J. F. O'CONNOR.

SAFETY DEVICE FOR CAR DOOR OPERATING MECHANISMS.

APPLICATION FILED NOV. 6, 1919.

1,374,673. **Patented Apr. 12, 1921.**

Fig. 1

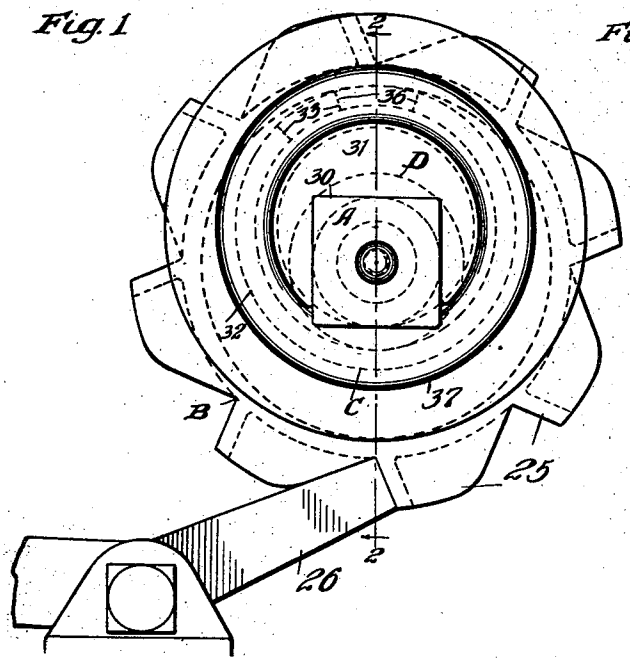


Fig. 4

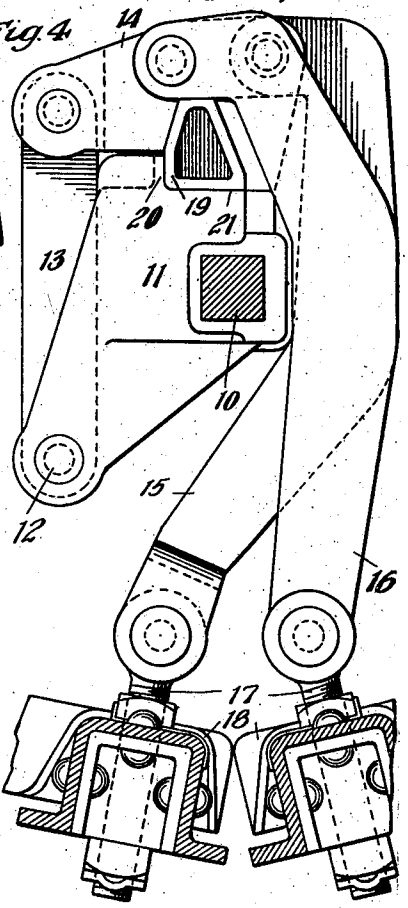


Fig. 2

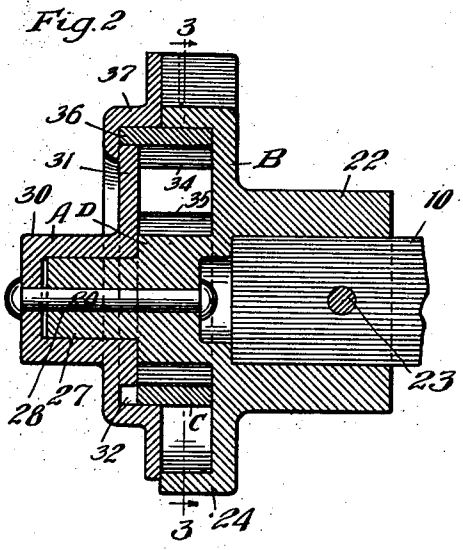
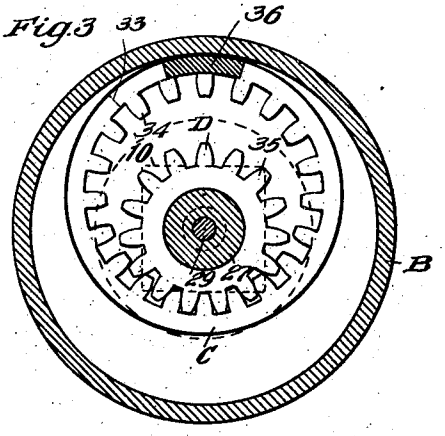


Fig. 3



Witnesses

Wm. Geiger

Inventor

John F. O'Connor

By Geo. I. Haight

His Atty.

UNITED STATES PATENT OFFICE.

JOHN F. O'CONNOR, OF CHICAGO, ILLINOIS, ASSIGNOR TO WILLIAM H. MINER, OF CHAZY, NEW YORK.

SAFETY DEVICE FOR CAR-DOOR-OPERATING MECHANISMS.

1,374,673. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed November 6, 1919. Serial No. 336,055.

To all whom it may concern:

Be it known that I, JOHN F. O'CONNOR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Safety Devices for Car-Door-Operating Mechanisms, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in safety devices for door operating mechanisms.

The object of the invention is to provide an efficient safety device applicable for use in door operating mechanisms of dump cars and the like and whereby danger to the operator, during the opening movements of the doors, is eliminated.

In the drawing forming a part of this specification, Figure 1 is an end elevational view of a door operating mechanism showing my improvements in connection therewith. Fig. 2 is a vertical longitudinal sectional view taken substantially on the line 2—2 of Fig. 1. Fig. 3 is a vertical sectional view taken partly on the line 3—3 of Fig. 2 and partly in a plane coincident with the outer edge of the internal gear. And Fig. 4 is a vertical sectional view of a door operating mechanism and associated doors of a dump car, the mechanism being of a well-known type.

In said drawing, 10 denotes an operating shaft of a car door mechanism to which is secured a winding drum 11. Pivotally connected to the drum 11 at 12 is a link 13 to which in turn is pivotally attached another link 14. Pivotally connected to the link 14 are elongated hook-shaped links 15 and 16. The latter are pivotally connected to eye-bolts 17—17 adjustably attached to the free edges of pivoted doors 18—18. The link 14 has a shoulder 19 which is adapted to coöperate with a corresponding shoulder 20 formed on the hub 11 to insure the unwinding of the linkages when the shaft 10 is rotated in a clockwise direction. It will be noted that the link 14 and hub 11 have coöperating flat surfaces 21 so positioned with respect to the pivotal connections between the links 15 and 16 and doors 18 as to relieve the shaft 10 of all torsional strains when the doors are in closed position. In carrying out my invention, I provide a lost motion clutch form of safety device at the end of the shaft 10 and, as shown, this clutch comprises, broadly, an outer clutch member A, an inner clutch member B, an internal gear C, and a pinion D.

The clutch member B is provided with a hub 22 which is recessed so as to fit over the non-circular end of the shaft 10 and be riveted thereto as indicated at 23. Said member B is provided with an annular flange 24 which, in conjunction with the clutch member A, as hereinafter described, forms a housing for the pinion and internal gear. Around its periphery, said member B is provided with a series of shoulders 25 with which is adapted to coöperate a pivotally mounted locking dog 26 of well-known form to hold the door mechanism positively in locked position while the car is in transit.

The pinion D, as clearly shown in Fig. 2, is preferably formed integrally with the clutch member B and is located in alinement with the axis of the shaft 10. Beyond the pinion D, the clutch member B is provided with an integral axle 27 on which the clutch member A is rotatably mounted. The clutch member B is provided with an axially extending opening 28 to accommodate a rivet or other suitable securing element 29 which also passes through the clutch member A and is adapted to hold the parts in assembled relation, as will be understood.

The clutch member A is provided on its outer side with a squared section 30 adapted to accommodate the usual claw bar or other operating tool. In addition, said member A has a disk-like flange 31 which covers the pocket or recess defined by the annular flange 24 and, in conjunction with the latter, forms the housing for the other parts, as hereinbefore explained. On its interior, said flange 31 has formed therein an annular groove 32 which extends for a complete circle except for a lug 33 which extends through a relatively short arc. The lug 33 is best indicated by dotted lines in Fig. 1. It will be noted that the groove 32 is arranged eccentrically with respect to the axis of the shaft 10 and in fact the center of the groove 32 coincides with the axis of the internal gear C.

The internal gear C has teeth 34 which mesh with the teeth 35 of the pinion D, as

clearly indicated in Fig. 3, and said internal gear C has a peripheral lug of relatively short, arcuate form as indicated at 36. Said lug 36 is adapted to travel within the groove 32 and obviously will permit of lost motion between the clutch member A and the internal gear C through an arc of 360° less the combined arc subtended by the lugs 33 and 36. A bearing for the internal gear C is provided by the inwardly extending flange 37 of the clutch member A, as shown in Fig. 2.

The operation of the device is as follows: Assuming the doors in closed position and the parts of the door mechanism as shown in the drawing, the operator, after releasing the dog 26, will apply the claw bar to the squared section of the clutch member A and proceed to rotate the latter in a clockwise direction. As the member A is rotated in a clockwise direction, the lug 33 thereof will engage against the lug 36 of the internal gear C and consequently rotate the internal gear C in a clockwise direction. This movement is communicated to the pinion D which of course produces a corresponding rotation in the shaft 10. The shaft 10 will thus be rotated until such time as the linkages of the door mechanism proper become unlocked from the drum 11 and the doors start to swing downwardly at high speed under the load thereon. This high speed rotation of the shaft 10 will cause the pinion D to rotate rapidly as will be understood and during the remainder of the door opening operation, the clutch member A will remain stationary. As the pinion D is rotated rapidly in a clockwise direction under the influence of the freely falling doors, the internal gear C will also be rotated in a clockwise direction and the lug 36 thereof will travel around the groove 32 until it comes into engagement with the opposite side of the lug 33. This provides for the necessary lost motion between the main shaft 10 and the manually operated clutch member A and injury to the operator is thus eliminated.

In actual practice, the amount of lost motion required between the operating shaft proper of the door mechanism and that part which is directly actuated by the claw bar, will vary in accordance with the particular type of door mechanism employed. Some of these require less than a complete revolution whereas others require approximately one or one and one-quarter revolutions. These variations may be readily taken care of in my device by properly proportioning the lugs 33 and 36 and the ratio of the teeth in the pinion D to the teeth in the internal gear C. In the device as illustrated, I have employed fifteen teeth on the pinion D and twenty teeth on the internal gear C so that, for every complete revolution made by the pinion D when it is traveling under the influence of the loaded doors, there will be produced only three-quarters of a revolution of the internal gear C, and inasmuch as the combined arc of the lugs 33 and 36 is less than 90°, it is evident that I obtain slightly more than a complete revolution of lost motion between the shaft 10 and the clutch member A.

As will be appreciated by those skilled in the art, the arrangement of pinion D and internal gear C constitutes a differential gearing. While a specific ratio has been illustrated in the drawing, it will be understood by those skilled in the art that the ratio may be varied to suit different conditions by employing different numbers of teeth on the pinion and gear.

Although I have herein shown and described what I now consider the preferred manner of carrying out my invention, the same is merely illustrative and I contemplate all changes and modifications as come within the scope of the claims appended hereto.

I claim:

1. In a safety device for door operating mechanism, the combination with two relatively rotatable clutch members, one of which is adapted to be directly operated and the other is adapted to rotate simultaneously with a shaft of the mechanism, of an internal gear loosely rotatably mounted between said clutch members and having a lug rigid therewith, a coöperating lug on one of said clutch members, said lugs limiting the amount of relative rotation between said internal gear and the clutch member carrying the lug, and a pinion coöperable with said internal gear and rigidly mounted on the other of said clutch members.

2. In a safety device for door operating mechanism, the combination with two clutch members, one of which is adapted to be secured to a shaft of the mechanism and which is provided with an integral journal, the other clutch member being rotatably mounted on said journal and having a section adapted to receive an operating tool, of a pair of coöperating differential gears interposed between the two clutch members, one of said differential gears being rigid with one clutch member and the other loosely rotatably mounted with respect to the other clutch member for a limited distance.

3. In a safety device for door operating mechanism, the combination with a clutch member adapted to be rigidly secured to a shaft of the mechanism, said clutch member having a pinion formed integrally therewith and a bearing axle both in alinement with the axis of the shaft, of a second clutch member rotatably mounted on said bearing axle and having a section adapted to receive an operating tool, an internal gear in-

terposed between the two clutch members and having its center disposed eccentrically with respect to the axis of the shaft, cooperating lugs on the tool operated clutch member and the internal gear, said lugs permitting relative rotation between the internal gear and said clutch member for an arc less than 360°, said internal gear being in mesh with said pinion, the ratio of the teeth on the pinion to the teeth on the internal gear being less than unity.

In witness that I claim the foregoing I have hereunto subscribed my name this 4th day of Nov., 1919.

JOHN F. O'CONNOR.