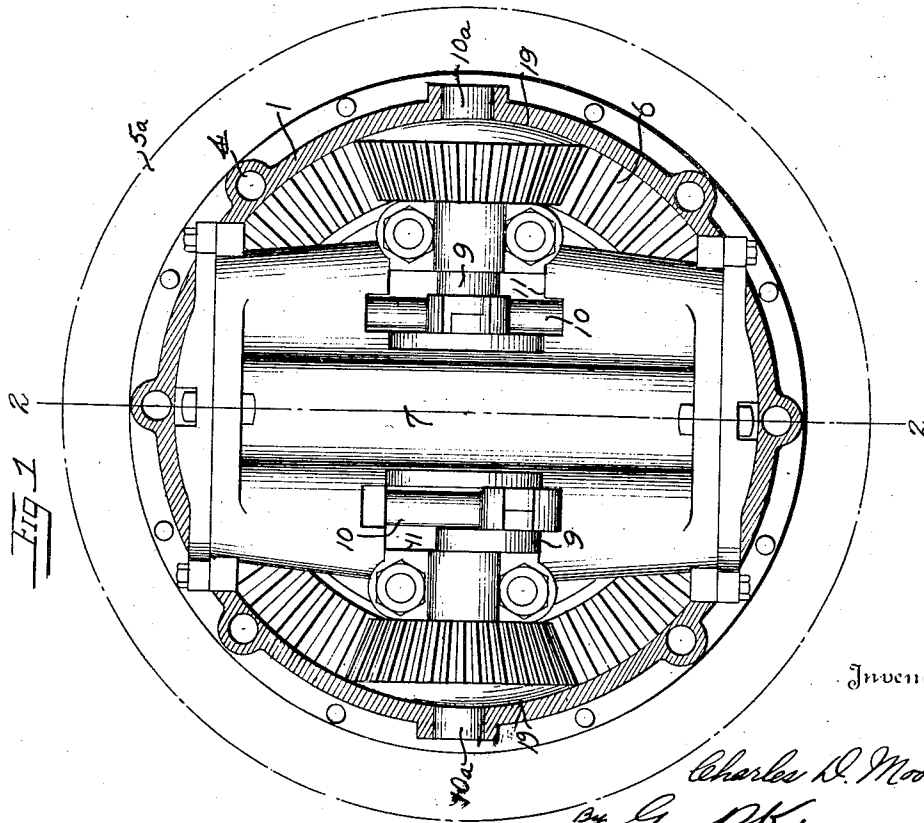
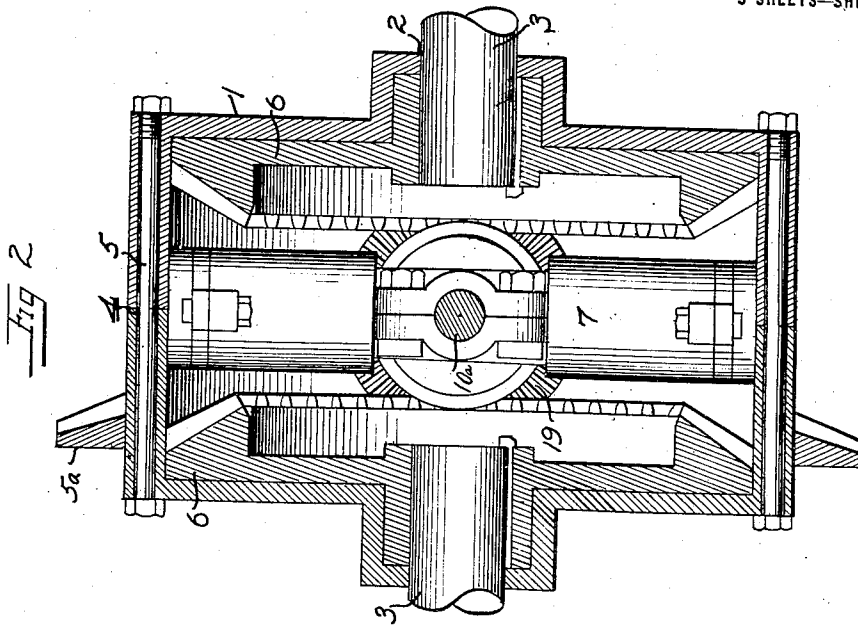


C. D. MOON.
DIFFERENTIAL GEARING.
APPLICATION FILED JULY 8, 1915.

1,178,093.

Patented Apr. 4, 1916.
3 SHEETS—SHEET 1.



Inventor

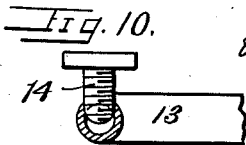
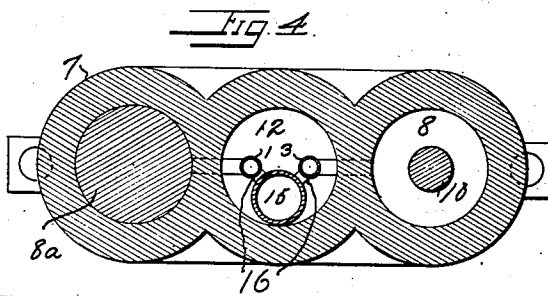
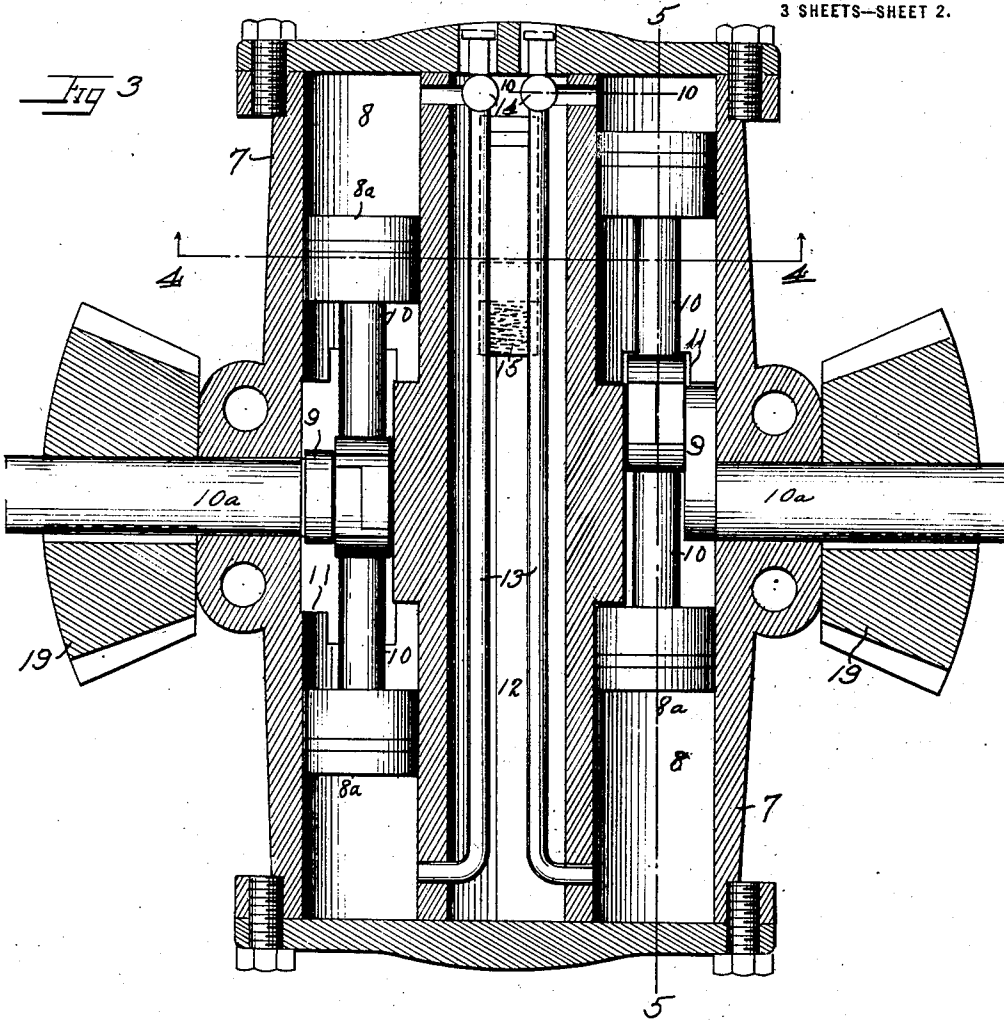
Charles D. Moon.
by Geo. P. Kimmel.
Attorney

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Inventor

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By

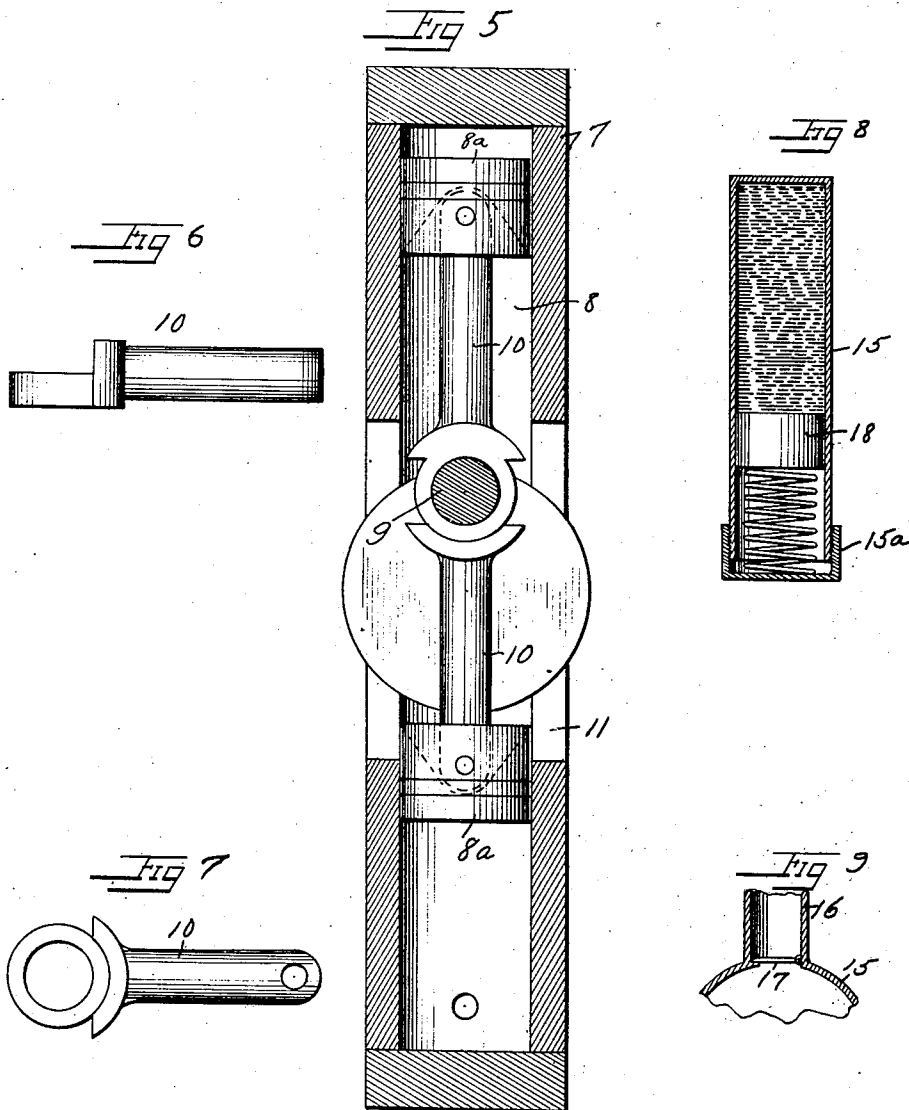
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3 SHEETS—SHEET 3.



Inventor

Charles D. Moon.

By

Geot. P. Kimmel.

Attorney

UNITED STATES PATENT OFFICE.

CHARLES D. MOON, OF ENSLEY, ALABAMA.

DIFFERENTIAL GEARING.

1,178,093.

Specification of Letters Patent.

Patented Apr. 4, 1916.

Application filed July 8, 1915. Serial No. 38,706.

To all whom it may concern:

Be it known that I, CHARLES D. MOON, a citizen of the United States, residing at Ensley, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Differential Gearing, of which the following is a specification.

This invention relates to improvements in machine elements, and more specifically to differential gearing.

The object of my invention is to combine with a differential gearing, having the usual characteristics, oil pump means tending to act as a check when the normal action of the differential is disadvantageous. Forward motion of the vehicle frequently affords varying tractive efforts to the drive wheels, as in sandy or slippery spots in the roadway. Normally the action of the differential is such that the retarded wheel, that wheel which meets the greater resistance of the good portion of the road, is given a lessening power, while the slipping wheel is furnished with useless power. By employment of my novel oil pump, however, the action of the differential gearing is so checked and without shocks, that power is directed to the retarded wheel to propel the car forward from the bad spot in the road, preventing stalling of the vehicle therein. The differential gears of the separated wheel axles are driven by the interlocking action of the intermediate driving pinions. When the road resistance on the one wheel is increased, or lessened for the other wheel, the pinions rotate about the first wheel and tend to apply all the more power to the wheel of less resistance.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the detailed description and drawings forming a part of this specification.

Furthermore, this invention consists in the novel arrangement and combination of parts more particularly described in the following specification and embodied in the claims appended hereunto and forming a part of this application.

Referring now to the drawings, which are merely illustrative of my invention,

Figure 1 is a vertical longitudinal sectional view of a differential housing, the oil pump shown in side elevation. Fig. 2 is a transverse sectional view taken on the line

2—2 of Fig. 1. Fig. 3 is a longitudinal sectional view of the pump. Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3. Fig. 5 is a detail vertical sectional view taken on the line 5—5 of Fig. 3. Fig. 6 is a detail side elevation of the connecting rod. Fig. 7 is a detail plan view of the same. Fig. 8 is a detail sectional view of oil supply tank. Fig. 9 is a detail sectional view of the check-valve at the supply tank. Fig. 10 is a detail sectional view of the adjustment valve taken on the line 10—10 of Fig. 3.

Referring further to the drawings, wherein similar reference characters designate similar parts throughout the respective views, 1 designates a cylindrical housing formed with a perforation 2 centrally thereof within which a drive axle 3 is adapted to seat. Said housing is formed of two sections, having a plurality of bolt holes 4 spaced apart circumferentially thereof, by means of which said sections are secured together by bolts 5. Said housing is bolted to a drive gear 5^a. Bevel-gears 6 are keyed to the drive axle 3 and are oppositely disposed within said housing 1. Said housing 1 is provided with oppositely disposed recesses interiorly thereof adapted to receive the corner portions of a substantially rectangular pump casing 7. Said pump casing is formed with three tubular bores longitudinally thereof, the outer bores 8 constituting double cylinder pumps, each pump having a pair of oppositely disposed pistons 8^a mounted therein, each pair of said pistons being connected to a similar crank arm 9 by means of pitmen 10, each arm being carried by a stub shaft 10^a and an opening 11 being provided within said casing 7 to permit the rotation of said crank arm.

The centrally disposed bore 12 is provided with oil manifolds 13 disposed along the length thereof and adapted to connect each of the double cylinder pumps, said manifolds having adjustment valves 14 adapted to regulate the flow of oil there-through. An oil supply tank 15 is mounted within said bore 12 and is connected to said manifolds by means of inlets 16, said inlets having check valves 17 mounted therein. A spring operated disk 18 is mounted within said tank adapted to exert pressure on the oil therein, whereby any leakage in the manifolds and pumps may be replenished, the check valves operating to prevent

a return of the oil to the tank. Said tank is provided with a screw cap 15^a upon one end thereof.

A bevel pinion 19 is mounted upon each of said stub shafts 10^a, each of said pinions being adapted to mesh with both of said bevel gears 6.

From the construction as described, it is obvious that as the main drive gear 5^a is revolved by a drive shaft (not shown) of an automobile engine, the housing 1 will revolve, carrying the pump casing 7 and the pinions 19 attached thereto with it in its rotation. The oil pump casing 7, being recessed within the housing 1, will revolve therewith. The bevel-pinions 19 will remain stationary with respect to said bevel gears 6, when the tractive effort upon both halves of the axle is equal. However, when turning a corner or when meeting varying resistances the effect is that the retarded gear 6 is caused to rotate the pinions 19 with their respective shafts thereby operating the crank arms 9 and the pistons 8^a, which forces the oil from one cylinder to the other through the manifolds 13. As the oil must necessarily pass through said manifolds somewhat slowly, the takeups of both halves of the drive axle will be equalized, the retarded gear gaining speed slowly at the expense of the gear meeting the lessened road resistance.

The utility, adaptability, and advantages of my improved form of differential gearing being obvious, it is unnecessary to further enlarge upon the same herein.

Having now described and pointed out the new and useful features of my invention, I do not limit myself to the shape of certain parts where the shape is not essential, nor do I restrict myself to the exact details of construction shown and described, but mean and intend to claim all equivalents and variations thereof not departing in principle from my invention, and falling within the purview of the appended claims.

What I claim as my invention and desire to secure by Letters Patent is:

1. A differential gearing consisting of a housing adapted to be rotated by the driving mechanism of an automobile, bevel gears mounted upon both ends of the drive axle of said automobile, said bevel gears being oppositely disposed within said housing, bevel pinions mounted upon a stub shaft interiorly of said housing and interposed between said bevel gears, a fluid pump mounted within said housing between said bevel pinions,

and a crank arm connecting the pistons of said pump with the stub shafts of said bevel pinions.

2. A differential gearing consisting of a housing adapted to be rotated by the driving mechanism of an automobile, bevel gears mounted upon both ends of the drive axle of said automobile, said bevel gears being oppositely disposed within said housing, bevel pinions mounted upon a stub shaft interiorly of said housing and interposed between said bevel gears, a fluid pump mounted within said housing between said bevel pinions, a crank arm connecting the pistons of said pump with the stub shafts of said bevel pinions, and a manifold mounted within said pump connecting the oppositely disposed cylinders thereof.

3. A differential gearing consisting of a housing adapted to be rotated by the driving mechanism of an automobile, bevel gears mounted upon both ends of the drive axle of said automobile, said bevel gears being oppositely disposed within said housing, bevel pinions mounted upon a stub shaft interiorly of said housing and interposed between said bevel gears, a fluid pump mounted within said housing between said bevel pinions, a crank arm connecting the pistons of said pump with the stub shafts of said bevel pinions, a manifold mounted within said pump connecting the oppositely disposed cylinders thereof, and a fluid reservoir mounted within said pump adapted to replenish the supply of fluid to said pump.

4. A differential gearing consisting of a housing adapted to be rotated by the driving mechanism of an automobile, bevel gears mounted upon both ends of the drive axle of said automobile, said bevel gears being oppositely disposed within said housing, bevel pinions mounted upon a stub shaft interiorly of said housing and interposed between said bevel gears, a fluid pump mounted within said housing between said bevel pinions, a crank arm connecting the pistons of said pump with the stub shafts of said bevel pinion, a manifold mounted within said pump connecting the oppositely disposed cylinders thereof, a fluid reservoir mounted within said pump adapted to replenish the supply of fluid to said pump, and means mounted upon said manifolds for regulating the speed of said pump.

In testimony whereof I affix my signature hereto.

CHARLES D. MOON.