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PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements relating to Free-wheel or One-way Clutches

We, WOLSELEY MOTORS (1927) LIMITED, a Company registered under the Laws of Great Britain, and OLIVER BODEN, British Subject, both of the Company's Works, 5 Drews Lane, Ward End, Birmingham 8, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to free-wheel or one-way clutches for coupling shafts, and particularly for use on motor vehicles. It is usual, when such clutches are fitted to motor vehicles, to provide a slidable locking device or member splined to the driving shaft and adapted to be coupled through co-operating teeth with the outer member of the free-wheel clutch, so as to render the latter inoperative, when desired. With such arrangements it is frequently found, if the locking device is brought into engagement whilst the drive is being transmitted, that the said locking device can only be disengaged with difficulty. This is owing to the wedging action of the balls or rollers of the free-wheel clutch which require a material relative angular movement between the shafts before the balls or rollers can be freed. This necessary relative movement is not permitted, with the result that on the "over-run" the locking member is tightly gripped by the teeth of the clutch member and the splines of the driving shaft.

The object of the present invention is to overcome the above difficulty and to provide simple and effective means for permitting of a relative angular movement between the shafts sufficient to free the driving elements of the free wheel clutch, so that binding of the teeth is prevented.

According to this invention, the locking device comprises a slidable portion or part separate from the free-wheel or one-way clutch and a co-operating or associated portion or part having dogs or teeth for co-operating with dogs or teeth on a member of the free-wheel or one-way clutch, the dogs or teeth of the said locking device and clutch member having

peripheral clearance to permit, on the "over-run," of a relative angular movement between the driving and driven shafts which is sufficient to free the driving elements of the free-wheel clutch and enable the locking device to be readily disengaged or put out of action. The locking member may have spaced dogs or teeth adapted to co-operate with peripherally-separated dogs or teeth on an annular part or sleeve integral with or carried by the outer member of the free-wheel clutch, whilst according to the preferred arrangement the locking member is in two parts, comprising a slidable inner sleeve, splined to the driving shaft, and a disc-like outer part to which the sleeve may be coupled by intermeshing teeth, the said outer part carrying the spaced dogs or teeth on the outer member of the clutch. This disc-like outer part of the locking member may be in permanent driving connection with the outer member of the clutch and may be retained in place by a spring ring, or by other means, being preferably biased in a forward direction by a spring or springs.

We are aware that it has been suggested, in free-wheel clutch mechanism for transmission gearing, to provide one element of the clutch with dogs or teeth adapted to engage dogs or teeth on a driving member for the purpose of rendering the clutch inoperative, the co-operating dogs or teeth being separated by gaps or clearances, but that in such arrangement the clutch device has been moved bodily to engage the dogs or teeth and no locking device comprising a slidable part independent of the clutch has been provided.

Figure 1 of the accompanying drawings represents a vertical section through a free-wheel clutch fitted between the driving and driven shafts of a motor vehicle, and provided with locking means in accordance with this invention.

Figure 2 represents a cross-section on the line $x-x$, Figure 1, with the member on the driving shaft moved into its locking position.

Referring to the drawings, the free-wheel clutch is housed within a casing 1

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forming a rear extension of the gear-box and is located between the driving shaft 2 of the vehicle and the driven shaft 3. The latter terminates at its forward end 5 in a hollow drum-shaped part comprising a cylindrical wall or sleeve 4 constituting the outer member of the free-wheel clutch, the said clutch being provided with rollers 5 disposed between the sleeve or outer part 4 and the free-wheel cam member 6 keyed to the end of the driving shaft. In order to render the free-wheel inoperative, when desired, a locking device is provided comprising two separate parts, 15 namely an inner sleeve 7 and an outer disc-like part 8, the inner sleeve being splined to the driving shaft 2 and being adapted to be moved axially along the latter by any suitable means. Formed 20 around the outer periphery of the sleeve 7 is a ring of teeth 9 which are adapted, on moving the sleeve in a rearward direction, to intermesh with a ring of internal teeth 10 around the inner periphery of the disc-like outer part 8 of the locking device, thus coupling the parts 7 and 8 of the latter together. Provided around the 25 outside edge of the outer part 8 of the locking device is a number of integral dogs or teeth 11 (Figure 2) spaced widely apart in a peripheral direction, whilst projecting into the spaces between these dogs or teeth 11 is a number of similarly spaced dogs or teeth 12 carried by, and 30 projecting inwards from, the outer cylindrical part 4 of the free-wheel clutch. At certain intervals the dogs or teeth on the locking member 8 and clutch member 4 are omitted or cut away leaving wide clearances within which are located light 40 coiled compression springs 13. Three such springs are shown in the drawings spaced at equal distances apart, one end of each spring bearing against a dog 12 of the clutch member and the other end 45 engaging against an adjacent dog 11 of the locking member, in the manner illustrated. The outer part 8 of the locking member is in permanent driving connection with the outer part 4 of the free-wheel clutch through the medium of the co-operating dogs 11 and 12, and it is 50 maintained in place by two spring rings 14 sprung into grooves in the dogs 12 and engaging respectively against the opposite faces of the said outer part 8 of the locking member. The springs 13 serve to bias the part 8 of the latter in a forward or clockwise direction with 60 relation to the outer part 4 of the free-wheel clutch, but permit of the said part 8 moving rearwardly against the action of the said springs relatively to the part 4 to an extent limited to the distance 65 between the more closely spaced dogs or teeth 11 and 12, until such rearward movement causes the said teeth to move into engagement, the spaces between these dogs or teeth being such that a considerable relative angular movement is permitted between the outer clutch member 4 on the driven shaft and the part 8 of the locking member which is adapted to be coupled through the sleeve 7 to the driving shaft. 70 75

When it is desired for the free-wheel clutch to operate, the inner sleeve 7 of the locking device is moved into position shown in Figure 1, the free-wheel then functioning in normal manner. The 80 outer part 8 of the locking device is now freed from the sleeve 7 on the driving shaft and is moved round by the springs 13 so that it takes up the position shown in Figure 2 of the drawings, with the 85 dogs 11 engaging behind the dogs 12. To render the free-wheel clutch inoperative the inner part or sleeve 7 of the locking device is slid along the driving shaft 2 to the left to cause the teeth 90 on the said sleeve 7 to mesh with the teeth 10 around the inner edge of the outer locking part 8, so that the latter thus turns with the driving shaft, the engagement of the parts 7 and 8 being easily effected 95 whilst the drive is being transmitted since the part 8 is free to turn in an anti-clockwise direction against the action of the springs 13. During the "over-run" the outer part 4 of the free-wheel clutch 100 turns in the direction of the arrow relatively to the part 8 of the locking device until limited by the dogs or teeth 12 engaging behind the forwardly-adjacent dogs or teeth 11. A material relative angular movement is thus permitted dependent on the size of the narrower gaps between adjacent dogs or teeth, a similar 105 relative angular movement being consequently permitted between the driving and driven shafts. This relative angular movement is sufficient entirely to free the rollers 5 of the free-wheel device before the over-running drive is transmitted to the driving shaft, and when the drive is 110 again taken up the driving shaft and the part 8 of the locking member move forwardly or clockwise relatively to the part 4 of the free-wheel clutch, until the rollers 5 of the latter again wedge and 115 transmit the drive. The gaps on the rear sides of the dogs 11 thus leave the part 8 of the locking device free to turn backwards, in a relative sense, against the springs in relation to the part 4, and 120 inner part or sleeve 7 of the locking device may consequently be easily withdrawn or disengaged from the part 8 whilst the drive is being transmitted, there being no binding or jamming of the 130

teeth of the locking device, as is the case of ordinary locking arrangements where insufficient relative movement is permitted between the driving and driven shafts to result in the freeing of the rollers or driving elements of the free-wheel clutch, on the "over-run."

The improved arrangement thus enables the free-wheel clutch to be locked or unlocked at any time without having to relieve the drive, the danger of jamming of the slidable locking member being entirely eliminated. Owing to this the sliding locking member may, if desired, be connected to the clutch pedal so that, if the free-wheel is locked and it is desired to change gear the sliding member is automatically disengaged by the depression of the clutch pedal, subsequent re-engagement being effected at any time by separate controlling means.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A free-wheel or one-way clutch disposed between a driving shaft and a driven shaft, in combination with a locking device for rendering the free-wheel clutch inoperative, the said locking device comprising a slidable portion or part separate from the free-wheel or one-way clutch and a co-operating or associated portion or part having dogs or teeth adapted to co-operate with dogs or teeth on one member of the free-wheel clutch, with the dogs or teeth of the locking device and free-wheel clutch member having peripheral clearance which permits, on the "over-run," of a relative angular displacement of the driving and driven shafts sufficient to free the driving elements of the free-wheel clutch and enable the locking device to be readily disengaged or put out of action.

2. A free-wheel or one-way clutch disposed between a driving shaft and a driven shaft, in combination with a locking device for rendering the free-wheel clutch inoperative, the said locking device comprising a slidable portion or part separate from the free-wheel or one-way clutch and a co-operating or associated portion or part having dogs or teeth adapted to co-operate with dogs or teeth on an annular part or sleeve forming, or carried by, the outer member of the free-wheel clutch, with the dogs or teeth of

the locking device and free-wheel clutch member having peripheral clearances which permit, on the "over-run," of a relative angular displacement of the driving and driven shafts sufficient to free the driving elements of the free-wheel clutch and enable the locking device to be readily disengaged or put out of action.

3. A free-wheel or one-way clutch disposed between a driving shaft and a driven shaft, in combination with a locking device for rendering the free-wheel clutch inoperative, the said locking device comprising a slidable inner part splined to the driving shaft and adapted to be coupled by an axial movement with an outer part having dogs or teeth adapted to co-operate with dogs or teeth on an annular part or sleeve forming, or carried by, the outer member of the free-wheel clutch, with the dogs or teeth of the said outer part of the locking device and of the free-wheel clutch member having peripheral clearances which permit, on the "over-run," of a relative angular displacement of the driving and driven shafts sufficient to free the driving elements of the free-wheel clutch and enable the inner part of the locking device to be readily disengaged.

4. A free-wheel clutch combined with a locking device, as claimed in claim 3, in which the outer part of the locking device is movable angularly in a rearward direction, relatively to the outer member of the free-wheel clutch, to facilitate engagement and disengagement of the inner part of the locking device, against the action of a spring or springs.

5. A free-wheel clutch combined with a locking device, as claimed in claim 3 or 4, in which the outer part of the locking device is in permanent driving connection with the outer part of the free-wheel clutch, being retained in place by a spring ring or rings engaging grooves in the dogs or teeth of the said outer clutch member, or by other means.

6. A free-wheel clutch combined with a locking device substantially as herein described with reference to the accompanying drawings.

Dated this 3rd day of January, 1935.

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Agents for Applicants.

Fig. 1.

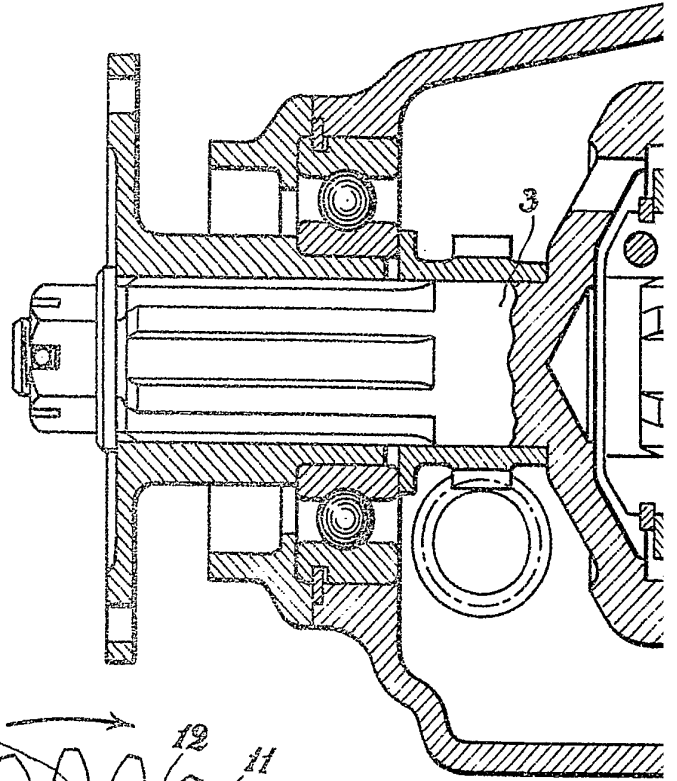
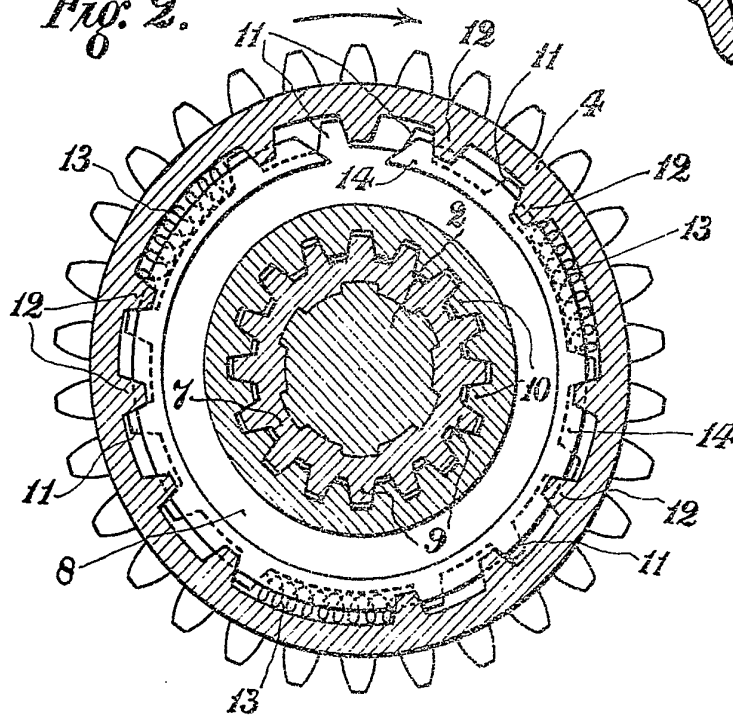
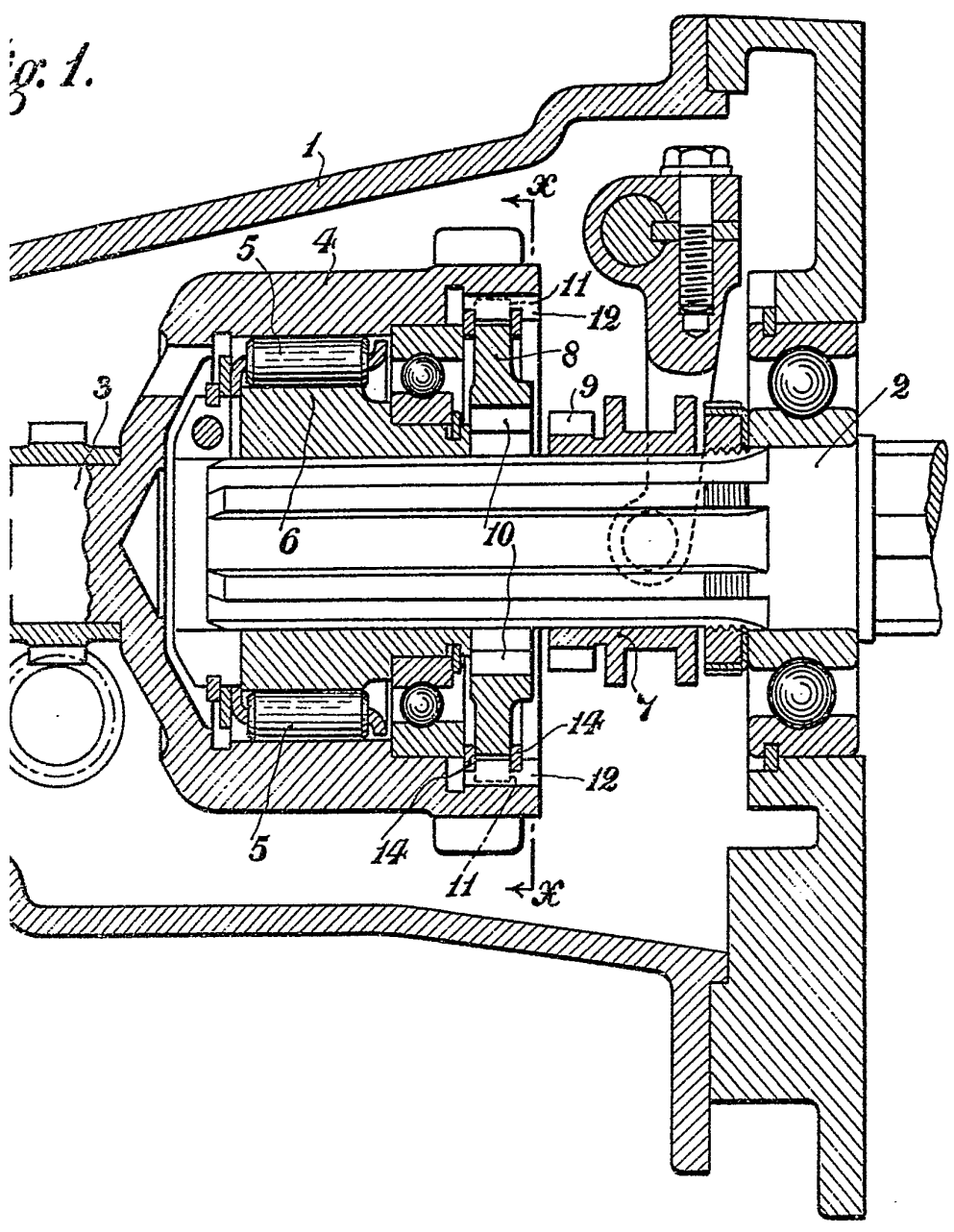


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.



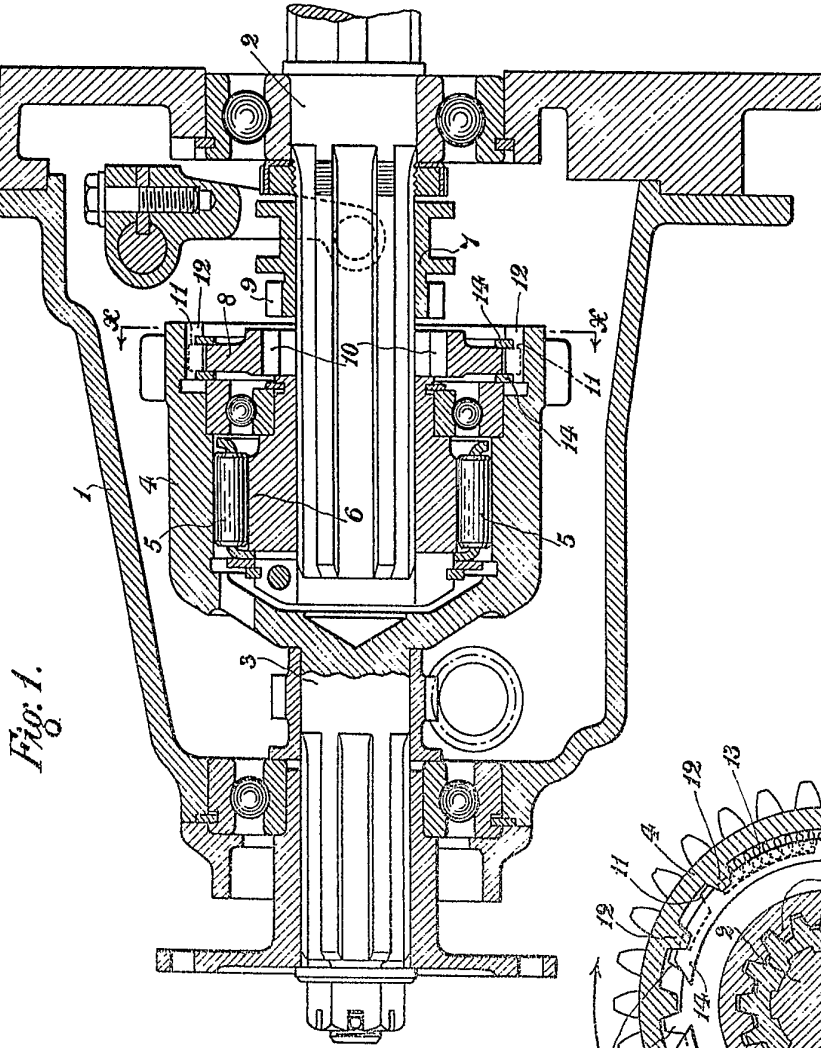


Fig. 1.

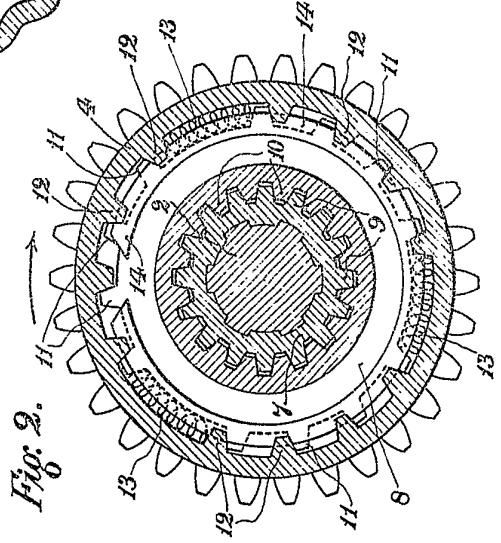


Fig. 2.

[This drawing is a reproduction of the Original on a reduced scale.]