To all whom it may concern:

Be it known that we, JOHN O. NEIKIRK and DAVID HINDAHL, citizens of the United States, residing, respectively, at Lombard, in the county of Du Page and State of Illinois, and at Chicago, in the county of Cook and State of Illinois, have jointly invented certain new and useful Improvements in Safety Devices for Dump Cars, of which the following is a specification.

The present invention relates to safety devices for dump cars.

An object of the present invention is to provide operating means for dump cars of the type which opens practically instantaneously, said mechanism including a lost motion connection of novel form.

A further object is to provide a lost motion connection of the kind referred to above which has the attributes of strength and ease of assembling.

A further object is to provide an arrangement of dumping mechanism involving flexible means, which mechanism will be simple in operation and little likely to get out of order.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 is a transverse sectional view of a dump car illustrating the dumping mechanism;

Figure 2 is a fragmentary view taken in the direction indicated by the arrows 2—2 of Figure 1;

Figure 3 is a side view in section of the structure illustrated in Figure 1, said view being taken in the direction of the arrow 3 in Figure 1;

Figure 4 is a view in elevation of a lost motion device;

Figure 5 is a side view taken in the direction of the arrow 5 in Figure 4;

Figure 6 is a sectional view taken along the plane indicated by the line 6—6 of Figure 4;

Figure 7 is a view in elevation of a modified form of lost motion device;

Figure 8 is a side view taken in the direction of the arrow 8 in Figure 7; and

Figure 9 is a sectional view taken along the plane indicated by the arrows 9—9 in Figure 7.

The numerals 10—10 indicate the sides of the car, while the numerals 11—11 indicate the center sills of said car. Mounted transversely of the car is the operating shaft 12, which carries two chains 13 and 14 for operating the hopper doors 15 and 16. The hopper doors 15 and 16 are pivoted along the longitudinal axes 17 and 18 respectively.

Pivoting to the door 16 by means of the pivot pin 16' located in an axis distant from the pivotal axis 18, is the link 19, which may take an angular form, as illustrated in the drawing. Pivoting to the door 15 on the shaft 20, located in an axis distant from the pivotal axis 17, is the crank 21, which to crank 21 is pivotally connected to the link 19 by means of the pivot pin 22. The chain 13 is connected at one end to the shaft 12 by means of a suitable connector 23, the other end of said chain 13 being connected to the side of the car by a suitable connector 24, illustrated in Figure 3. The chain 13 hangs in a loop between the shaft 12 and connector 24 and, as will be referred to hereinafter, is adapted to underlie the crank 21 when the hopper doors are in closed position, whereby upon turning the shaft 12 the operator may cause said loop to shorten to raise the crank 21 for dumping purposes. The loop of chain 13, as illustrated in the drawings, may lie in a plane transversely of the length of crank 21 when said crank is in door holding position. Expressed in other language, the loop of chain 13 may lie in a plane extending longitudinally of the car. A detent 24' may be provided for controlling shaft 12.

Connected to the crank 21 by means of the pin 25, located at a point adjacent to the pivot pin 20, is the link 26 which constitutes a part of the chain 14. In part of its travel the chain 14 raises the pivot pin 20, and for this reason said pivot pin 20 may be provided with a flanged sheave portion 27 for engaging chain 14. The link 19 is provided with the sheave 28, which sheave engages with chain 14. A guard plate 29 may be provided to keep the chain 14 in operative relationship with the sheave 28.

It has been stated that one end of the chain 14 will be connected through the link 26 to the crank 21. The other end of said chain is connected to a safety device which has been referred to hereinafter as a lost motion device. Figures 4, 5 and 6 represent one form of lost motion device, which device is indicated as a whole by the numeral 30.
Said lost motion device as illustrated in Figures 4, 5 and 6 comprises an integral housing 31 rotatably mounted on the shaft 12, the two sides of said housing being provided with holes 32 which provide bearing surfaces for shaft 12. Said housing provides an annular recess, which annular recess contains the abutment 34. Mounted transversely of the shaft 12 is the stud 35 having the head 36, which head is adapted to have a movement in a circular path between the two abutting sides of abutment 34. As will be noted from Figure 6, almost a complete revolution is permitted between the housing 31 and the head 36. One side 37 of the housing 31 is provided with an opening 37a of sufficient size to admit the head 36 of stud 35, the other side 37b of said housing being of complete annular form. As will be noted hereinafter, the pull of chain 14 is in a direction to hold the side 37a of housing 31 toward the head 36 of stud 35, whereby there is no tendency for said housing 31 to move out of operative relationship with said head 36.

The housing 31 is provided with a bolt 38, which may be secured to housing 31 by suitable nuts and nut locking devices. The end link of chain 14 may be mounted upon bolt 38, the head 39 of said bolt preventing the escape of said chain from connection with housing 31.

The form of lost motion device illustrated in Figures 7, 8 and 9 performs the functions of the structure illustrated in Figures 4, 5 and 6. According to the disclosure in Figures 7, 8 and 9, however, the housing 31, instead of being made integral, is made in two separable parts 40 and 41. As illustrated in Figure 9, the member 41 may have a pin 42 and the member 40 may have a hooked portion 43 adapted to catch over said pin 42. The two parts 40 and 41 are held together by means of the bolt 43', which thereby serves the double function of securing the chain 14 and holding together the two parts of housing 31. The housing disclosed in Figures 7, 8 and 9 provides an annular chamber 33 for receiving the head 36 of stud 35.

The parts are so designed that when the dump doors 15 and 16 are in closed position the chain 14 will have a greater number of convolutions on said shaft than has chain 13. In the conditions referred to, that is— with the doors closed, the link 19 will rest upon the crank 21, as illustrated in Figure 1, and the pivot pin 22 which pivotally connects link 19 and crank 21 will lie in a position past dead center, whereby stresses applied to doors 15 and 16 to urge same to open position will react upon link 19 and crank 21 to force pivot pins 16' and 20 toward one another whereby to hold said doors 15 and 16 in closed position. As will be referred to hereinafter, when the pivot pin 22 is raised past dead center with reference to pivot pins 20 and 16', the doors 15 and 16 will fly open, resulting in the practically instantaneous dumping of the car.

With the doors in closed position releasing may be accomplished by turning the shaft 12 in the direction indicated by the arrow. Such motion will result in the unwrapping of chains 13 and 14 from shaft 12. The weight of chain 14 will cause the housing 31 to revolve as the shaft 12 revolves, whereby the abutment 34 of said housing will follow the head 36 of stud 35. After the chain 13 has been completely unwrapped from the shaft 12, further revolution of the shaft 12 in the direction indicated by the arrow will cause the chain 13 to again wrap itself upon shaft 12 but in the reverse direction from that indicated in the drawing. The wrapping up of chain 13 on shaft 12 will finally cause chain 13 to engage with cranks 21, raising said crank and pivot pin 22 to a position past dead center. At this time the chain 14 will have become practically unwrapped from shaft 12. The raising of pivot pin 22 above dead center will cause the doors 15 and 16 to fly open, resulting in the instantaneous dumping of the car. Inasmuch as chain 14 has become practically unwrapped from shaft 12, there should be no turning movement exerted upon shaft 12 by this sudden opening of doors 15 and 16. Figures 7, 8 and 9 illustrate conditions when the chain 13 is wound up on shaft 12.

It will be understood that many modifications of the present invention will occur to those skilled in the art. It is intended in this patent to cover all such modifications that fall within the scope of the invention as defined by the appended claims.

We claim:
1. Dump car construction comprising dump doors, a chain for controlling said doors, a shaft for said chain, said chain being wrapped upon said shaft during certain phases of operation of said dump car construction, a lost motion connecting means between said shaft and said chain, said lost motion connecting means comprising an...
abutment means non-rotatably mounted upon said shaft, and a housing for said abutment means rotatably mounted upon said shaft, said housing having an abutment limiting relative rotative movement between said housing and said abutment means, said housing being connected to said chain.

2. In combination, a dump door adapted to move to open position practically instantaneously, an operating chain likely to be moved by said dump door in its opening movement, a shaft, said chain being wrapped upon said shaft during certain phases of operation of said mechanism, a lost motion device between said shaft and said chain, said lost motion device including an abutment non-rotatably mounted upon said shaft, and a housing rotatably mounted upon said shaft, said housing being connected to said chain and being provided with stop means for cooperating with said abutment means but permitting a material amount of lost motion between said housing and said abutment means.

3. In combination, a rotatable shaft, a chain wrapped thereon, abutment means non-rotatably mounted upon said shaft, a housing having a side wall arranged transversely of said shaft, said side wall providing an abutment for said first mentioned abutment throughout the range of relative movement between said housing and said first mentioned abutment, the other side of said housing having an opening for the insertion of said first mentioned abutment, said chain being disposed upon said shaft during certain phases of operation in a position to exert a pull upon said housing whereby said side wall is held against said first mentioned abutment.

4. A shaft and lost motion means therefor, said lost motion means comprising an abutment non-rotatably mounted on said shaft, and a housing for said abutment rotatably mounted upon said shaft, said housing having stop means for limiting rotation of said housing relative to said abutment and having a side wall stopping longitudinal movement of said housing relative to said abutment, and flexible means connected with said housing and disposed in a position to hold said side wall adjacent to said abutment.

5. In combination, a shaft, flexible means cooperating therewith, said flexible means being wrapped upon said shaft during certain phases of operation and exerting a pull parallel with said shaft, said shaft being provided with an abutment non-rotatably mounted upon said shaft, and a housing for said abutment having a annular chamber permitting a lost motion connection between said housing and said abutment, said housing having a side wall held against said abutment by the pull of said flexible member.

6. Dump car construction comprising said door means, mechanism for controlling the closing and the practically instantaneous opening thereof, said mechanism including a crank and a link operatively associated with said door means, flexible means for raising said mechanism against the force of gravity to a position to hold said door means closed, flexible means adapted to operate said mechanism against the force of gravity to cause the practically instantaneous opening of said door means, said last mentioned flexible means comprising a loop adapted to underlie said crank transversely thereof, and a common rotatable shaft for operating said flexible means.

7. Dump car construction comprising said door means, link mechanism operatively associated therewith adapted to occupy a position in which it exerts forces under the influence of gravity for holding said door means closed, and a flexible member lying in a plane transversely of said link mechanism adapted to enclose a portion of said link mechanism and to raise said link mechanism against the force of gravity to cause the opening of said door means, a second flexible member adapted to move said doors and said link mechanism to cause said link mechanism to assume a door holding position, and a common rotatable shaft for operating said flexible members.

8. Dump car construction comprising said door means, link mechanism extending transversely of the car adapted in a predetermined position to hold said door means closed under the influence of gravity, and a flexible member having a loop extending transversely of said link mechanism adapted to raise said link mechanism against the force of gravity to cause the rapid opening of said door means, a second flexible member for moving said door means to closed position and said link mechanism to door holding position, and common operating means for said flexible members.

9. Dump car construction comprising said door means, operating mechanism therefor, said mechanism comprising means for urging said door means to closed position under the influence of gravity, and a pair of flexible members, one of which is operated to move said door means to closed position and the other of which is adapted to control said mechanism to raise same against the force of gravity to cause the opening of said door means, said other flexible member comprising a loop lying substantially in a plane extending longitudinally of the car, and a common operating member for said flexible members.
10. Dump car construction comprising dump door means, operating mechanism therefor, said mechanism having means for urging said door means to closed position under the influence of gravity, and a pair of flexible members, one of which is operative to move said door means to closed position and the other of which is adapted to control said mechanism to raise same against the force of gravity to cause the opening of said door means, said last mentioned flexible member including a loop adapted to be lengthened or shortened, said loop occupying a plane longitudinally of the car and underlying part of said mechanism, and common operating means for said flexible members.

11. A door operating mechanism comprising a rotatable shaft, flexible door closing means attached to the shaft, flexible door opening means also attached to the shaft, and means for permitting the rotation of the shaft for continued operation of the door opening means and at the same time interrupting the operation of the door closing means. Signed at Chicago, Illinois, this 19th day of January, 1922.

JOHN O. NEIKIRK.

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