Feb. 3, 1959 J. W. NORWOOD 2,872,050

OVERHEAD TRAVELING CRANES

Filed Oct. 25, 1956 4 Sheets-Sheet 1

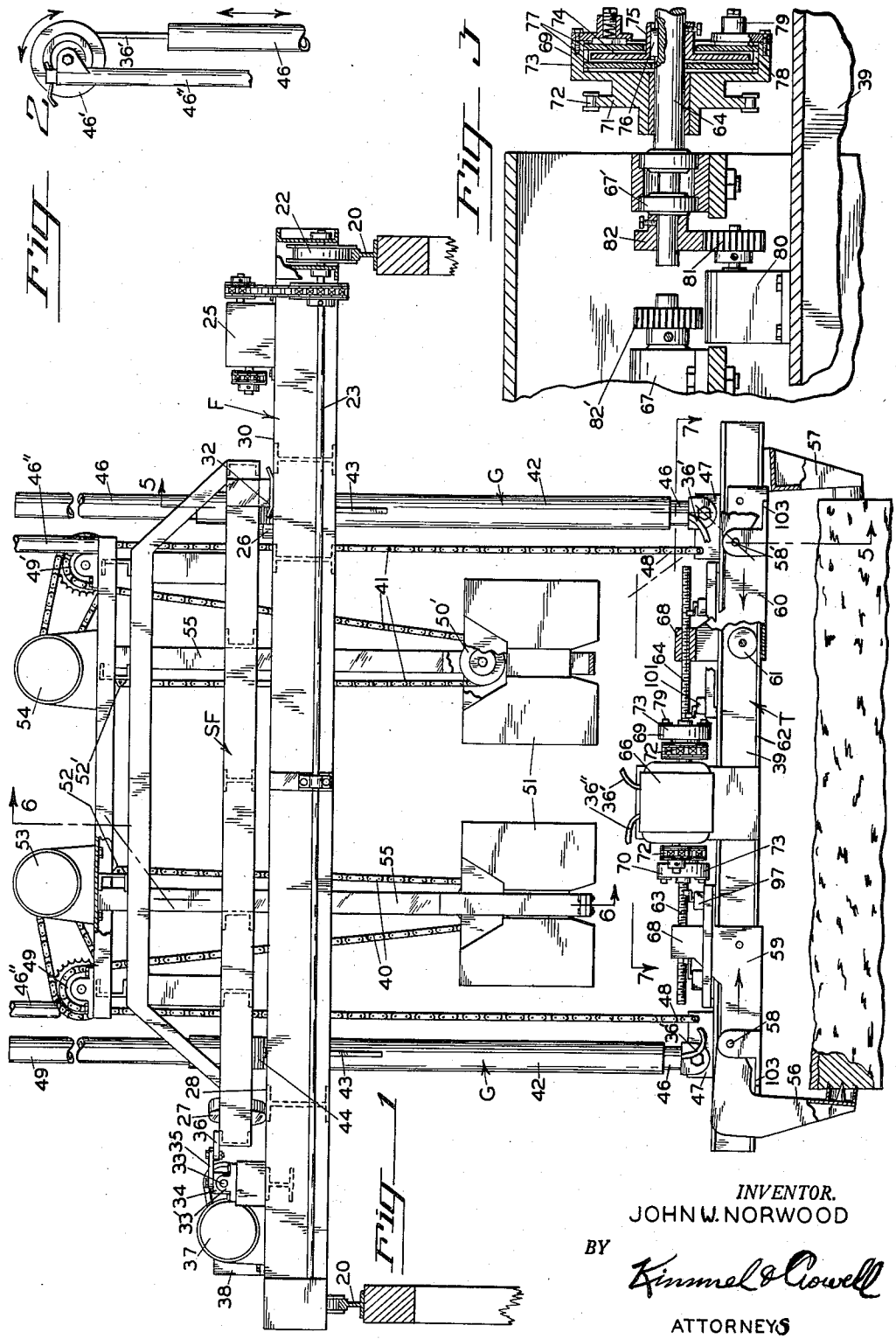


Fig. 2

Fig. 3

Fig. 1

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4 Sheets-Sheet 2

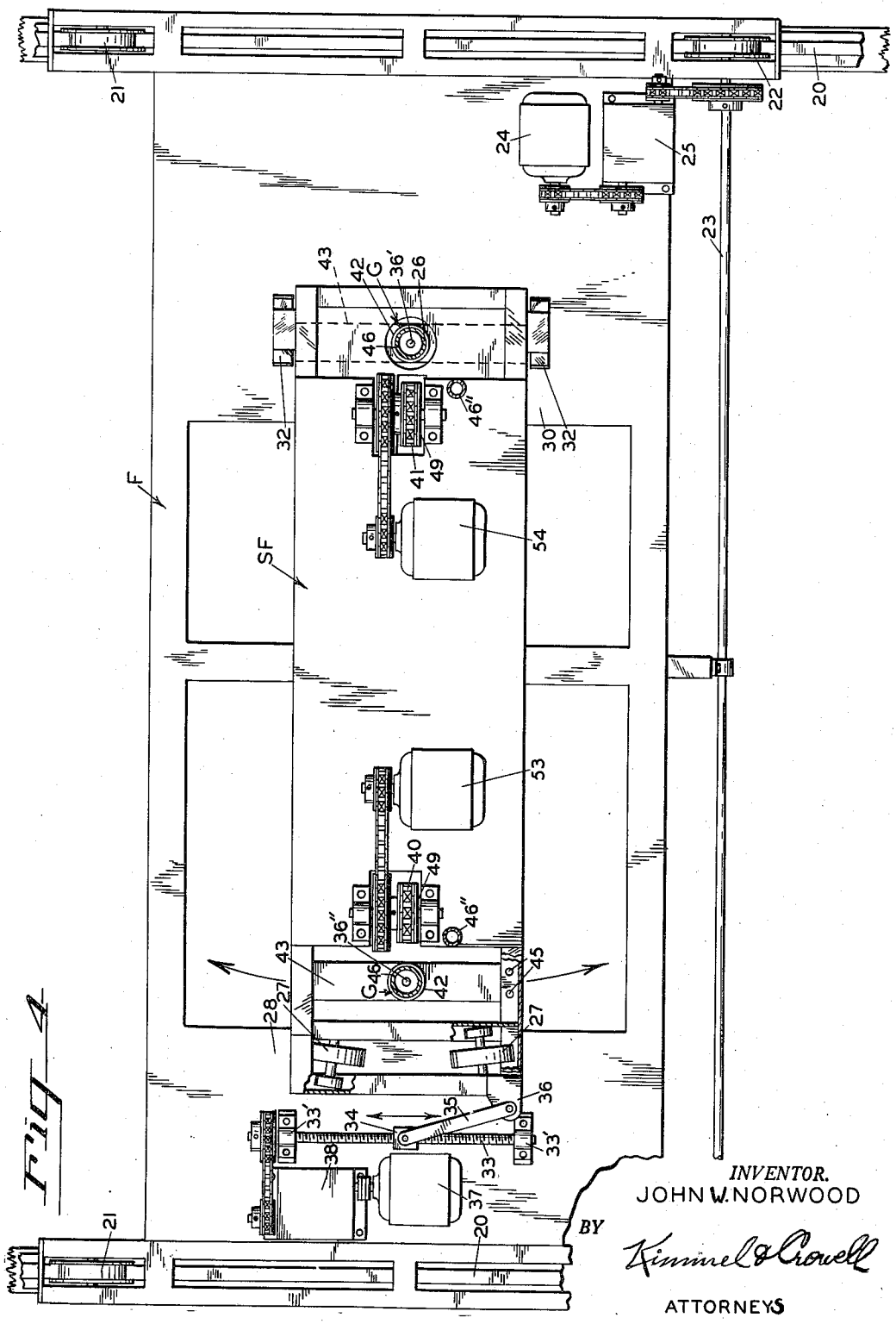


Fig. 4

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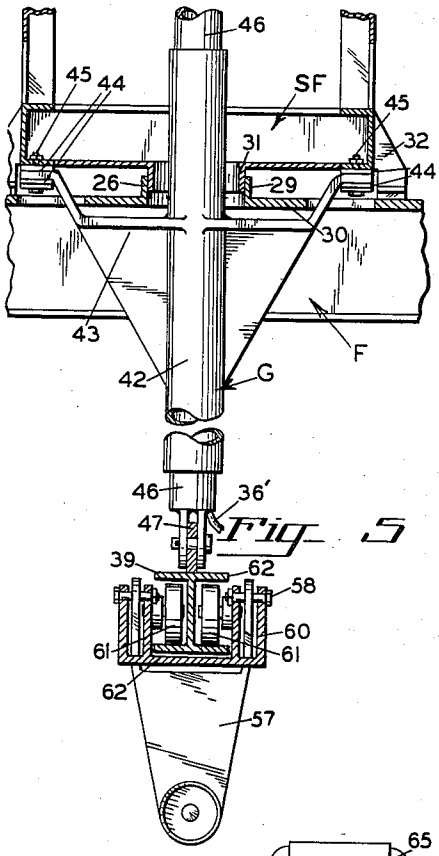


Fig 5

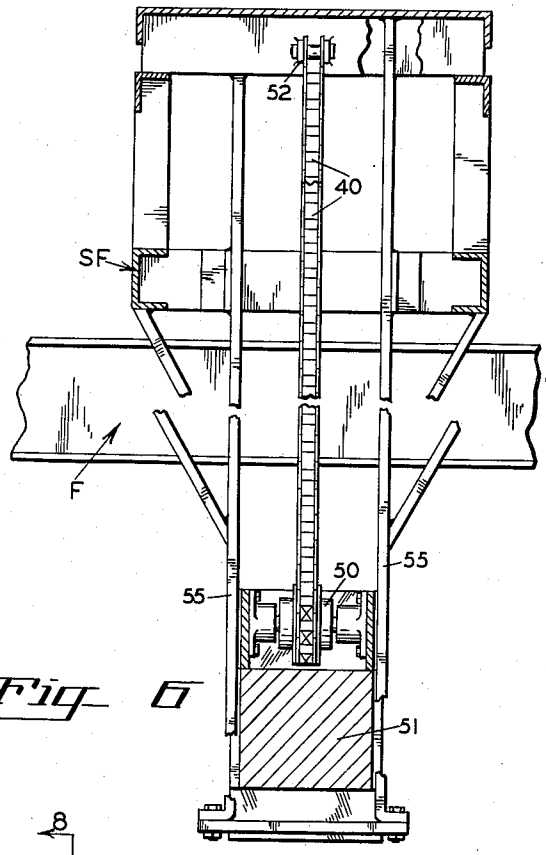


Fig 6

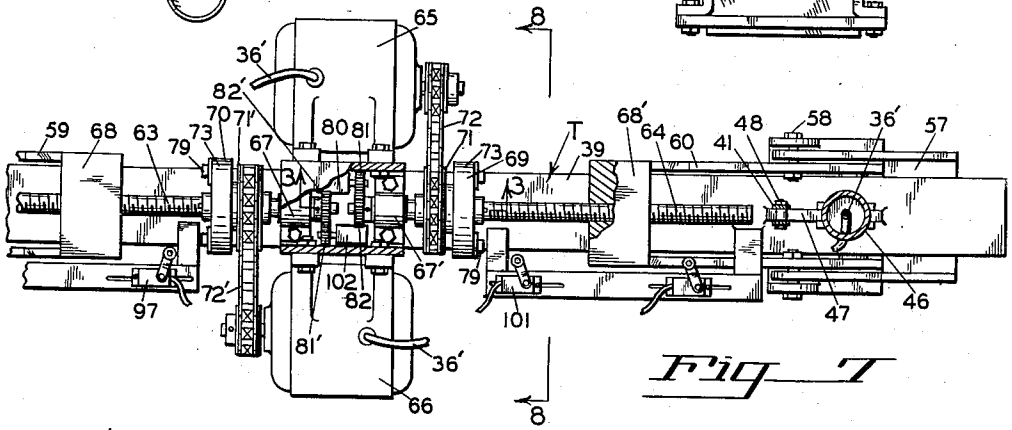


Fig 7

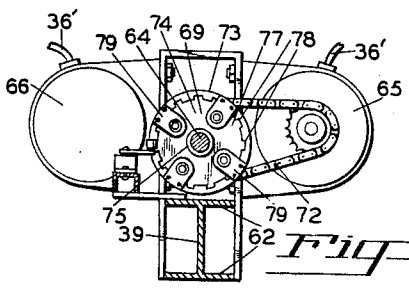


Fig 8

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4 Sheets-Sheet 4

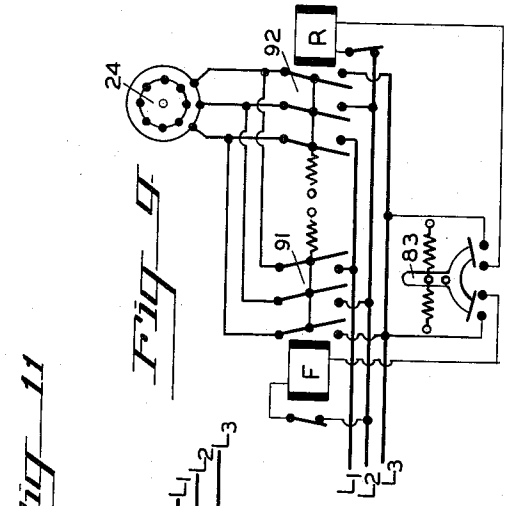


Fig. 9

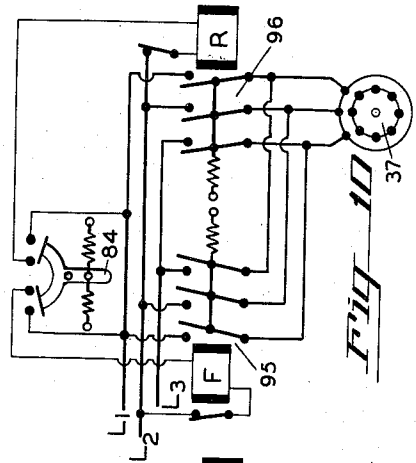


Fig. 10

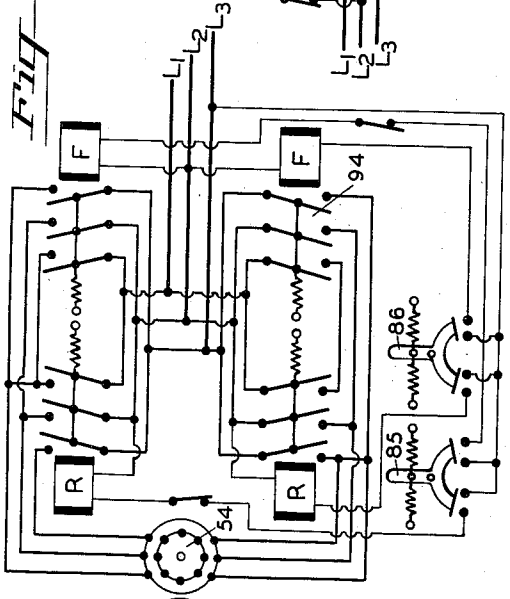


Fig. 11

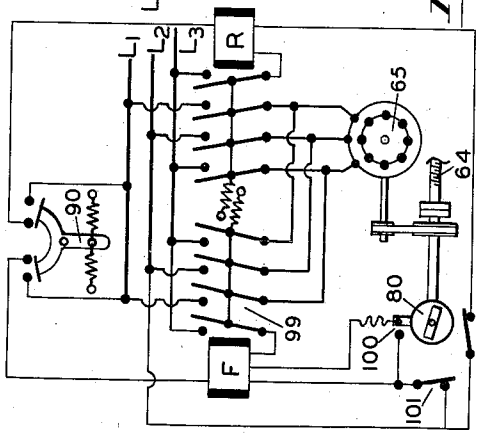


Fig. 14

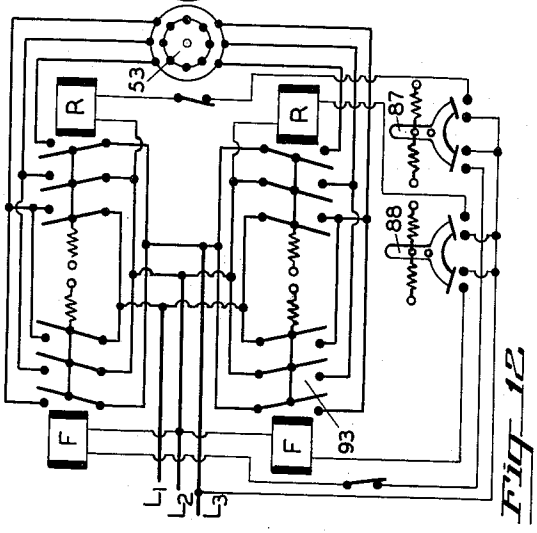


Fig. 12

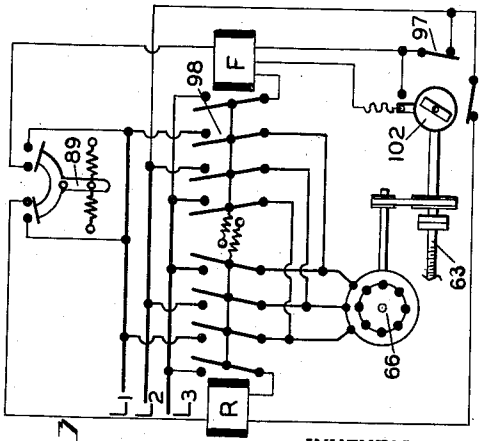


Fig. 13

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2,872,050

OVERHEAD TRAVELING CRANES

John W. Norwood, Cottage Grove, Oreg.

Application October 25, 1956, Serial No. 618,348

2 Claims. (Cl. 212—12)

The present invention relates to overhead traveling cranes and more particularly to such devices which are adapted for the handling of peeler logs in plywood plants.

The primary object of the invention is to provide an overhead traveling crane that will lift, lower and transport peeler logs and the like wherein the log can be accurately aligned within the centers of the truing and peeler machines, variable speed raising and lowering means are employed so as to enable the operator to accurately center the heart of the log horizontally in alignment with the centers of the machines.

Another object of the invention is to provide a crane with which the operator can swing one end of the log on a horizontal plane to vertically align the same within the centers of the machines. Special lifting tongs are provided for gripping the ends of various length logs in the handling of the same by the crane. These lifting tongs automatically adjust themselves to the length of log being handled.

A further object of the invention is to provide means for gripping the log accurately positioning the log in regards to the truing and peeling machines so that when the heart of the log is brought into alignment with the centers of the machines, the log will be in the proper position for peeling.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings, in which:

Figure 1 is a fragmentary side elevation of the invention with parts broken away for convenience of illustration.

Figure 2 is a fragmentary side elevation of the means of supporting the electrical conductors for operating the lifting tongs of the crane.

Figure 3 is an enlarged fragmentary sectional view taken on line 3—3 of Figure 7, looking in the direction indicated.

Figure 4 is a plan view of the crane, parts broken away for convenience of illustration.

Figure 5 is a fragmentary enlarged transverse sectional view, taken on line 5—5 of Figure 1, looking in the direction indicated.

Figure 6 is an enlarged fragmentary transverse sectional view, taken on line 6—6 of Figure 1, looking in the direction indicated.

Figure 7 is a fragmentary horizontal section, taken on line 7—7 of Figure 1, looking in the direction indicated, parts broken away for convenience of illustration.

Figure 8 is a fragmentary transverse sectional view taken on line 8—8 of Figure 7, looking in the direction indicated.

Figure 9 is the wiring diagram of the system controlling the movement of the carriage along its supporting tracks.

Figure 10 is the wiring diagram of the motor circuit for swinging the sub-carriage horizontally.

Figure 11 is the wiring diagram for controlling the

operation of one of the two-speed tong raising and lowering motors.

Figure 12 is a wiring diagram for a circuit similar to that shown in Figure 11, and operates the other of the raising and lowering motors for the tongs.

Figure 13 is a wiring diagram for a circuit operating one of the lifting tongs.

Figure 14 is a wiring diagram for a circuit similar to that shown in Figure 13, for controlling the other of the motors for operating the tongs of the crane.

Referring now to the drawings in detail wherein like reference characters indicate like parts throughout the several figures, the reference character F indicates generally a horizontal frame for my new and improved overhead traveling crane. The frame F operates on horizontal tracks 20 on pairs of trunnion wheels 21 and 22. The trunnion wheels 22 are coupled together by the cross shaft 23 which is driven by a motor 24 through the speed reduction gear box 25.

A sub-frame SF is pivotally mounted to the frame F at 26 at its one end ,and is supported on its opposite end by the trunnion wheels 27 operating on the platform 28 of the frame F.

Referring to Figure 5, the frame F has an integral collar 29 mounted on web 30 and extending thereabove and the sub-frame SF has a depending collar 31 formed thereon and journaled in the collar 29. Stabilizing shoes 32 form part of the sub-frame SF and stabilizes the sub-frame SF in its operation.

Referring to Figures 1 and 4, the opposite end of the sub-frame SF is moved on a horizontal plane about its center 26 by the threaded screw 33 which moves the nut 34 in either direction thereon, together with the connecting link 35, which is pivotally connected to the nut 34 and to the bracket 36 of the sub-frame SF. The screw 33 is journaled in bearing blocks 33' which are mounted to the platform 28 of the frame F. The screw 33 is revolved in either direction by the motor 37 through the reduction gear box 38, the operation of which will be later described.

The lifting tong assembly is indicated by the letter T, and consists of a horizontal beam 39 supported by lifting chains 40 and 41. The beam 39 is guided by vertical telescopical guides G. Referring to Figures 1 and 5, the guides G consist of tubular members 42, which are supported from the sub-frame SF by hangers 43. The hangers 43 are secured to the sub-frame SF by resilient blocks 44, which in turn are bolted to the sub-frame SF by bolts 45.

The tubular members 42 are permitted to swing transversely of the crane when viewing Figure 1, but are held relatively rigid in regards to the longitudinal axis of the crane. Plungers 46 are pivotally connected to the ears 47 forming part of the beam 39. The plungers 46 pass up through the tubular members 42 in their operation. The ends 48 of the chains 40 and 41 are also fixedly connected to the ears 47 forming part of the beam 39. The chains 40 and 41 are trained about the hoisting gears 49 and 49' respectively and down around the sheaves 50 and 50' journaled within the counterweights 51 and back up to the sub-frame SF to which they are secured at 52 and 52' respectively.

The hoisting gears 49 and 49' are operated by the variable speed motors 53 and 54 respectively. The motors 53 and 54 are independently controlled by the operator. More detailed explanation will be given later on. The counterweights 51 operate within guideways 55 supported by the sub-frame SF, as best illustrated in Figure 6.

A pair of tongs 56 and 57 are pivotally connected at 58 and 58' respectively to the carriages 59 and 60, which

are supported by trunnion wheels 61 operating on the flanges 62 of the beam 39. The movement of the carriages 59 and 60 along the beam 39 is controlled by the threaded screws 63 and 64.

Referring particularly to Figures 1, 3, 7 and 8, the threaded screw 64 is driven by the electric motor 65, while the threaded screw 63 is driven by the motor 66. The screws 63 and 64 are journaled on their inner ends within the bearings 67 and 67' and are threaded into the nuts 68 and 68' on their outer end, the nuts 68 and 68' respectively forming part of the carriages 59 and 60. The screw shafts 63 and 64 are driven from the motors 65 and 66 through the clutches 69 and 70. The clutches 69 and 70 are of any suitable type, such as a disk clutch. The sprockets 71 and 71' are driven by the chains 72 and 72' from the motors 65 and 66 and in turn drive the sprockets 71 and 71'.

Referring to Figure 3, the sprocket 71 forms part of a drum 73 which rotates freely on the threaded screw 64. A clutch disk 74 is keyed to the shaft 64 through its hub 75 by the key 76. Clutch disks 77 are keyed within the grooves 78 of the drum 73 while the clutch disk 74 is keyed to the screw shaft 64. An adjustable tension is brought against the clutch disk 74 in the usual manner by the adjustable spring tension units 79. The tension units 79 are adjusted to allow the clutch disk 74 to slip when a predetermined resistance is offered by the tongs 56 and 57 in the gripping of the ends of the log.

What is known as electric plug switches are indicated by numerals 80 and 102. The switches 80 and 102 are geared respectively to the screw shafts 63 and 64 by the gears 81, 82 and 81' and 82'. When the screw shafts 63 and 64 slow down due to the gripping of the end of the log by the tongs 56 and 57 and the slipping of the clutches 74 above described, the electric plug switches 80 and 102 will stop the operation of the electric motors 65 and 66, in a manner which will be more fully described later on.

Each of the electric wires 36' and 36'' leading to the motors 65 and 66 is conducted up through one of the hollow plungers 46 to a take-up reel 46', referring to Figure 2. The reel 46' is supported upon a pedestal 46'', permitting the up and down movement of the tong assembly T without interfering with the electrical supply to the motors 65 and 66.

The mode of operation of this new and improved overhead traveling crane will now be described in relation to the handling of peeler logs in plywood plants. Referring to the wiring diagrams, manually operated switches 83, 84, 85, 86, 87, 88, 89 and 90 are located on a control panel handy to the operator of the crane, which would be ordinarily adjacent to the truing and peeler machines, each machine having a separate crane and a separate control station.

The electric diagram shown in Figure 9 controls the operation of the electric motor 24 for moving the frame F along the tracks 20. In order to operate the motor 24 in either direction a forward relay switch 91 operates the motor 24 in one direction, and a reverse relay switch 92 operates the motor 24 in the opposite direction, under the control of switch handle 83. When the operator releases the handle 83 the motor 24 will stop.

The motor 24 drives the cross shaft 23 through the gear reduction 25, this rotating the trunnion wheels 22 moving the crane along the track 20.

After the crane has been moved on its track 20 to a point directly over a log to be picked up, referring to Figures 11 and 12, the operator will move the control levers 86 and 88. This will energize the forward relays 93 and 94, which will energize the high speed windings of the motors 53 and 54, causing the tong assembly T to lower itself on hoisting units 49 and the lifting chains 40 and 41 as described previously.

When the tong assembly T has been lowered to the approximate elevation desired for gripping the log, the operator will release the control levers 86 and 88, stopping the downward movement. In order to more accurately position the tong assembly T in regards to the center of the log, the operator will then operate the control levers 87 and 85 operating the motors 53 and 54 under a reduced speed.

The object of the two speeds is to give the operator a finer accuracy in a final alignment of the hooks 56 and 57 relative to the end of the log, or when he is about to place the log between the centers of the truing and peeling machines he can raise and lower either end of the tong assembly T, together with the log at a relatively slow speed, which he must have in order to properly align the heart of the log with the centers of the machines.

On lowering the tong assembly T he may find that it is necessary to swing the tong assembly beam 39 so as to align the same with the center of the log on a horizontal plane. This he can do by pivoting the sub-frame SF about its center 26 using the reverse motor 37 in the following manner.

Referring to Figure 10, the motor 37 is a reversing type and is provided with a forward relay 95 for operating the same in one direction and a reverse relay 96 for operating the motor 37 in the reverse direction controlled directly by the operator using the hand operated switch 84. Motor 37 will rotate the threaded screw 33 in the desired direction, swinging the sub-frame SF about its pivot point 26 through the link connection 35, as seen in Figure 4.

He also will want to swing the sub-frame SF on a horizontal plane when aligning the heart of the log with the desired center lines when placing the log in either the truing machine or the peeling machine.

The gripping of the log by the lifting tong assembly T by the hooks 56 and 57 will now be described. A limit switch 97, referring to Figures 1 and 13, may be set to permit the hook 56 to travel a predetermined distance towards the log. This distance being such as to align this end of the log with one of the centers of the machine in which the log is to be placed.

When the tong assembly T is in the proper position relative to the log, the operator operates the control switch 89 so as to operate the motor 66 in a forward direction through the holding relay switch 98. This will rotate the threaded shaft 63 so as to move the carriage 59 in the direction of the arrow, causing the hook 56 to engage the end of the log. When the carriage 59 moves a predetermined distance, the limit switch 97 will open the relay 98 stopping the motor 66. The operator then can operate the switch 90, which will energize the motor 65 through the closing of the holding relay 99.

When the hook 57 engages the end of the log it will enter the log by force until a predetermined resistance is offered to this clamping action. At this time the clutch 69 will begin to slip slowing down the speed of rotation of the threaded screw 66. This will cause the automatic stopping of the motor 65 in the following manner.

The plugging switch 80, which is driven from the threaded shaft 64 through the gears 81 and 82, will open due to the lower speed of the shaft 64. Its contacts 100 will open, breaking the electric circuit through the holding relay switch 99, thereby stopping the motor 65. The operation of the plugging switch 80 is well understood. The switch 80 will remain closed until the speed of rotation of the same has been reduced to a certain predetermined point, at which time this type of switch 80 will open.

A limit switch 101 is provided in case of an emergency in case the plugging switch 80 would fail to operate. By observing the diagrams in Figures 13 and 14, it can be understood how the motors 65 and 66 can be reversed through the reversing relays R and F from the control switches 89 and 90, separating the hooks 56 and 57 from one another, when depositing the logs between the centers of the truing or peeling machine, or previous to picking a log up by the tong assembly T.

A plugging switch **102** is shown in the diagram Figure 13, but this switch would only come into operation when the limit switch **97** has not stopped the motor **66** from operating.

On the raising of the lifting tong assembly T, the hooks **56** further force themselves into the end of the log due to the fact that they pivot in relation to the carriages **50** and **59** at **28**, causing their tips to engage the log more forcibly due to the weight of the log being lifted. The amount that the hooks **56** and **57** will pivot is limited by their engaging the carriage at **103**, which acts as a stop.

Having thus described the preferred embodiments of the invention, it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the scope of the appended claims.

What is claimed is:

1. An overhead traveling crane system comprising, a pair of elongated substantially spaced parallel horizontal rails, means rigidly supporting said rails in spaced relation to the ground, a horizontal frame, a plurality of wheels journaled on opposite sides of said frame supporting said frame on said rails for longitudinal movement thereon, power means on said frame coupled with at least one wheel on each side of said frame for moving said frame on said rails, a horizontal sub-frame positioned in vertically spaced parallel relation above said frame, shoes fixed to one end of said sub-frame engaging said frame supporting said sub-frame on said frame, wheels journalled in the opposite end of said sub-frame engaging said frame movably supporting the opposite end of said sub-frame on said frame, vertically extending means pivotally securing said one end of said sub-frame to said frame, power means on said frame connected to the

opposite end of said sub-frame for swinging said sub-frame in a horizontal plane about said pivotal securing means, a pair of spaced apart power hoists mounted on said sub-frame, a pair of spaced parallel vertically extending guides fixed to said sub-frame beneath each of said hoists, a counterweight positioned for vertical sliding movement in each pair of said guides, an upright tubular guide fixed to each end of said sub-frame, a plunger positioned in each of said tubular guides for vertical sliding movement therein, a horizontal beam, horizontal means pivotally connecting opposite ends of said beam to said plunger, a pair of chains fixed at one end to each end of said beam, said chains each being trained over one of said hoists and having the opposite end portions thereof supporting one of said counterweights, a pair of tongs mounted for horizontal movement on said beam, and power means on said beam for moving each of said tongs on said beam.

2. A device as claimed in claim 1 wherein hand controlled means are provided for said crane for individually actuating each of said power means and said power hoist whereby said tongs may be universally adjusted with respect to said frame.

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