of depending supports or legs indicated in their entirety by the numerals 28 for supporting the extension frame when extended as shown in Fig. 1 and whenever desired for intermediate positions. Each of these supports 28 is composed of telescopic outer and inner sections 29 and 30 respectively, slidably associated as is well understood for varying the effective length of the same. The inner section 30 of each leg is provided with a longitudinally extending series of apertures, any one of which is adapted to receive a pin 31 to support the lower edge of the outer section 29. This outer section is also equipped with an aperture 32 adapted to be brought into registration with any of those of the inner section for the reception of the pin 31 to retain the supporting legs 28 in shortened positions to facilitate movement of the extension frame or while the crane as an entirety is being transported. The lower end of each inner section 30 is provided with a foot 33 which is swivelly connected to the jack screw 34 threaded into a nut secured within the lower end of the section 30. Tool apertures are provided in the jack screw 34 for engagement with a suitable tool for turning the screw to afford slight adjustments to the legs 28 for leveling-up purposes.

The upper end of each leg section 29 is provided with a casting 35 having a horizontal shoulder or flange 36, best seen in Fig. 5, for engagement with the lower flange of the side channel bars of the extension frame. Bolted to this flange 36, by cap screws or the like, is a clamping plate 37, which when tightened by the screws, securely engages over the flange of the extension frame to securely retain the legs 28 in the desired position. By loosening these clamping plates 37 it will be seen that the legs 28 can be slid longitudinally along the flanges of the extension frame 26 to any intermediate positions or up close to the legs 8 when the crane as an entirety is to be transported. In order to detachably retain the legs 28 up close to the legs 8, either when the legs 28 are moved along the flanges of the extension frame or when the extension frame is moved to cause the legs 28 to approach the legs 8, a hook 38, pivoted to the casting 35, is arranged to engage an eyelet 39 extending from the leg casting 11. In order to provide for running a load back or forth on the extension frame 26, which is about twice the length of the stationary overhead frame 7, a hoist mechanism carriage 40 is provided with four wheels 41 to rest and travel upon the outwardly extending flanges of the side beams constituting the extension frame 26. This carriage 40 comprises a substantially rectangular open frame constructed of structural iron or steel channel beams with gusset plates 42 and other reinforcements provided at the corners of the frame as shown. End plates 43 are secured to the inner sides of the end beams of the carriage and depend between the side beams of the extension frame as best seen in Fig. 4. Connecting the lower ends of these end plates 43 and extending longitudinally of the carriage are pairs of channel beams 44 which are connected at intervals by transversely extending angle bars 45 which form the support of a transmission mechanism to be presently described.

A reversible electric motor 46 including reduction gearing is mounted upon the carriage 40 furnished with power through flexible conductors from any suitable source. This motor is controlled from a reversing control mechanism 47 mounted upon the carriage and provided with a two arm lever 48 from each arm of which depends an operating cable or tassel 49 extending beneath the overhead stationary frame to a point within easy reach of an operator whereby the electric motor may be run in either direction depending upon which operating cable 49 is operated.

The drive shaft of the electric motor is journaled within a gear reduction casing 50 containing speed reducing gears and a clutch at either end controlled by the clutch shafts 51 and 52. This transmission mechanism has a frame mounted upon the cross bars 45, which includes a spaced vertical wall 53 forming one of the bearings for a cable drum 54 having its axis extending transversely of the carriage 40.

The intermediate portion of a cable 55 is wound about the drum 54 with one end of the cable extended longitudinally of the extension frame and connected as at 56 to one end of the same. The other end of the cable 55 extends in the opposite direction from winding drum 54 to be connected as at 57 to the opposite end of the extension frame 26. The clutch shaft 51 is adapted to control the operation of the winding drum 54 and by oscillating this clutch shaft 51 in one direction, the cable drum clutch is engaged to operate the cable drum 54 from the gearing, and when turned in the opposite direction, disengages the clutch to permit the winding drum to idle.

These two clutch shafts 51 and 52, as best seen in Fig. 4, are connected through a system of links and levers 58 to the axle of sheave 59 mounted upon one of the beams 44. A cable is trained over the sheave 59 with its tassel ends 60 and 61 depending through the carriage frame and to a point where the operator may pull

either of these tassels to actuate either clutch shaft 51 or 52.

When the clutch shaft 52 is operated, it causes the speed reduction gearing in the housing 50 to drive a shaft 60a journaled in the transmission casing and in the vertical wall 53. This shaft has a sprocket 61a secured thereto for driving a chain 62 which is trained about an enlarged sprocket 63 secured to a drum shaft 64 journaled transversely of the carriage in bearings 65 mounted upon the longitudinal beams 44 thereof. The ends of this shaft 64 extend beyond these bearings and are provided with winding drums 66, to each of which is secured one end of a cable 67 forming part of the block and tackle 68 of a hoist mechanism including the usual grappling hook 69. The cable 67 of the tackle is trained over a sheave wheel 70 mounted in bearings at the side of the carriage 40. One of these hoist mechanisms is arranged at each side of the carriage 40 and since they are simultaneously operable, a load supporting bar, not shown, may connect the two grappling hooks 69 in a manner well understood in the art. When the clutch shaft 52 is operated the hoist mechanisms are operated to elevate the block and tackle and when operated in the opposite direction, the drive to the two cable drums 66 is disconnected, permitting the hoist mechanisms to idle. When the cable drum 54 is rotated in a clockwise direction, it will be seen, due to the connection of the cable to opposite ends of the extension frame, that the cable will be wound up on one side of the drum and paid out on the other, thereby causing the carriage 40 to move along the extension frame toward the end of the cable which is being wound up upon the drum. Reversal of the electric motor will cause reverse drive of the drum to cause the carriage to move along the extension frame in the opposite direction.

In order to extend and retract the extension frame 26 by means of the power operated mechanism carried by the carriage 40, means are necessary to lock this carriage 40 relative to the overhead stationary frame 7, in order to pull the extension frame one way or the other, depending upon the direction of rotation of the cable drum 54. In order to accomplish this, a pair of locking dogs 71 are mounted upon a small grooved cable shaft 72 mounted transversely of the frame in bearings on top of the transmission casing 50. A cable 73 is wound about the shaft 72 between the locking dogs 71 and has its two ends 74 depending beneath the carriage frame to a point within easy reach of the operator. By pulling one of the cables 74, one of the dogs 71 will be moved upwardly while its companion is moved downwardly. This operation is performed when the carriage is in such a position to dispose the dogs 71 between the two transverse channel beams 22. Referring to Fig. 4, it will be seen when one of the dogs 71 is moved to upright position adjacent the inner channel beam 22 and the clutch cable 60 is operated to cause the cable drum 54 to rotate in a clockwise direction, the carriage will be moved until the raised dog 71 is engaged with the beam 22 thereby preventing further movement of the carriage, so that winding of the cable 55 upon the drum 54 results in movement of the extension frame 26 to the left of the figure. When the device is operated to rotate the cable drum 54 in the opposite direction, the companion locking dog 71 is moved to upright position to prevent movement of the carriage 40 to the left of Fig. 4, thereby propelling extension frame 26 toward the right of Fig. 4 to an extended position such as shown in Fig. 1. During these operations, the carriage 40 remains within the stationary overhead frame until the locking dogs 71 are disengaged from the beams 22 and the drum 54 is rotated in a clockwise direction to draw the carriage 40 out upon the extended end of the extension frame 26. Movement of the carriage 40 back to a position within the overhead frame is caused by reversing the direction of the drum 54 to cause the cable 55 to wind up at its end 56.

Due to the adjustability of the legs 28 associated with the extension frame 26, they can be adjusted to find substantial footing on the ground or other support to rigidly support the frame 26 when extended whereby the latter can ably sustain any load hoisted by the grappling hooks 69. These legs 28 may or may not be employed when the extension frame is extended into railway rolling stock to load or unload objects therefrom and when the legs 28 are not employed, it will be obvious that the anchoring connections with the extended arms 24 will prevent tilting of the entire apparatus upon the intermediate legs 8 as fulcrums. By operating the jack screws 34 to shorten the legs 28, the latter may be permitted to remain clamped to the outer ends of the extension frame 26 to be moved therewith by the power operated means hereinbefore described, and in this manner the legs 28 will always be in proper position to run out the jack screws for engaging the feet 33 with the ground upon the completion of movement thereof. On the other hand, if conditions require the legs to be shifted along the extension frame, this may be accomplished as explained hereinbefore.

Having fully described the construction and operation of the device, it will be understood that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed:—

1. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a horizontal plane, a hoist mechanism movable on the extension frame and operably connected thereto to move the same relative to said stationary frame.

2. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a horizontal plane, a load moving carriage movable along said extension frame and having connection therewith, holding means for rendering the carriage immovable with respect to said stationary frame, and prime mover power means mounted on the carriage for propelling the same.

3. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a carriage movable along the extension frame, means connected to the carriage for moving said extension frame, and means for rendering said carriage immovable with respect to the stationary frame to cause movement of said extension frame upon operation of aforesaid means.

4. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a carriage movable along the extension frame, a cable drum mounted on said car-

riage, a cable connected to said drum and to opposite ends of said extension frame, and means for rendering said carriage immovable with respect to the stationary frame to cause movement of the extension frame upon operation of said drum.

5. A crane or stack lifter comprising an elevated relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a load carrying device mounted for travel upon said extension frame, and a vertically adjustable support adjustable longitudinally of the extension frame and carried thereby to support the same when extended.

6. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a load supporting carriage mounted for movement upon said extension frame, means mounted on said carriage for propelling the same in opposite directions upon said extension frame, and means for rendering said carriage immovable with respect to said stationary frame for causing movement of said extension frame.

7. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a carriage movable upon said extension frame, a prime mover carried by said carriage for moving the same in opposite directions upon said extension frame, and means for rendering said carriage immovable with respect to said stationary frame to cause movement of said extension frame under the power of the prime mover.

8. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a carriage movable in opposite directions upon said extension frame, a cable drum mounted on said carriage, prime mover power means mounted on the carriage for rotating said drum in either direction, a cable wound upon said drum and having its ends connected to opposite ends of said extension frame, and holding means for rendering said carriage immovable with respect to said stationary frame.

9. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, a carriage movable in opposite directions upon said extension frame, prime mover power means mounted on said carriage, carriage propulsion means operable from said power means, a hoist mechanism operable from said power means, means operable to selectively drive said propulsion means or said hoist mechanism from said power means, and holding means for rendering said carriage immovable with respect to said stationary frame.

10. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, means for propelling said carriage in opposite directions upon said extension frame, and a locking device mounted on said carriage and engageable with said stationary frame to prevent relative movement between said carriage and stationary frame for moving said extension frame under the power of the propulsion means for said carriage.

11. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a substantially horizontal plane, means for propelling said carriage in opposite directions upon said extension frame, and a pair of locking dogs selectively movable to an operative position to engage said stationary frame for preventing relative movement between said carriage and stationary frame for moving the extension frame under the power of said carriage propulsion means.

12. A crane or stack lifter comprising a relatively stationary frame, an extension frame relatively movable thereon in a horizontal plane, a load carrying device movable horizontally along the extension frame, and prime mover power means mounted on the load carrying device operable to actuate said load carrying device and to move said extension frame relative to said stationary frame in a horizontal plane.

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