

C. H. JOHNSON.
DRIVING MECHANISM FOR DIVIDED AXLES.
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951,915.

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Fig. 2.

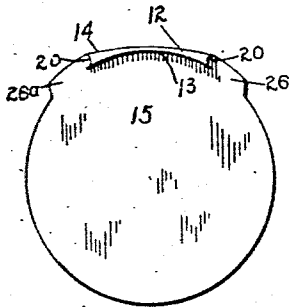
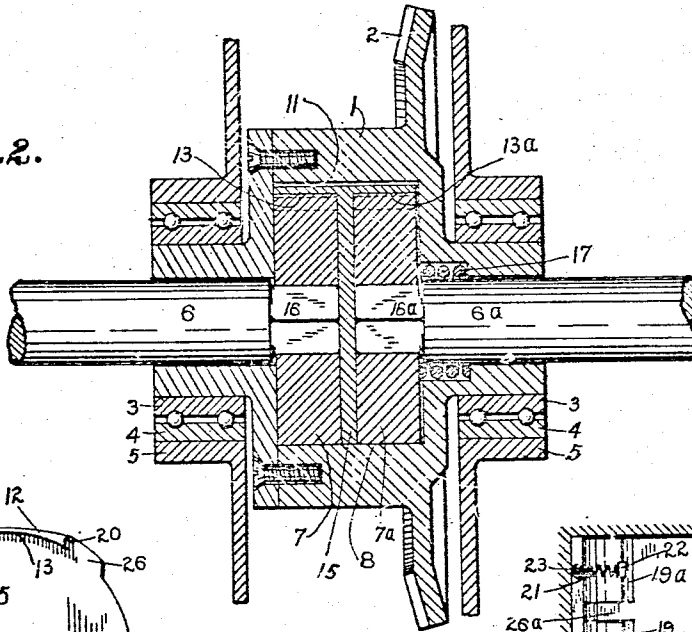


Fig. 3.

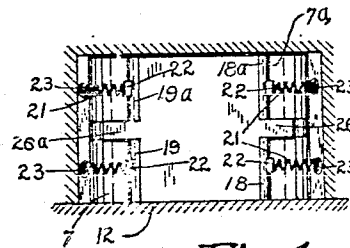


Fig. 4.

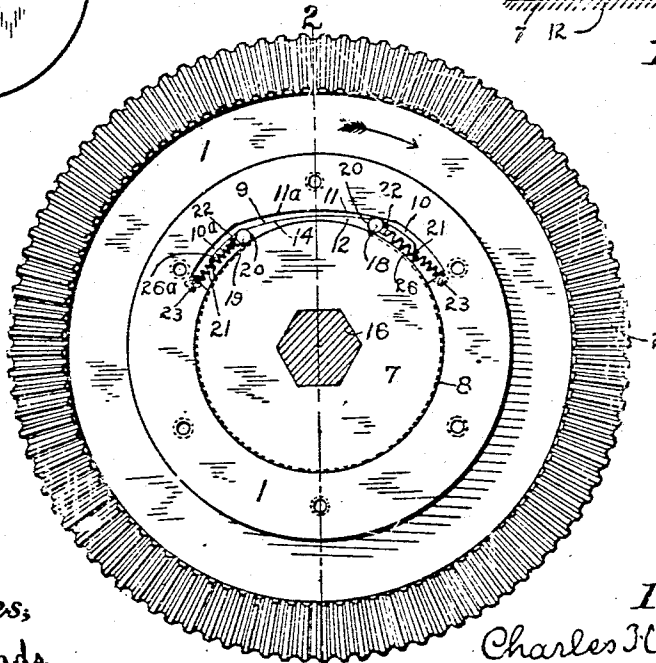


Fig. 1.

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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR DIVIDED AXLES.

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To all whom it may concern:

Be it known that I, CHARLES H. JOHNSON, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented a new and useful Driving Mechanism for Divided Axles, of which the following is a specification.

The invention relates to a clutch for driving divided shafts, like the axles of automobiles and other motor vehicles, in which it is desirable to release either one or both sections of the axle from the clutch to permit the same to rotate free of the driving mechanism, as when the vehicle is making a turn or is coasting down hill. In the first case, it is desirable to automatically engage the free section of the axle as soon as a straight course is regained, and in the latter case when both sections of the axle have run ahead of the driving mechanism, it is desirable to reengage them by the clutch to utilize the resistance of the motor mechanism, to retard the rotation of the wheels. And again, when both axle sections have been clutched against the motor, it is desirable to automatically release and reengage them by the clutch when necessary to drive them again by the motor. These general objects and purposes of the invention are attained by journaling the inner end portions of the axle sections in a driving drum, and by providing friction disks on the adjacent ends of the sections and forming cam-faced recesses in the peripheral wall of the drum, with spring-controlled wedging rolls in the recess between the disks and the cam faces, and an intervening spacing block between the rolls; whereby either one or both of the disks are clamped to or released from the drum by the relative rotation in either direction of the same, or of either one or both of the disks.

A preferred embodiment of the invention as applied to the divided axles of an automobile, is illustrated in the accompanying drawings, forming part hereof, in which—

Figure 1 is a side elevation of the drum and clutch mechanism, showing the axle in section and one end of the drum removed; Fig. 2, is a longitudinal section of the drum and clutch mechanism on line 2—2, Fig. 1; Fig. 3, a detached side elevation of the spacing block; and Fig. 4, a fragmentary plan view of the spacing block with the wedging rolls and adjacent parts.

Similar numerals refer to similar parts throughout the drawings.

The driving drum 1 is provided with a suitable gear as 2 by means of which it is operated by a suitable motor, not shown; and in the ends of the drum are provided the tubular trunnions 3 which are adapted to rotate in the bearings 4 mounted in the gear housing 5 of the vehicle, not shown, through which trunnions are extended the inner end portions of the axles 6 and 6^a, as shown. The friction disks 7 and 7^a are formed or secured against rotation on the adjacent ends of the axle sections inside the drum, the peripheries of which disks are adapted to neatly fit the inner face of the peripheral wall 8 of the drum. The recess 9 is provided in the peripheral wall of the drum, the end sections 10 and 10^a of which recess are of greater depth than at the middle, thus presenting the annular cam faces 11 and 11^a opposite the peripheries of the disks. The spacing block 12 is located in the recess and is shaped on its inner faces 13 and 13^a to neatly fit the peripheries of the corresponding disks, while its outer face 14 is located at an interval from the cam face of the recess. The spacing block is held in proper position against the peripheries of the disks by means of the circular plate 15 which is preferably formed integral with the block and intervenes between the adjacent sides of the friction disks, the periphery of which plate is adapted to neatly fit the inner face of the peripheral wall of the drum, thus holding it always concentric with the disks. The friction disks are preferably mounted on the angular portions 16 and 16^a formed on the ends of the shafts, which permits a slight longitudinal movement thereon; and the disks and the intervening plate are preferably pressed together and also against one end of the drum by the spiral compression spring 17 located around the axle in the other end of the drum, whereby the spacing block is normally held against rotation with respect to the disks.

The wedging rolls 18, 18^a and 19, 19^a are located in the recess 9, one roll being located on the periphery of each disk in each end of the recess. The wedging rolls are properly spaced apart by the block 12, and are preferably held against the rounded sockets 20 formed in the ends of the block, by action of the controlling compression springs 21, 110

the adjacent ends of which springs are preferably provided with the shoes 22 adapted to abut the sides of the rolls, and the remote ends of the springs are preferably engaged in the sockets 23 formed in the end of the recess 9. The diameter of the rolls is slightly less than the depth of the end portions of the drum recess, but considerably greater than the depth of the middle portion thereof, so that by rotating the drum to bring the cam face of the recess in contact with the roll, the same is wedged tightly and gripped between this face and the periphery of the corresponding disk, thus securely clamping the disk in the drum. The rolls are held against endwise movement toward each other by the short circumferential extensions 26 and 26^a which are provided on the periphery of the circular plate at each end of the spacing block.

In use, when the driving drum is operated to rotate in the direction indicated by the arrow in Fig. 1, which for convenience is herein referred to as the forward direction, it is evident that the forward rolls 18 and 18^a will soon be wedged between the cam face 11 of the drum and the peripheries of the respective friction disks, which wedge action serves to positively clamp the drum and the disks together and to rotate the disks with the drum. In this operation, it will be understood that the spacing block tends to rotate with the disks by reason of the friction produced by the pressure of the spring 17, and that the rolls are normally held against the ends of the spacing block by the action of the controlling springs 21; but that when the roll is impinged by the cam face of the drum, it will be slightly rotated away from the adjacent end of the spacing block until the wedging of the roll between the cam face and the periphery of the friction disk prevents a further rotation of the former with reference to the other.

Whenever one axle section tends to rotate faster than the driving mechanism, as the section 6 of the outer wheel when rounding a curve, it is evident that the faster rotation of the corresponding friction disk 7 with reference to the driving drum will carry the forward wedging roll 18 forward free from contact with the cam face of the drum, thus releasing the gripping effect of the same and permitting the disk and its axle section to rotate free of the driving mechanism. At the same time, the rearward roll 18^a of the overrunning disk will be held out of engagement with its cam face by the spacing block, which is held against forward rotation by the roll 19 which is now firmly wedged between its cam face and the disk 7^a by the entire power of the driving mechanism. The overrunning disk may and will continue to run free of the driving mechanism until from any cause it acquires the same axial

velocity as its fellow, when it will be re-clamped by the driving mechanism and will resume its portion of the load. And when, both axle sections tend to rotate faster than the driving drum, as when coasting down hill, the wedged rolls are carried forward free from contact with the cam face of the drum, thus releasing the disks from the grip of the drum, and both disks are thus permitted to rotate free of the driving mechanism. This freedom continues as long as none of the rolls are gripped between the drum and the disks, but in event the friction disks rotate far enough in advance of the driving drum to cause the rear rolls 19 and 19^a to become wedged against the cam face 11^a of the drum, it is evident that both disks will again be positively clamped in the drum, thus positively clutching the same against the motor mechanism, the resistance of which serves to brake a further excessive rotation of the axles. Furthermore, when driving power is again required, the rotation of the axles and friction disks will lag behind the driving drum, and the rear gripping rolls will be released from contact with the cam face of the drum, thus permitting the drum to again rotate faster than the friction disks and to again engage and wedge the forward rolls against the periphery of the disks, thus positively clutching and driving them forward as before. And finally, when it is desired to drive the vehicle backward, it is only necessary to reverse the rotation of the driving drum, whereupon both of the rear rolls 19 and 19^a will be wedged between the peripheries of the disks and the cam face 11^a of the drum, which will positively clamp the disks to be driven backward by the drum, and will adapt either one or both of the disks to be released and reengaged in the same manner as when the vehicle is being driven forward.

It will be understood that for the purpose of avoiding friction, rolls are preferably used as the wedges between the peripheries of the disks and the cam face of the drum, but it is not intended to limit the scope of the invention to the use of such cylindrical wedges.

I claim:

1. A driving mechanism including a divided axle, disks on the axle sections, a driving drum fitting around the disks and having a recess with cam faces therein presented toward the disks, spring-controlled rolls in the recess on each disk adapted to be wedged between the cam faces of the drum and the disks by the relative rotation of the drum and disks, and a spacing block between the rolls having a centering plate frictionally held between the disks.

2. A driving mechanism including a divided axle, disks on the axle sections, a driving drum fitting around the disks and

having a recess with cam faces therein presented toward the disks, spring-controlled wedges in the recess on each disk adapted to be gripped between the cam faces of the drum and the disks by the relative rotation of the drum and disks; and a spacing block between the wedges having a centering plate frictionally held between the disks.

3. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with a cam face therein presented toward the disks, spring-controlled rolls in the recess on each disk adapted to be wedged between the cam faces of the driving means and the disks by the relative rotation of the driving means and disks in either direction, and a spacing block between the rolls having a centering plate frictionally held between the disks.

4. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented toward the disks, spring-controlled wedges in the recess on each disk adapted to be gripped between the cam faces of the driving means and the disks by the relative rotation of the driving means and disks, and a spacing block between the wedges having a centering plate frictionally held between the disks.

5. A driving mechanism including a divided axle, annular friction elements on the axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented toward the friction elements, and spring-controlled rolls in the recess adapted to be wedged between the cam faces of the driving means and the friction elements by the relative rotation of the driving means and the friction elements, and a spacing block between the rolls having a centering plate frictionally held between the friction elements.

6. A driving mechanism including a divided axle, annular friction elements on the axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented toward the friction elements, spring-controlled wedges in the recess adapted to be gripped between the cam faces of the driving means and the friction elements by the relative rotation of the driving means and friction elements, and a spacing block between the wedges having a centering plate frictionally held between the friction elements.

7. A driving mechanism including a divided axle, disks on the axle sections, a driving drum fitting around the disks and having a recess with cam faces therein presented toward the disks, and rolls in the recess adapted to be alternately wedged and released between the cam faces and the re-

spective disks by the relative rotation of the drum and the disks, whereby the disks are adapted to be clamped by the drum in either direction, both disks to be released and then one or both reclamped against the drum when both disks overrun, and one disk to be released when it overruns and both disks to be released when they overrun and the one disk or both disks to be reclamped when overtaken by the drum.

8. A driving mechanism including a divided axle, disks on the axle sections, a driving drum fitting around the disks and having a recess with cam faces therein presented toward the disks, and wedges in the recess adapted to be alternately gripped and released between the cam faces and the respective disks by the relative rotation of the drum and the disks, whereby the disks are adapted to be clamped by the drum in either direction, both disks to be released and then one or both reclamped against the drum when both disks overrun, and one disk to be released when it overruns and both disks to be released when they overrun and the one disk or both disks to be reclamped when overtaken by the drum.

9. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented toward the disks, rolls in each end of the recess adapted to be alternately wedged and released between the cam faces and the respective disks by the relative rotation of the driving means and the disks, whereby the disks are adapted to be clamped by the driving means in either direction, both disks to be released and then one or both reclamped against the driving means when both disks overrun, and one disk to be released when it overruns and both disks to be released when they overrun and the one disk or both disks to be reclamped when overtaken by the driving means.

10. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented toward the disks, wedges in each end of the recess adapted to be alternately gripped and released between the cam faces and the respective disks by the relative rotation of the driving means and the disks, whereby the disks are adapted to be clamped by the driving means in either direction, both disks to be released and then one or both reclamped against the driving means when both disks overrun, and one disk to be released when it overruns and both disks to be released when they overrun and the one disk or both disks to be reclamped when overtaken by the driving means.

11. A driving mechanism including a divided axle, annular friction elements on the

axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented toward the friction elements, and rolls in the recess adapted to be alternately wedged and released between the cam faces and the respective friction elements by the relative rotation of the driving means and said elements, whereby the elements are adapted to be clamped by the driving means in either direction, both elements to be released and then one or both re-clamped against the driving means when both elements overrun, and one element to be released when it overruns and both to be released when they overrun and the one element or both elements to be re-clamped when overtaken by the driving means.

12. A driving mechanism including a divided axle, annular friction elements on the axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented toward the friction elements, and wedges in the recess adapted to be alternately gripped and released between the cam faces and the respective friction elements by the relative rotation of the driving means and said elements, whereby the elements are adapted to be clamped by the driving means in either direction, both elements to be released and then one or both re-clamped against the driving means when both elements overrun, and one element to be released when it overruns and both to be released when they overrun and the one element or both elements to be re-clamped when overtaken by the driving means.

13. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented to the disks, and rolls in each end of the recess adapted to be alternately wedged and released between the cam faces and the respective disks by the relative rotation of the driving means in either direction, and a spacing block between the rolls having a centering plate frictionally pressed between the disks and adapted to be held by the wedged roll of one disk when the other disk overruns, whereby the rearward roll of the overrunning disk is prevented from engaging its cam face.

14. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented to the disks, and wedges in each end of the recess adapted to be alternately gripped and released between the cam faces and the respective disks by the relative rotation of the driving means in either direction, and a spacing block between the wedges having a centering plate frictionally pressed between the disks and adapted to be held by the gripped wedge of one disk when the

other disk overruns, whereby the rearward wedge of the overrunning disk is prevented from engaging its cam face.

15. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented to the disks, and rolls in each end of the recess adapted to be alternately wedged and released between the cam faces and the respective disks by the relative rotation of the driving means in either direction, and a spacing block between the rolls adapted to be held by the wedged roll of one disk when the other disk overruns, whereby the rearward roll of the overrunning disk is prevented from engaging its cam face.

16. A driving mechanism including a divided axle, disks on the axle sections, driving means fitting around the disks and having a recess with cam faces therein presented to the disks, and wedges in each end of the recess adapted to be alternately gripped and released between the cam faces and the respective disks by the relative rotation of the driving means in either direction, and a spacing block between the wedges adapted to be held by the gripped wedge of one disk when the other disk overruns, whereby the rearward wedge of the overrunning disk is prevented from engaging its cam face.

17. A driving mechanism including a divided axle, annular friction elements on the axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented to the friction elements, and rolls in each end of the recess adapted to be alternately wedged and released between the cam faces and the respective friction elements by the relative rotation of the driving means in either direction, and a spacing block between the rolls adapted to be held by the wedged roll of one element when the other element overruns, whereby the rearward roll of the overrunning disk is prevented from engaging its cam face.

18. A driving mechanism including a divided axle, annular friction elements on the axle sections, driving means fitting the friction elements and having a recess with cam faces therein presented to the friction elements, and wedges in each end of the recess adapted to be alternately gripped and released between the cam faces and the respective friction elements by the relative rotation of the driving means in either direction, and a spacing block between the wedges adapted to be held by the gripped wedge of one element when the other element overruns, whereby the rearward wedge of the overrunning disk is prevented from engaging its cam face.

19. A driving mechanism including an

axle, a disk on the axle, driving means fitting around the disk and having a recess with cam faces therein presented to the disk, and a roll in each end of the recess adapted to be alternately wedged and released between the cam faces and the disk by the relative rotation of the driving means in either direction, and a spacing block between the rolls adapted to hold one free when the other is wedged.

20. A driving mechanism including an axle, a disk on the axle, driving means fitting around the disk and having a recess with cam faces therein presented to the disk, and a wedge in each end of the recess adapted to be alternately gripped and released between the cam faces and the disk by the relative rotation of the driving means in either direction, and a spacing block between the wedges adapted to hold one free when the other is gripped.

21. A driving mechanism including an axle, a friction element on the axle, driving means fitting the friction element and having

a recess with cam faces therein presented to the friction element, and a roll in each end of the recess adapted to be alternately wedged and released between the cam faces and the friction element by the relative rotation of the driving means in either direction, and a spacing block between the rolls adapted to hold one free when the other is wedged.

22. A driving mechanism including an axle, a friction element on the axle, driving means fitting the friction element and having a recess with cam faces therein presented to the friction element, and a wedge in each end of the recess adapted to be alternately gripped and released between the cam faces and the friction element by the relative rotation of the driving means in either direction, and a spacing block between the wedges adapted to hold one free when the other is gripped.

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