To all whom it may concern:

Be it known that I, CHARLES A. CASE, a citizen of the United States, and a resident of the borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Tramway Loading Devices, of which the following is a specification.

This invention relates to aerial tramway loading devices. Its organization comprises a movable loading hopper having means for automatically locking itself with a moving bucket and the like. The loading hopper also has means for opening and closing a discharge gate connected therewith, while it is locked with the bucket, and means to unlock itself from one bucket and return to its original position to engage another bucket.

Referring to the drawings which exemplify the invention, Figure 1 represents an end view of the loading hopper with a bucket and trolley, Figure 2 shows a partial section of Figure 1 on the line 2, 2, Figure 3 shows a partial left-hand side view of Figure 1, Figure 4 is a partial right-hand side view of Figure 1, Figure 5 represents a detail elevation of a movable shaft, Figure 6 is a top view of Figure 5, Figure 7 is a right-hand end view of Figure 5, Figure 8 shows the top view of Figure 1, Figure 9 represents an enlarged plan view of Figure 3, Figure 10 shows an end view of the invention in a loading station, Figure 11 shows a left-hand side view of Figure 11, Figure 12 is a plan view and partial section of Figure 12 on the line 13, 13.

A track 30 supports the rollers 31 of a trolley 32, from which is suspended the chain 33 that carries the bucket 34. The said bucket is connected by means of grips 35 to a shafting rope 36. The grips are the subject-matter of an application for Letters Patent executed March 30, 1907, and will not be described herein. The bucket 34 is journaled a locking roller 37.

Tracks 40, 41 support the wheels 42 of the loading hopper 43 having the sides 44 and 45. The wheels 42 are journaled on journal pins 46, that are fastened to the brackets 47, 48 and 49. The brackets 48, 49 are connected by the cross-bracket 50. A guard rail 51 is secured over the track 41. A rope clamp 52 secures the weight box rope 53 with the cross-bracket 50 of the loading hopper 43.

A pair of journal brackets 54 extend from the sides of the loading hopper 43, and a square shaft 55 which is turned cylindrical near its ends is fulcrumed in the said brackets 54. An arm 56 extends from the shaft 55, which has pinned therewith the link 62, that in turn is pinned to the arms 57 on the pin 58. The arms 57 are fulcrumed on the pin 59 supported on a bracket 60 extending from the side 44 of the loading hopper 43. The pin 58 also carries the links 61. A bell-crank with arms 65, 66 is fulcrumed to the side of the hopper on the pin 67, the arm 65 being pinned to the links 61 with the pin 68, while to the arm 66 is pinned the pin 69. A bell-crank with the arms 70, 71 is fulcrumed in the bracket 72, the arm 70 of the bell-crank being pinned to the link 69 with the pin 73, and to the end of the arm 71 is journaled a roller 74. To the square shaft 55 is fastened the gate 75 and said shaft 55 carries an arm 80 with the counter-weight 81.

With the brackets 47 are formed journal bearings 82 for the axially movable and partially rotary shaft 83, which has near its ends the collars 84, 85, the arm 86 with the roller 87, and the latch arms 88, 89, in about its central portion. The latter arm is capable of swinging on said movable shaft between the collars 90. The arm 89 has connected therewith the counter-weight 95 and a horizontal pin 92 which can bear against the arm 88.

A spring 93 is carried on the shaft 83 and bears between one of the bearings 82 and the arm 88.

A bracket 100 extends from the side 45 of the hopper 43, in which is journaled on a pin 101 a bell-crank with the arms 102, 103. A forked end 104 of the arm 102 carries rollers 105 that are engaged between the collars 85 of the movable shaft 83. The arm 103 is pinned to the link 106 which in turn is pinned to the latch 107, the latter being fulcrumed on a pin 108 extending from one of the brackets 47. A pin 109 extends from the track 40 to engage the latch 107.

To the side 44 of the hopper 43 is pinned the trip lever 112, on the pin 113. To one end of the lever 112 is journaled the roller 114, which can bear against the arm 96. On the other end of the said lever 112 is carried a pin 115 which latter supports the link 116.

A bracket 117 extends from the side 44 of the hopper and carries a pin 118 on which is fulcrumed a bell-crank with the arms 119 and 120. The arm 119 is pinned to the link 116 by the pin 121. The arm 120 has formed there-
with the fork 122 which carries rollers 123 that are straddled by the collars 84 on the movable shaft 83.

Referring particularly to Figs. 11 to 13 the invention is shown with the framing of a loading station. In the said station is journaled a return wheel 130 for the hauling rope 36. Guide sheaves 131 for the rope 36 are journaled on the flooring 132. Above and in line with the rope 36 in said station is supported the track 30 which is formed to follow the direction of said rope 36 in the station. Track ropes 133 join with the track 30 at the shoes 134. Tracks 40 and 41 are supported in the station on a level between the track 30 and the hauling rope 36. Between the tracks 40 and 41 are located the wedges 141 and 142 to engage the rollers 74 and 87 respectively.

A weight box rope 53 of the loading hopper is fastened to the cross sill 135, leads under the sheave 136, extends to the sheave 137 and from thence turns around the sheave 138, and leads to and is fastened to the loading hopper 43 by means of the clamp 52 as already stated. The rope 53 then passes around the sheave 139, thence around the sheave 140 from which it again turns around the sheave 136 and finally leads to and is fastened to the cross sill 141. The sheave 136 is supported and can roll on the timber or track 145. It has an axle 146 which carries the links 147 at the lower ends of which latter is pinned one end of the triangular weight box 148. The other end of the weight box has extending therethrough brackets 149 that are supported on the pin 150 supported on the vertical timbers 151. In the framing of the station is built a bin 160 which may have a number of partitions.

Chutes 161 with gates 162 extend from the said bin.

To operate the invention the bin 160 is filled with ore or any other material to be handled, and by means of the clamp 52 the loading hopper 43 is clamped in proper position to operate with any of the chutes 161. When the loading hopper is opposite the chute from which the material is drawn to fill the said hopper, the sheave 136 is a little to the left of its normal position, and the weight box is raised somewhat as shown particularly in Fig. 12. In this position the roller 37 of the bucket 34 strikes the arm 89 of the movable shaft 83, and turns it up out of the way. The roller 37 next strikes the arm 88 compressing the spring 93 and the arm 89 falls in place behind the said roller 37, locking the roller 37 of the bucket in place. During this operation the loading hopper is propelled with the buckets in the direction of the arrow shown in Fig. 12, and at the same time the weight box 148 lowers, pulling the sheave 136 in a direction opposite to the arrows shown in Fig. 12. This action of the weight box and the rolling of the sheave 136 causes the rope 53 to pull the loading hopper in the same direction as the direction of the movement caused by the bucket 34. This additional pull caused by the weight box prevents excessive jar. When the roller 37 on the bucket locks itself with the loading hopper 43, the spring 83 assists in cushioning the force of the blow due to the locking. As the roller 37 impinges against the arm 88 the latch 107 is unlocked from the pin 109, the spring 93 cushioning the first effect of the locking of the loading hopper and the bucket. During the same time that the latch 107 is unlocked, the movable shaft 83 by actuating the bell crank with the arms 119 and 120 drops the gate 75 to allow a charge of material to enter the bucket from the loading hopper, and remains open while the loading hopper and bucket are connected or locked. After the hopper and bucket have traveled a short distance, the sheave 136 is moved so as to allow the weight box to descend to its lowest position. As the hopper with the bucket continues to travel in the direction of the arrow in Fig. 12, the weight box 148 is again raised and the sheave 136 is moved to the right until the roller 87 strikes the wedge 142 when the arm 88 with its accompanying arm 89 is pulled clear of the roller 37 of the bucket disconnecting the latter from the loading hopper, allowing the bucket to travel with its pulley rope 36. At this instant the weight box lowers and the loading hopper is pulled back by the rope 53 to its original position opposite its chute. While the loading hopper is traveling back to this position, the roller 74 is engaged with the wedge 141 which causes the link 69 and its appurtenances to raise the gate 75 to a closed position.

Having described my invention I claim:
1. The combination of a movable receiving receptacle and a movable loading hopper, an axially movable and partially rotary shaft supported on the loading hopper, an arm on said shaft and means on the receptacle to engage said arm.
2. The combination of a movable receiving receptacle and a movable loading hopper, an axially movable and partially rotary shaft supported on the loading hopper, an arm on said shaft, means on the receptacle to engage said arm, a latch on the hopper to clamp it in place and means between said shaft and said latch to unclamp the loading hopper.
3. The combination of a movable receiving receptacle and a movable loading hopper, a shaft supported in bearings on the said hopper, an arm extending from said shaft located to engage with means on the movable receptacle to connect the latter with the movable loading hopper, a gate in the hopper, means between said movable shaft and the gate to actuate the latter.
4. The combination of an aerial tramway,
a receiving receptacle propelled by the hauling rope of the tramway, a loading hopper supported on the tracks adjacent to said tramway, a shaft that can oscillate about and move along its axial line supported on the loading hopper, an arm extending from said shaft located to engage the receiving receptacle, a second arm extending from said shaft, and means to engage said second arm and thereby disengage the first arm from the receiving receptacle.

5. The combination of an aerial tramway, a bucket propelled by a hauling rope of said tramway, a loading hopper supported on tracks adjacent to said tramway, a shaft that can oscillate about and move along its axial line supported on the loading hopper, an arm extending from said shaft, a roller journaled on the bucket in the path of said arm, a second arm extending from said shaft, a wedge located in the path of the second arm to engage therewith and thereby disengage the first arm and the roller on the bucket.

6. In a loading hopper the combination of a shaft slidable along its axial line supported thereon, a bell-crank fulcrummed on the hopper with the arm thereof connected with said shaft, a lever fulcrummed at about its central portion on the hopper, a link extending between one end of said lever and one of the arms of the bell-crank, a swinging gate journaled in the hopper, means connected with the swinging gate located in the path of the swinging lever to operate the said gate.

7. In a loading hopper the combination of a shaft slidable along its axial line supported thereon, a bell-crank fulcrummed on the hopper with one arm thereof connected with said shaft, a lever fulcrummed at about its central portion on said hopper, a link extending between one end of said lever and the other arm of said bell-crank, a second bell-crank fulcrummed to the hopper with one arm in the path of the latter lever, a second shaft journaled in the hopper, a gate extending from the second shaft, an arm extending from the second shaft, a link with one end pinned to the arm, a pair of arms pinned to the other end of the latter link, and a link extending between the second bell-crank and pinned to the said pair of arms.

8. In an aerial tramway the combination of a traveling bucket and a movable loading hopper, a movable shaft fulcrummed on the hopper which shaft can oscillate and move along its axial line, tracks for the movable hopper parallel to the aerial tramway, a pin extending from one of said tracks, a latch connected with the movable shaft in the path of said pin, an arm extending from the shaft in the path of the said bucket to lock it with the loading hopper, a second arm extending from said movable shaft, a wedge in the path of said second arm, a bell crank with one arm thereof engaged by the movable shaft, a counter weighted gate fulcrummed on the loading hopper, a link pinned to the other arm of the bell crank, a tripping lever fulcrummed to one side of the hopper, and pinned to one end of the latter link, a second bell crank fulcrummed to the side of the hopper, linked connections between the gate and the second bell crank, the second bell crank being located in the path of the tripping lever, a link pinned to one arm of the second bell crank, a third bell crank fulcrummed to the loading hopper, with one arm thereof pinned to the latter link, and a wedge in the path of the other arm of the third bell crank.

9. In a tramway loading station the combination of a traveling bucket and a movable loading hopper, a running rope connected to the bucket, a weight box hinged in the station, a movable sheave on a track in the station, links connecting the axle of the sheave and the swinging end of the weight box, a rope extending from the opposite sides of the loading hopper and each thereof passing around the said sheave in opposite directions, means to lock the bucket and loading hopper when the said sheave has pulled the weight box somewhat up from its lowest position, so that the impact caused by the locking of the bucket and loading hopper will pull the rope connected with the latter in the same direction of pull as caused by the lowering of the weight box consequent to the movement of the loading hopper.

10. In a tramway loading station the combination of a traveling bucket and a movable loading hopper, means to lock the hopper and bucket together, a running rope connected to the bucket, a weight box hinged in the station, a movable sheave on a track in the station, connections between the axle of the sheave and the swinging end of the weight box, a pair of sheaves in the station on the right hand side of the loading hopper, and a pair of sheaves in the station on the left hand side of the loading hopper, a rope extending from the right hand side of the loading hopper leading over the said sheaves on the right hand side and passing around the movable sheave and secured at the right hand side of the station, a rope extending from the left hand side of the loading hopper leading over the said sheaves on the left hand side, then passing around the movable sheave and fastened at the left hand side of the station.

11. In a tramway loading station the combination of a traveling bucket and a movable loading hopper, means to lock the hopper and bucket together to move the former, a bin in the station, a chute extending from the bin to charge the loading hopper, a running rope for the bucket, a wedge in the station in the path of the locking means between the loading hopper and bucket to unlock the two latter elements, a rope extending from the opposite side of the loading hopper; a mov-
able sheave in the station the latter rope passing around the movable sheave in oppo-
site directions, a weight box hinged in the
station, connections between the weight box
and the movable sheave to return the loading hopper opposite its bin after having been
moved therefrom by the bucket, a movable
gate in the loading hopper, connections be-
tween the said locking means and the mov-
able gate to open the latter, means to close

the gate, a wedge in the station to engage the
latter means.

Signed at the borough of Manhattan in
the county of New York and State of New
York this 30th day of March A. D. 1907.

CHARLES A. CASE.

Witnesses:

M. H. COOK,

MARTIN ZIMANSKY.