A. S. PERKO.

DIFFERENTIAL GEARING.

APPLICATION FILED APR. 15, 1918.

1,280,535.

Patented Oct. 1, 1918.

4 SHEETS—SHEET 1.

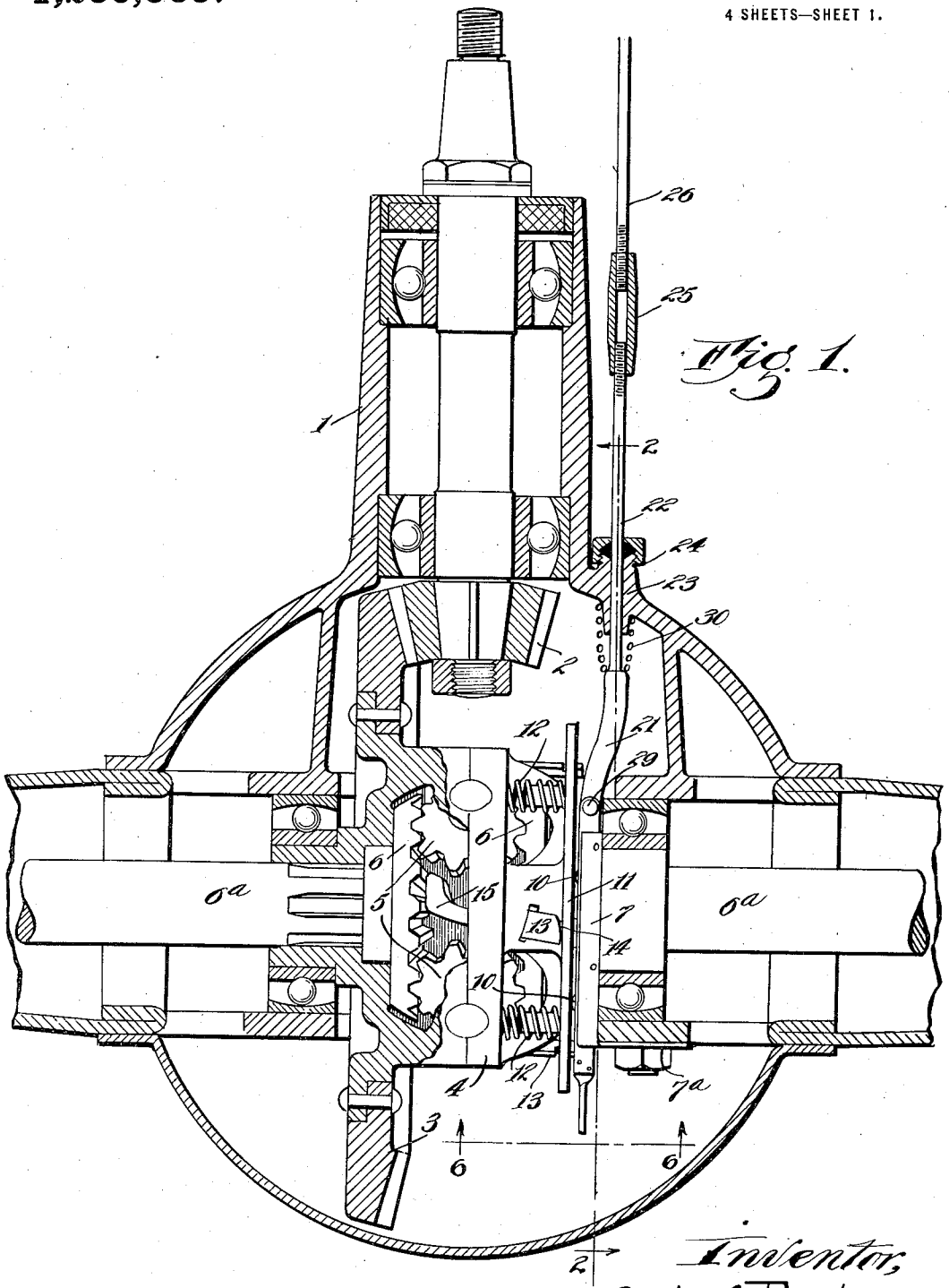


Fig. 1.

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4 SHEETS—SHEET 2.

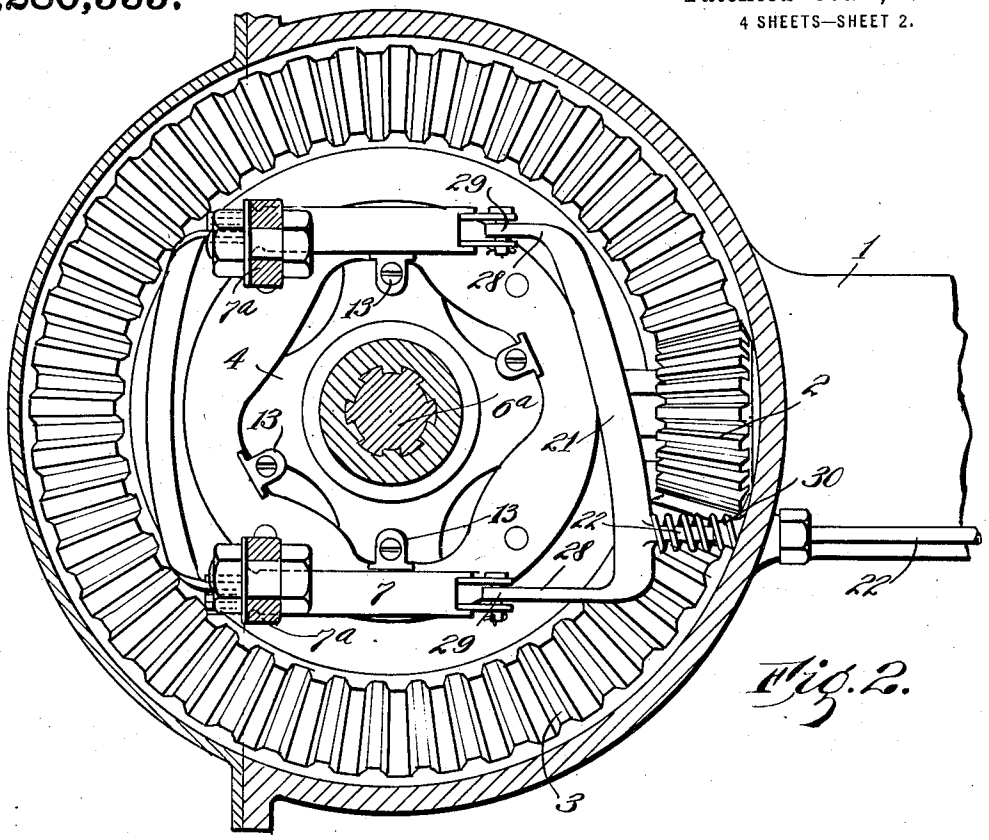


Fig. 2.

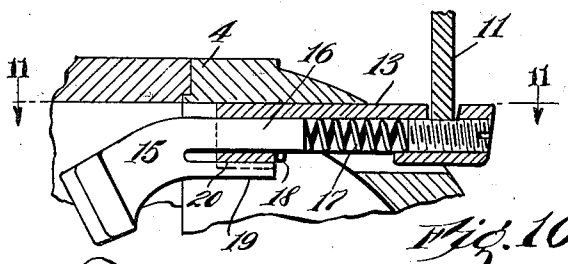


Fig. 10.

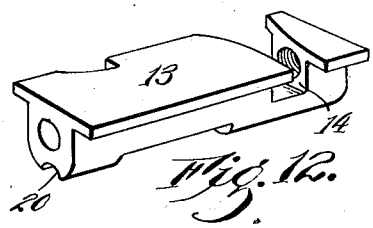


Fig. 12.

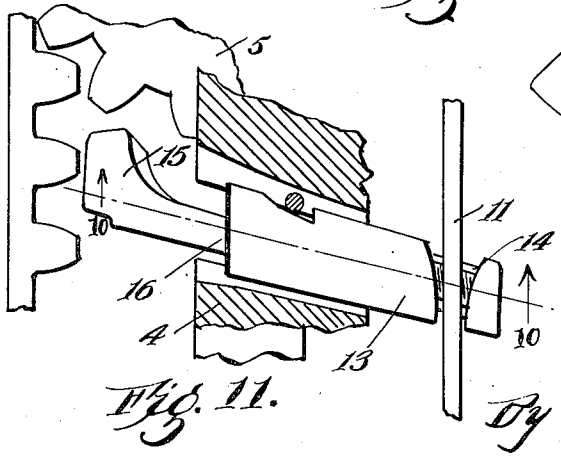


Fig. 11.

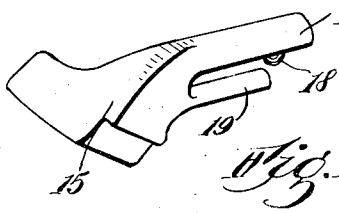


Fig. 13.

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4 SHEETS—SHEET 3.

Fig. 3.

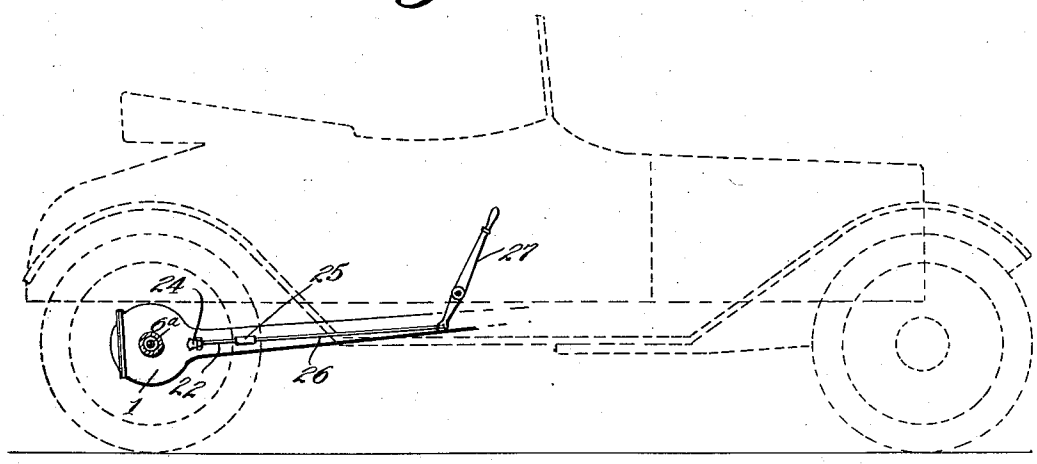


Fig. 4.

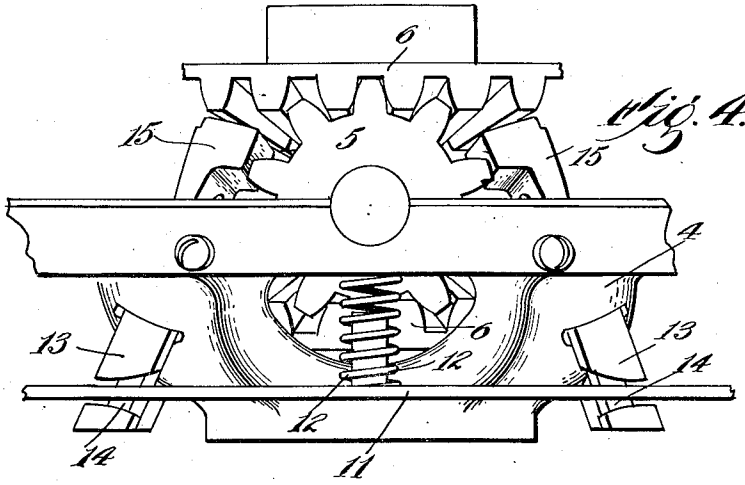
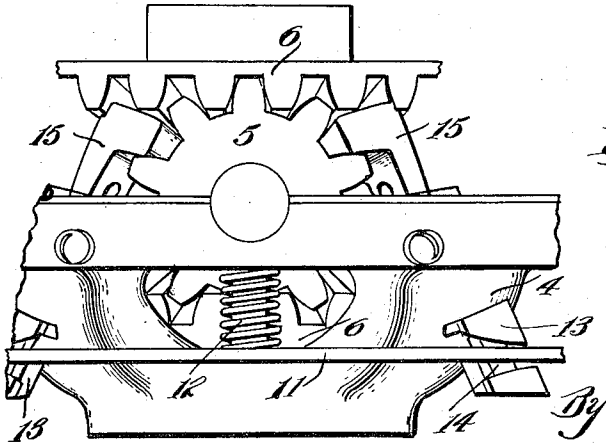


Fig. 5.



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4 SHEETS—SHEET 4.

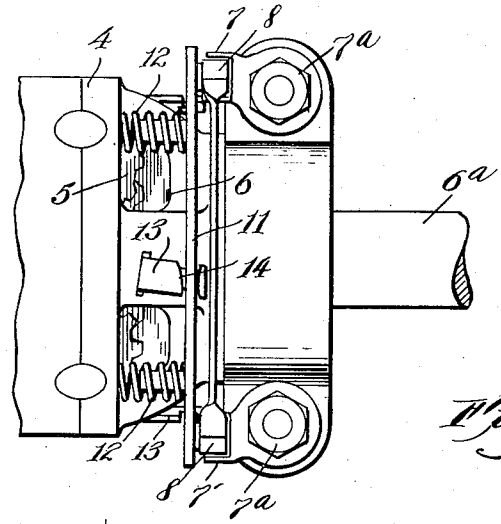


Fig. 6.

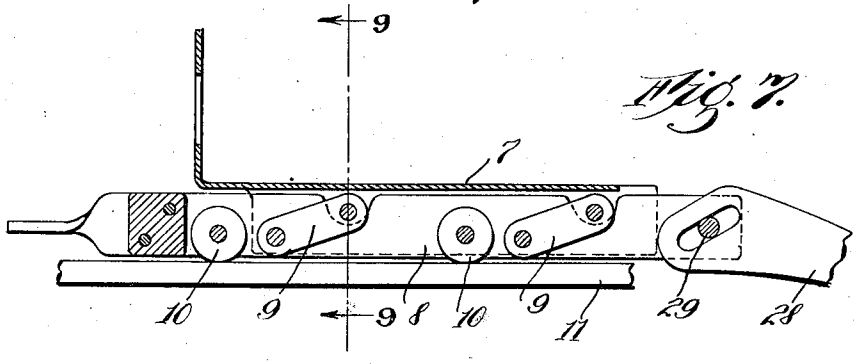


Fig. 7.

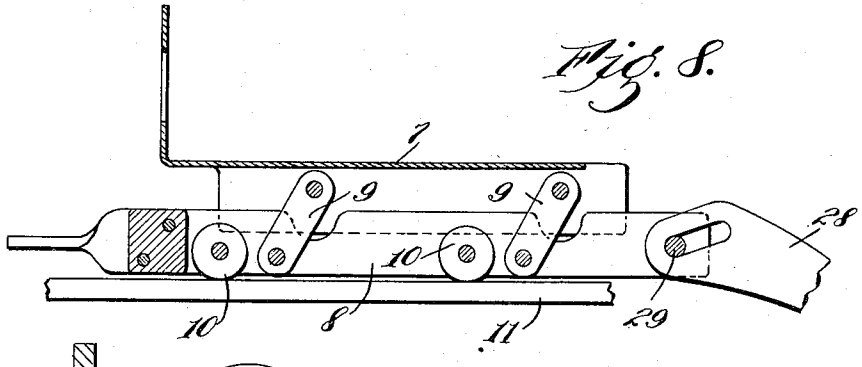


Fig. 8.

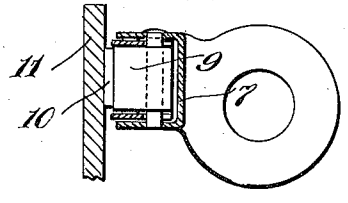


Fig. 9.

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UNITED STATES PATENT OFFICE.

ALOIS S. PERKO, OF CLEVELAND, OHIO, ASSIGNOR TO JOSEPH RAKOS, OF CLEVELAND, OHIO.

DIFFERENTIAL GEARING.

1,280,535. Specification of Letters Patent. Patented Oct. 1, 1918.

Application filed April 15, 1918. Serial No. 228,604.

To all whom it may concern:

Be it known that I, ALOIS S. PERKO, citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Differential Gearing, of which the following is a specification.

This invention relates to differential gears, and has for its object to provide means for locking the differential to prevent the compensating action thereof when desired; for example, when one of the driving wheels of an automobile slips in the mud, or whenever it is desirable to drive both wheels, or not to permit one to slip and the other to remain still.

To this end I provide a pawl or check which may be forced between the balance gears, to prevent relative rotation thereof, and thereby, in effect, make a solid axle of the two axle sections so that equal driving power is given to both wheels. These devices are under the control of the driver, so that they may be applied or released as desired.

In the drawings forming part of this specification Figure 1 is a horizontal section through the rear axle of an automobile, certain parts being shown in elevation for convenience of description. Fig. 2 is a transverse vertical section on the line 2—2 of Fig. 1; Fig. 3 is a detail view showing the mode of operating my device from the driver's seat; Fig. 4 is an enlarged detail of the locking pawls in the unlocked position; Fig. 5 is a similar view showing the pawls in a locked position; Fig. 6 is a section on the line 6—6 of Fig. 1; Fig. 7 is a sectional detail of the clutch plate operating mechanism in the normal or inoperative position; Fig. 8 is a like view showing the parts in an operative position; Fig. 9 is a sectional detail on the line 9—9 of Fig. 7; Fig. 10 is a vertical section indicated by the line 10—10 of Fig. 11 through the pawl carrier, the pawl being shown in elevation; Fig. 11 is a horizontal section corresponding to the line 11—11 of Fig. 10; Fig. 12 is a perspective view of the pawl carrier and Fig. 13 is a perspective view of the locking pawl.

In the drawings, 1 is the drive shaft housing, 2 the pinion meshing with the large bevel gear, 3 which is securely fixed to a cage or carrier, 4 in which are pivotally supported the planetary pinions 5. The pinions 5 are constantly in mesh with two miter gears 6—6 each being keyed to their respective axles 6^a—6^a, the gears 6—6 acting to rotate both axles in unison but allowing freedom of movement to one wheel should the resistance become too great on the other. These parts may be of any standard construction and require no further description except as may be needed in the disclosure of my invention.

Securely fixed to any convenient stationary part of the housing as shown at 7^a in Figs. 1, 2 and 6 are two channel shaped members 7—7 within which are supported similar members 8—8 of lesser cross sectional dimensions, to permit parallel movement of the members 8—8 by means of links 9, one end of each of which is pivoted to the members 8—8 and the other end to the members 7—7.

Carried by the members 8—8 are two antifriction rollers 10—10 which bear upon an annular clutch plate 11, which is normally held in an operative position against the rollers by the pressure of springs 12—12, which springs also help to retrieve the locking pawls hereinafter described.

Approximately 90° apart and having operative engagement with the clutch plate 11 are four pawl carriers 13 having suitable bearing in the cage 4, the pawl carrier receiving within a slot 14, the inner periphery of the clutch plate 11. The opposite ends of the pawl carriers are bored for the reception of the locking pawls designated generally as 15, each having a cylindrical stem portion 16 which fits in the bore of the pawl carrier and is pressed outwardly by a compression spring 17, and to prevent an excessive outward movement a pin 18 is placed in the lower part of the portion 16 which operates within a slot in the lower part of the pawl carrier, the pin 18 engaging the forward end of said slot when the pawl is in the free or normal position. A finger 19 on the pawl 15 engages in a semi-cylindrical groove 20 in the pawl carrier 13 and prevents any possible independent rotation of the pawl 15.

Referring particularly to Figs. 1, 2, 7 and 8, I have shown a forked member 21 having formed integral therewith an operating rod 22 which passes through the front wall of the differential housing at 23 and is provided with a stuffing box 24 to prevent

leakage of the oil therefrom. The rod is connected by a turnbuckle 25 with a pull rod 26, said rod being attached to an operating lever 27 beside the driver's seat.

The member 21 is provided with two fingers 28—28 spaced apart and each finger has a pivotal connection at 29 with the members 8—8. To provide for a positive return of the fork to its normal position, a spring 30 surrounds the rod 22 and is confined between the differential housing and the fork proper.

In operation, normally the springs 12 force the ring plate 11 outwardly, or to the right in Fig. 1, in which position the pawl carriers 13 and the pawls 15 are pulled out or away from the gears 5 and 6, and these gears are free to operate in the usual differential way while the gear cage 4 is rotating. To lock the differential, the fork 21 is pulled forwardly by means of the pull rod, and the plates 8 thereby swing out with a toggle action of the links 9, and by the pressure of the rollers 10, the ring 11 is shifted inwardly, or to the left as shown in Fig. 8, thereby compressing the springs 12 and advancing the carriers 13 and the pawls 15 into position between the entering teeth of the gears 5 and 6 as they are about to mesh, thereby locking the gears and preventing the normal action thereof, the cage 4 being free, however, to revolve and drive both axle sections to positively turn both wheels fixed thereto. On release of the pull rod the springs 12 and 30 restore the parts to original position and operation.

The invention is not limited to the exact devices shown, but may be modified in various ways within the scope thereof.

I claim:

1. The combination with differential gearing, of a chock movable into position between the teeth of meshing gears of the differential, and means to operate the chock.

2. The combination with differential gearing including a revoluble gear cage, of a chock carried by the cage and adapted to be moved into position to engage the teeth of one of the gears of the differential and prevent rotation of the gear, and means to operate the chock.

3. The combination with differential gearing including a revoluble gear cage, of a chock carried by the cage, and means to advance the chock into position between the teeth of meshing gears carried by the cage, to prevent rotation of said gears.

4. The combination with differential gearing including a revoluble gear cage, of a chock carried by the cage, and adapted to be advanced into locking engagement with a gear carried by the cage, an axially shiftable ring revoluble with the cage and operatively connected to the chock, and means to shift the ring.

5. The combination with differential gearing including a revoluble gear cage, of a chock carried by the cage, and adapted to be advanced into locking engagement with a gear carried by the cage, an axially shiftable ring revoluble with the cage and operatively connected to the chock, and means to shift the ring, said means comprising a manually-operated pressure device bearing against the side of the ring.

6. The combination with differential gearing, including a revoluble gear cage and radial pinions in said cage, of a chock carried by the cage and slidable into and out of locking engagement with said pinions, and means to operate the chock.

7. The combination with a revoluble gear cage and differential gears carried thereby, of a chock mounted on the cage and shiftable into and out of locking position between the teeth of meshing gears in said cage, and means external to said cage to shift the chock.

8. The combination with a revoluble gear cage and differential gears carried therein, said cage having an opening in its wall, of a chock mounted on the cage and extending through said opening and movable inwardly to engage and lock said gears, and means external to the cage to operate the chock, said means including a carrier for the chock and a shifting ring extending around the cage and operatively connected to the carrier.

9. The combination with a revoluble gear cage and differential gears carried therein, including a plurality of compensating pinions engaging a gear, of a plurality of chocks carried by the cage and shiftable between the teeth of said pinions and gear, to lock the same, a shiftable ring extending around the cage and connected to the chocks, and means to shift the ring.

In testimony whereof, I do affix my signature in presence of two witnesses.

ALOIS S. PERKO.

Witnesses:
JOSEPH F. RAKOS,
JOHN A. BOMMHARDT.