March 11, 1952 A. KNOX 2,588,733

AERIAL TRANSPORTER

Filed Nov. 29, 1948 2 SHEETS—SHEET 1

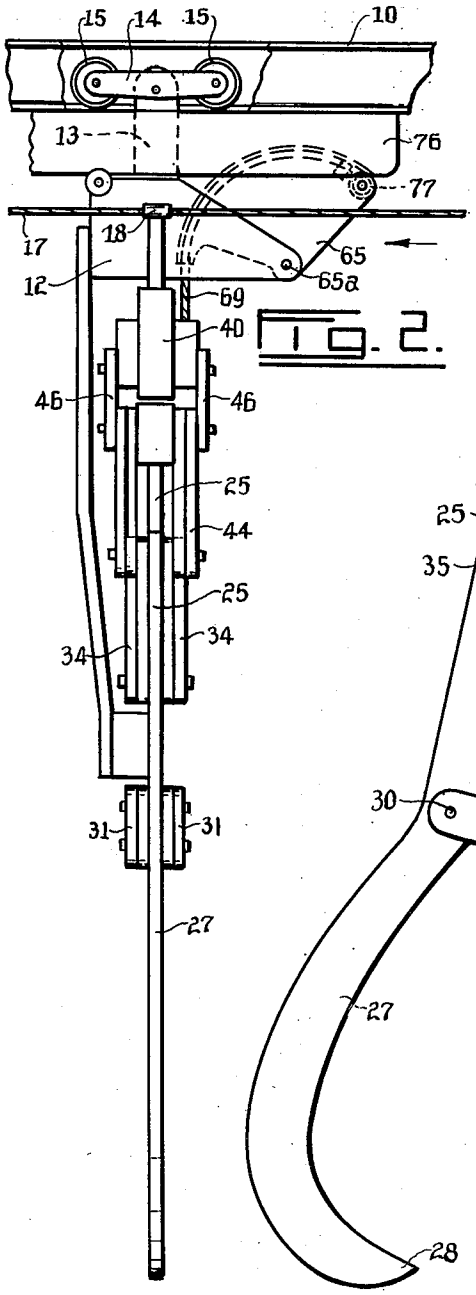


Fig. 2.

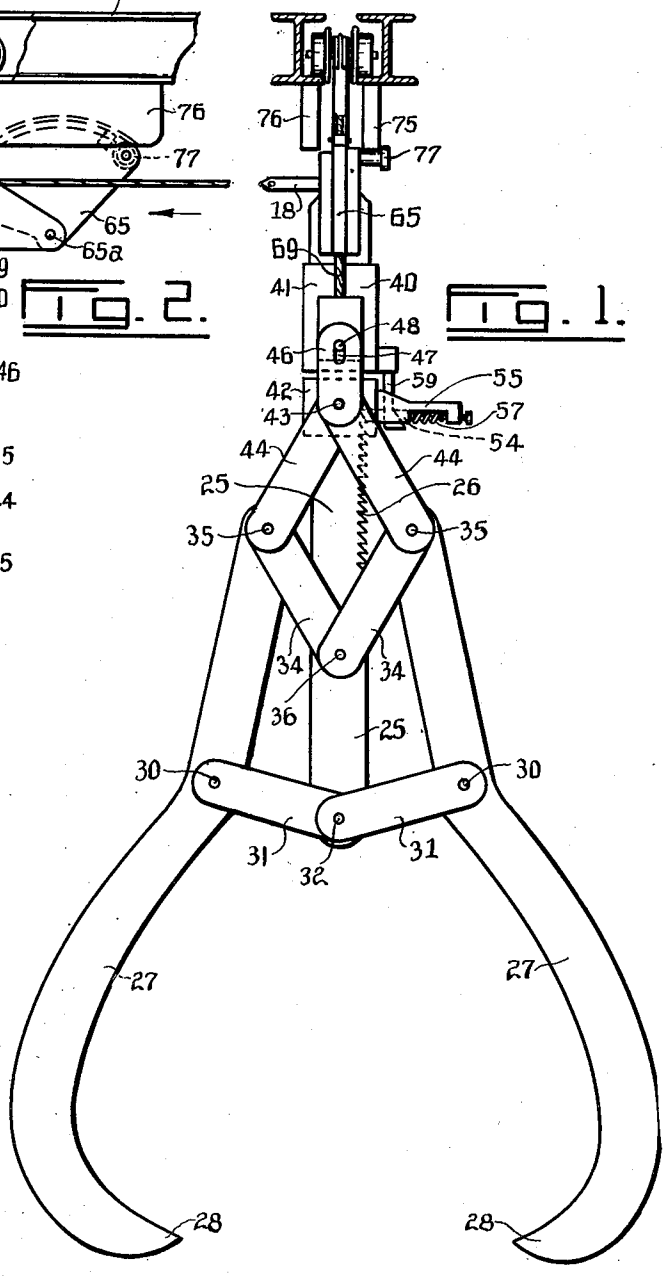


Fig. 1.

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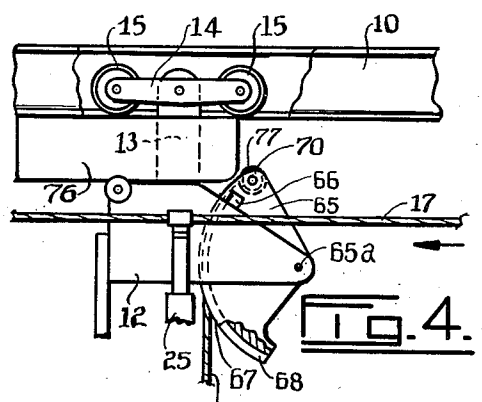


Fig. 4.

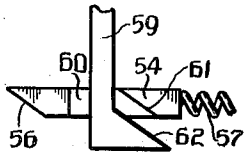


Fig. 5.

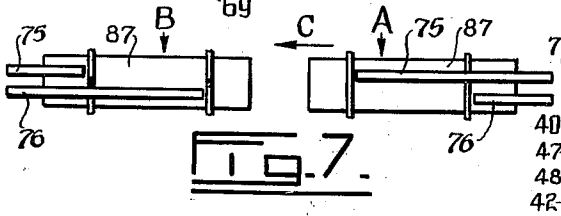


Fig. 7.

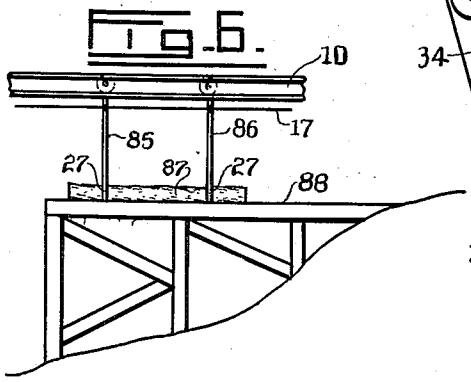


Fig. 6.

Fig. 3.

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Patented Mar. 11, 1952

2,588,733

UNITED STATES PATENT OFFICE

2,588,733

AERIAL TRANSPORTER

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Application November 29, 1948, Serial No. 62,473
In Canada January 12, 1948

9 Claims. (Cl. 212—77)

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This invention relates to an aerial transporter particularly designed for carrying logs, but which may be used for other purposes as well.

This aerial transporter is adapted to carry logs within the woods. At the present time, logging is taking place at increasing distances from the bodies of water on which they are usually moved to the mills. At present, roads are built to the water and very expensive equipment is needed for this work and for carrying the logs over them. This necessitates a great deal of handling of the logs and this work is very dangerous.

This invention eliminates the necessity of building roads and of having heavy trucks for carrying the logs.

It consists of an overhead rail having tong arrangements working in pairs which are adapted to pick up the logs without human aid. The logs are laid on a platform a certain distance below the overhead rail and at the right moment, tong arrangements drop down and grip the logs, said tong arrangements being capable of gripping logs of different diameters. The overhead rail may be endless so that the tong arrangements keep moving along this rail. At a desired point, which may be over water, suitable means is provided for automatically releasing the tong arrangements to drop the logs.

Other objects and features of the invention will appear from the accompanying description with reference to the drawings, in which

Figure 1 is an elevation of the aerial transporter in fully opened position.

Figure 2 is a side elevation of the transporter in the open position.

Figure 3 is an elevation of the transporter in the fully closed position.

Figure 4 is a fragmentary view of the upper part of the transporter showing the position of the various elements thereof when it is closed.

Figure 5 is an enlarged detail of a latch used on the transporter.

Figure 6 diagrammatically illustrates the transporter picking up a log, and

Figure 7 diagrammatically illustrates the tripping means for the transporater at both the loading and unloading positions.

Referring more particularly to the drawings, 10 is an overhead rail which may be single, or it may be double, as shown. This rail is mounted in any convenient manner and it extends from the point where the logs are gathered after being cut to the point where they are to be handled either for water transportation or at a mill. It is preferable that this overhead rail is endless so that the aerial transporter does not have to be reversed.

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A carriage 12 is mounted for movement on the rail in any convenient manner. If it is a double rail, as shown, an arm 13 projects upwardly between the rails and is pivotally connected to a horizontal bearing member 14 substantially mid-way between the ends thereof, and having wheels 15 mounted at its opposite ends. These wheels ride on the rail and are clearly shown in Figures 1 and 2. The arm 13 extends outwardly below the rail so that the carriage is actually spaced therefrom. Suitable means is provided for moving the carriage along the rail. For example, a cable 17 may be connected to the side of the carriage by a link 18. This cable is preferably endless and it is moved in any convenient manner.

A tong arrangement for gripping the logs is suspended from the carriage 12. A vertical support 25 extends downwardly from the carriage immediately below the arm 13. This support is relatively long and has a plurality of teeth 26 formed on one edge thereof. A pair of opposed tongs 27 are pivotally mounted on the lower end of the support. These tongs are mounted so that when the upper ends thereof are moved upwardly, their lower ends or inwardly projecting prongs 28 separate from each other. This action is reversed as the upper ends of the tongs are moved downwardly. This is accomplished by pivotally connecting the tongs at a point 30 spaced below the upper ends thereof by a pair of toggle links 31 to the lower end of the support 25 at 32. Another pair of toggle links 34 pivotally connects the upper ends of the tongs at 35 to the support 25 at a point 36 above the lower end thereof.

When the tongs are in their fully closed position, as illustrated in Figure 3, the lower toggle links 31 extend downwardly from and outwardly at a slight angle to the lower end of the vertical support. At the same time, the upper toggle links 34 are almost in a horizontal position, and the prongs 28 touch or almost touch each other. A slide 40 is movably mounted on the support 25 above the point 36 thereof. This slide is divided into independent upper and lower sections 41 and 42 respectively. The lower section 42 is pivotally connected at a point 43 by links 44 to the upper ends of the tongs 27 at the points 35 thereof. Said lower section is also connected at the point 43 by vertical links 46 to the upper section 41. In order to permit a small amount of relative movement between the upper and

lower sections, the links 46 are provided with elongated slots 47 adjacent their upper ends in which pins 48, extending outwardly from the upper section, ride.

With this arrangement, when the upper section of the slide is moved upwardly, it moves a short distance, within the extent of the slots 47, before the lower section begins to move, the links 44 are drawn upwardly to move the upper ends of the tongs in the same direction. The toggle links 34 cause said upper ends to move towards each other at this time, while the toggle links 31 force the lower ends of the tongs away from each other, as clearly shown in Figure 1.

Suitable locking means is provided for locking the tongs in any open position. This is accomplished by preventing the slide 40 from moving upwardly. One form of locking means is illustrated in Figures 1, 3 and 5. A latch 54 is slidably mounted in a bracket 55 which projects outwardly from the lower section 42 of the slide on the side thereof opposite the teeth 26 of the support 25. This latch has a bevel 56 on its lower side at the inner end thereof, and a spring 57 urges said latch inwardly with its inner end engaging the teeth 26. When the slide moves downwardly, the bevel 56 permits the latch to move over the teeth 26, but said latch prevents the slide from moving upwardly unless the latch is moved out of engagement with the teeth. An arm 59 extends downwardly from the side of the upper section 41 of the slide alongside the lower section 42 thereof. This arm passes freely through the bracket 55 and through and below a recess 60 formed in the latch 54, see Figure 5. The latch and the lower end of the arm are provided with co-operating bevel surfaces 61 and 62, respectively. These surfaces are normally spaced apart, but when the upper section of the slide is moved upwardly, the arm 59 moves with it and the surface 62 engages the surface 61, thus causing the latch to retract or move outwardly to disengage the teeth 26. The slots 47 in the links 46 are of such length that when the section 41 is moved upwardly, the latch 54 disengages the support teeth before the lower section 42 starts to move upwardly. When the slide 40 is released, the weight of the tongs is sufficient to pull it downwardly as far as it will go on the vertical support, but said slide cannot be moved upwardly by any movement of the tongs since the latch 54 will prevent any such movement.

Suitable means may be provided for moving the slide 40 upwardly, and this may even be done manually, but it is preferable to have this done automatically at certain points along the overhead rail. This may be done by means of a segment 65 pivotally mounted at 65a on the carriage 12 adjacent one end thereof. The segment is retained in its normal position by a stop 66 projecting outwardly therefrom which engages with a portion of the carriage. When in this position, the curved surface 67 of the segment is immediately above the slide 40. A groove 68 is formed in the curved surface 67, and a cable 69 is connected to the segment at its upper corner 70. This cable extends along the groove 68 and downwardly where it is connected to the upper section of the slide at 71. When the segment is pivoted upwardly and rearwardly around its pivot point 65a, the slide 40 is moved upwardly.

Suitable stops 75 and 76 project downwardly from the rail at the desired points. The stop 75 is located on one side of the rail, while the stop 76 is on the opposite side thereof. The segment 65 is provided with a roller 77 projecting laterally from one side of its upper corner to engage either of the stops 75 or 76. For logging operations, it is preferable to have the tong arrangements working in pairs. In this case, the roller 77 of one tong arrangement projects outwardly from one side of the segment 65, and the roller of the other tong arrangement projects outwardly from the opposite side of said segment. Thus, the stop 75 will operate one tong arrangement and the stop 76 operates the other.

When the tong arrangement is moved by the cable 17 in the direction of the arrows shown in Figures 2 and 4, the roller 77 engages one of the stops 75 or 76. Figure 4 shows the segment 65 in its normal position just before the roller engages a stop. As the tong arrangement continues to move, the stop swings the segment around its pivot point into the position shown in Figure 2, at which time the slide 40 has been drawn upwardly to open the tongs. These stops are a predetermined length so that when they are cleared by the segment roller, the segment is free to return to its normal position and the weight of the tongs is sufficient to bring this about.

Figure 6 shows a pair of tong arrangements 85 and 86 working together to lift a log 87 lying on a platform 88 which is located at a predetermined distance below the rail 10. Assuming that the tong arrangements 85 and 86 are operated respectively by the stops 75 and 76, Figure 7 shows the arrangement of these stops at the loading point A and the unloading point B. In this figure, the direction of movement of the tongs is indicated by the arrow C. It will be noted that at the loading area A, the stop 75 is longer than and extends beyond the stop 76, whereas at the unloading point B, the stop 76 is longer than and starts before the stop 75. As the empty tongs approach the loading area, the segment roller 77 of the tong arrangement 85 first engages the stop 75 to open the tongs thereof. While in this open position, the segment roller of the other tong arrangment engages the stop 76 to open its tongs. The opposite ends of the stops are located so that both segment rollers clear said stops at the same time, thus permitting the tongs to drop downwardly. The log 87 is positioned at the loading points so that as the tongs approach their lowermost positions, their prongs 28 will dig into the log. As the arrangements continue to move forwardly, the log is drawn off the platform 88. The overhead rail is mounted so that the log carried by the tongs clears all obstacles. When the log approaches the unloading area B, the segment rollers of both the tong arrangements engage the stops 75 and 76 at exactly the same time. This operates the tongs to release the log. When the segment rollers clear the stop, the tongs drop back down to their lowermost positions and remain there until they arrive back at the loading area.

The links 31, 34, and 44 are so arranged that as the tongs drop downwardly, their prongs 28 will engage logs of different diameters at approximately their widest points. For example, if a log is one foot in diameter, its widest point is a certain distance above the surface of the loading platform, whereas a log with a two foot diameter has its widest point further above said platform. The rate of closing of the tongs as they descend is determined so that their prongs engage the different logs at substantially their widest portions.

While this invention has been described with

an overhead rail, it is obvious that a cable may be used just as well, and, therefore, it is intended that the term "rail" as used in this specification and the accompanying claims should include cables.

What I claim as my invention is:

1. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, means connecting the slide to the upper ends of the tongs, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

2. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, said slide being divided into upper and lower sections, means connecting the slide sections, said connecting means permitting a small relative movement of said sections, means connecting the lower section of the slide to the upper ends of the tongs, a latch on the lower section adapted to prevent upward movement thereof, means on the upper section for releasing the latch when said section is moved upwardly relative to the lower one, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

3. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, said slide being above the links connected to the upper ends of the tongs, links connecting the upper ends of the tongs to the slide, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

4. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs to the support adjacent the lower end thereof, a slide movably mounted on the support and connected to the tongs, means for locking the tongs in closed positions, means connected to the slide for releasing the locking means when the slide is moved upwardly, and means for moving the slide upwardly to open the tongs.

5. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, said slide being divided into upper and lower sections, means connecting the slide sections, said connecting means permitting a small relative movement of said sections, locking means on the lower slide section for normally preventing upward movement of the slide, means operable by movement of the upper slide section in relation to the lower section for releasing the locking means when the slide is moved upwardly, means connecting the lower slide section and the upper ends of the tongs, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

6. An aerial transporter for logs and the like comprising a vertical support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, said slide being divided into upper and lower sections, a link connected to the lower slide section and extending to the upper section, said link having an elongated slot therein, a pin extending from the upper slide section into the slot, said pin and slot permitting small relative movement of the sections, locking means on the lower slide section for normally preventing upward movement of the slide, means operable by movement of the upper slide section in relation to the lower section for releasing the locking means when the slide is moved upwardly, means connecting the lower slide section and the upper ends of the tongs, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

7. An aerial transporter for logs and the like comprising a vertical support, a plurality of teeth along an edge of the support, a pair of opposed tongs, toggle links pivotally connecting the tongs at a point spaced below the upper ends thereof to the lower end of the support, toggle links connecting the upper ends of the tongs to the support above its lower end, a slide movably mounted on the support, said slide being divided into upper and lower sections, means connecting the slide sections, said connecting means permitting a small relative movement of said sections, means connecting the lower section of the slide to the upper ends of the tongs, a latch on the lower slide section normally resiliently pressed into engagement with the support teeth to prevent upward movement of said section, means on the upper section for disengaging the latch from the support teeth when said section is moved upwardly relative to the lower one, and means for moving the slide up and down the support to open and close the tongs through the toggle links thereof.

8. An aerial transporter for logs and the like comprising an overhead rail, a carriage adapted to be moved along the rail, a stop positioned adjacent the rail, a vertical support extending downwardly from the carriage, a pair of opposed tongs, toggle links pivotally connecting the tongs to the support adjacent the lower end thereof, a slide movably mounted on the support and connected to the tongs, said tongs being open and closed when the slide is respectively near the top and bottom of the support, a segment pivotally mounted on the carriage adjacent the support, a cable connected to the segment at one end thereof and extending down to the slide, said slide normally being in its lowermost position, and means on the segment for engaging the stop when the carriage moves past the latter to turn the segment about its pivot to raise the slide and open the tongs.

9. An aerial transporter for logs and the like

comprising an overhead rail, a carriage adapted to be moved along the rail, a stop positioned adjacent the rail, a vertical support extending downwardly from the carriage, a pair of opposed tongs, toggle links pivotally connecting the tongs to the support adjacent the lower end thereof, a slide movably mounted on the support and connected to the tongs, said tongs being open and closed when the slide is respectively near the top and bottom of the support, a segment pivotally mounted on the carriage adjacent the support, said segment having a grooved curved surface along one edge thereof, a cable connected to the segment at one end of its groove and extending over the groove and down to the slide, said slide normally being in its lowermost position, and means on the segment for engaging the stop

when the carriage moves past the latter to turn the segment about its pivot to raise the slide and open the tongs.

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