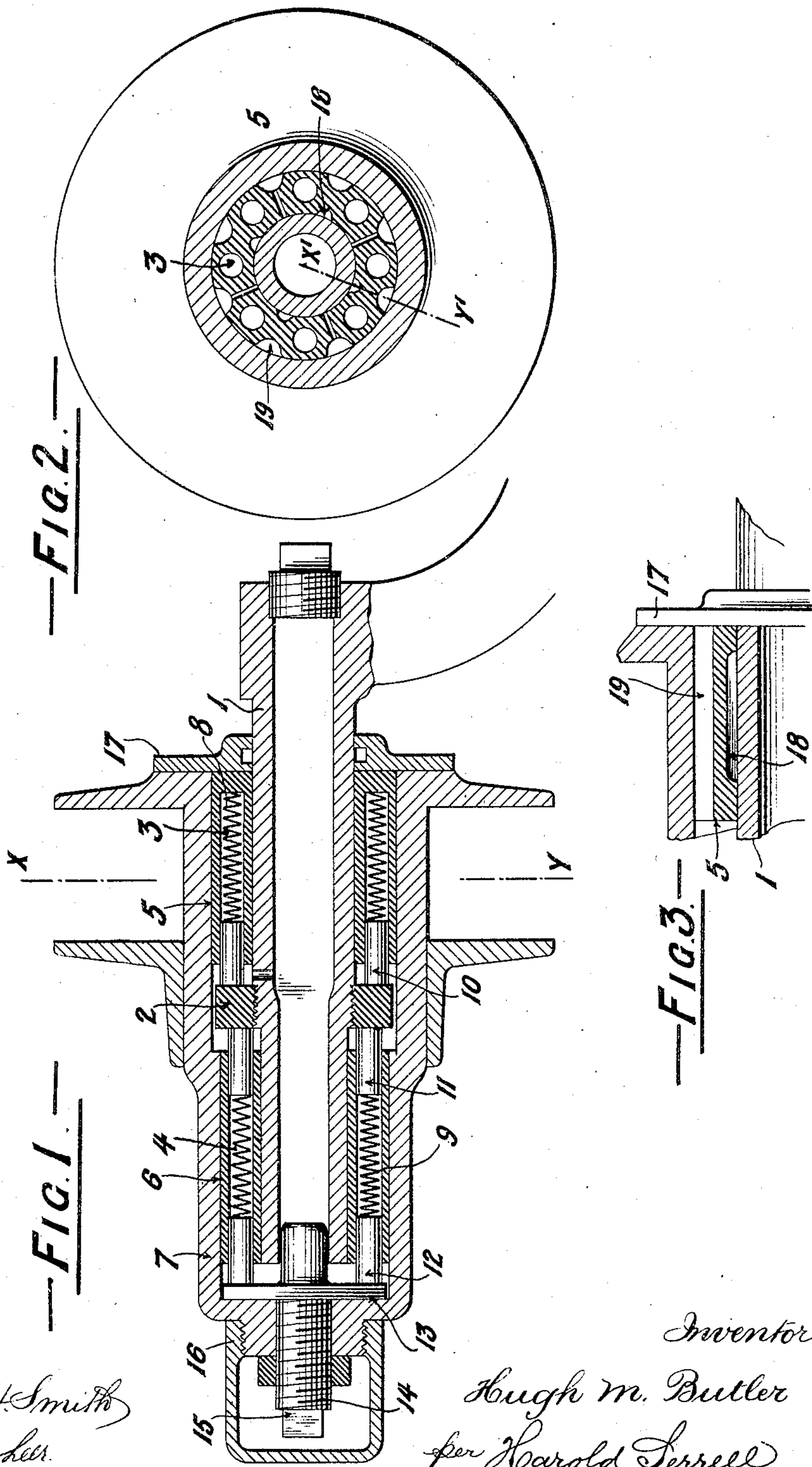


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H. M. BUTLER.
HUB AND BEARING FOR WHEELS.
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HUB AND BEARING FOR WHEELS.

SPECIFICATION forming part of Letters Patent No. 794,489, dated July 11, 1905.

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To all whom it may concern:

Be it known that I, HUGH MYDDLETON BUTLER, a subject of the King of Great Britain, residing at Kirkstall Forge, near Leeds, Yorkshire, England, have invented certain new and useful Improvements in Hubs and Bearings for Wheels, of which the following is a specification.

A considerable strain is placed on the wheels of road-vehicles by the shocks which they receive not only vertically from the road beneath the wheel, but laterally, due to irregularities in the road-surface, as well as to the turning or steering of the vehicle, and with wheels held rigidly against lateral motion on their axle-barrels these lateral strains are extremely likely to, and frequently do, result in damage to either the wheels or the axles. With the object of overcoming or lessening the damaging effect of such lateral strains it has been heretofore proposed to so mount the hubs of the wheels on the barrels of the axles that the said hubs shall be capable of movement through a small distance laterally of the said barrels, and it has been proposed in order that the wheel-hubs may be elastically held in a normal position upon their barrels to provide springs upon the ends of the barrels to act with opposite pressures upon both ends of the hubs of the wheels, so that the said wheel-hubs are only forced occasionally from their normal positions upon the barrels when the wheels are called upon to bear transverse strains. Not only is this arrangement advantageous for the purpose of moderating the effects of sudden lateral shocks, but also the occasional longitudinal movements of the hubs of the wheels upon the barrels greatly facilitates the efficient lubrication of the bearings.

Now the object of the present invention is to improve the construction and combination of parts comprising such axles so as to enable a number of helical springs, or what may be termed a "set" of springs, to be located within the hub and to act upon one side of a stationary abutment-collar, which is fixed upon the axle-barrel, so that the set of springs collectively tends to press the wheel-hub in one direction. At the same time the hub is to be

fitted with a similar set of springs acting on the opposite side of the stationary abutment-collar of the barrel, tending collectively to press the hub in the opposite direction to that of the first set of springs, so that normally the hub is held in equilibrium in a normal position upon its axle-barrel, from which position it is free to have elastically-controlled longitudinal motions. These springs are each located in a longitudinal way formed in bearing-bushes located within the wheel-hub, which bushes bear upon the barrel upon each side of the stationary collar.

The invention further provides means whereby all the springs aforesaid may be simultaneously adjusted in tension.

The invention, consisting in the construction and combinations of parts hereinafter claimed, will now be described with reference to the examples of construction shown upon the accompanying drawings.

Figure 1 is a longitudinal vertical section showing an axle-barrel carrying a wheel-hub capable of having elastically-controlled movements longitudinally of the barrel and fitted with controlling-springs interiorly of the hub acting with their inner ends against a stationary abutment. Fig. 2 is a vertical transverse section through the parts shown at Fig. 1, taken on the line X Y of that figure; and Fig. 3 is a longitudinal section of a portion of the device taken on the line X' Y' of Fig. 2 to illustrate lubricant-distributing grooves.

Referring to the construction shown, the axle-barrel 1, which may be solid or hollow, has radially fixed upon it about central of its length a collar 2 to serve as an abutment for the springs. The two sets of oppositely-acting springs 8 and 9 are located in longitudinal ways or bores formed in bearing-bushes 5 6, which latter are fixed to the wheel-hub 7, the bush 5 being arranged in the wheel-hub upon one side of the abutment-collar 2 and the bush 6 upon the other side of the collar 2. A number of these longitudinal bores 3 4 are formed in circular series in each of the bushes, so that one set of springs is carried in each bush upon opposite sides of the said collar 2. Obviously, instead of drilling the bores in the

thickness of the bushes they might be directly formed in the hub itself or the bores might be produced by making longitudinal grooves on the exterior surface of the said bushes 5 6; but these modes of forming the spring-containing bores are obviously mere mechanical equivalents of that which is illustrated in the drawings. The bores 3 in the bearing-bush 5 at the inner end of the hub are not shown as extending entirely through the same, and the outer end of each of these bores receives a plunger 10 capable of free motion within the bores, the heads of the plungers acting against the springs 8 therein located while the outer ends of the said plungers bear against one surface of the abutment-collar 2. The bores 4 of the bearing-bush 6 on the other side of the abutment-collar extend entirely through the said bush, being fitted with similar plungers 11 at the inner end, bearing against the other face of the abutment-collar, while the outer ends of the bores 4 have plungers 12, the inner ends of which plungers bear against the springs 9, which are compressed between the plungers 11 and 12, and the outer ends of the plungers 12 bear against a disk 13, carried by a screwed shank 14, which engages and passes through the closed outer end of the hub 7. Obviously the outer ends of the plungers 12 might bear against the closed end of the hub, and the wheel-hub would then be capable of elastically-controlled motions from its normal position upon its axle-barrel. By, however, causing the ends of the plungers 12 to press against the disk 13, carried by the shank 14, screwed into the end of the hub, I am enabled to provide means for simultaneously adjusting the tension of all the springs of each set, and this will be effected, as will be seen, by the adjustment of the screwed shank 14, which may have a square end 15, and by the motion of this screwed shank the disk 13 can be advanced inward and produce a greater tension of both sets of springs 8 9 simultaneously. The outer projecting ends of the screwed shank 14 of the adjustment apparatus is protected by a removable cap 16 and the opposite or inner face of the hub carries an oil-retaining collar 17.

For lubricating purposes the bushes 5 6 are formed with internal and external grooves 18 19 for distributing the lubricant, such being illustrated in section at Fig. 3 of the drawings.

With such a construction when the wheel receives a lateral pressure and the hub 7 moves inward upon the barrel the springs 9, located at the outer end, will be compressed by the plungers 12 against the plungers 11, which latter are immovable laterally, owing to their contact with the abutment-collar 2, and when the lateral pressure upon the wheel in that direction ceases the hub 7 will be carried back to its normal position by the expansion of the springs 9 and will normally run upon the barrel in that position in which the springs upon

one side of the stationary collar balance the pressure of the springs upon the other side. Similarly, when the wheel receives a lateral pressure in an outward direction and the wheel-hub moves upon the barrel laterally in that outward direction then the springs 8 will become compressed against the endwise immovable plungers 10 and in their expansion the hub 7 will be carried back to its normal and resiliently-balanced position. During such movements laterally the lubricant contained in the grooves, such as 18 19, will become very evenly distributed over the surface of the barrel and hub-bearing, and where the interior of the bearing contains fluid lubricant the same will be passed by the lateral movements of the hub from one end of the interior of the hub to the other.

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

1. In a wheel-hub free to have elastically-controlled longitudinal motions from a normal position upon its axle-barrel; the combination with an axle-barrel, and a stationary annular abutment-collar located about centrally and externally upon the barrel; of a wheel-hub, bearing-bushes within the wheel-hub to bear on the barrel on each side of the stationary collar the said bearing-bushes having longitudinal ways, helical springs in compression carried in the ways of the bushes, plungers in the inner ends of the ways of the bushes in contact with the springs therein and abutting upon opposite sides of the abutment-collar, and abutment-surfaces carried by the hub near the outer ends thereof to receive the pressure in opposite directions of the helical springs, substantially as set forth.

2. In a wheel-hub free to have elastically-controlled longitudinal motions from a normal position upon its axle-barrel; the combination with an axle-barrel and a stationary annular abutment-collar located about centrally and externally upon the barrel; of a wheel-hub, bearing-bushes within the hub to bear on the barrel and located on each side of the stationary collar the said bearing-bushes having longitudinal ways, helical springs located in the ways of the bush at the inner end of the hub and bearing against the closed ends of the ways of the said bush distant from the abutment-collar, plungers in the opposite ends of the ways of the said bush to act upon the springs and to bear against the inner face of the abutment-collar, springs located in the throughways of the bush at the outer end of the hub, plungers entering the ways at the inner ends of the said bush to act between the outer face of the abutment-collar and the said springs, and plungers in the outer ends of the ways of the bush to act between the outer ends of the springs and the outer end of the hub, substantially as set forth.

3. In a wheel-hub free to have elastically-controlled longitudinal motions from a normal

position upon its axle-barrel; the combination with an axle-barrel and a stationary annular abutment-collar located about centrally and externally upon the barrel; of a wheel-hub, 5 bearing-bushes within the hub to bear on the barrel and located on each side of the stationary collar the said bearing-bushes having longitudinal ways, helical springs located in the ways of the bush at the inner end of the hub 10 and bearing against the closed ends of the ways of the said bush distant from the abutment-collar, and plungers in the outer ends of the ways of the said bush to act against the springs and to bear against the inner face 15 of the abutment-collar, springs located in the throughways of the bush at the outer end of

the hub, plungers in the inner ends of the ways of the said outer bush to act against the abutment-collar, plungers in the outer ends of the ways of the latter bush to act against 20 the outer ends of the springs therein, a disk carried in the hub at the outer end thereof to bear against the projecting ends of the outer plungers located in the ways of the outer bush, and means for adjusting the disk in the 25 direction of the axis of the hub for adjusting the tension of the springs, substantially as described.

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Witnesses:

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