

No. 695,808.

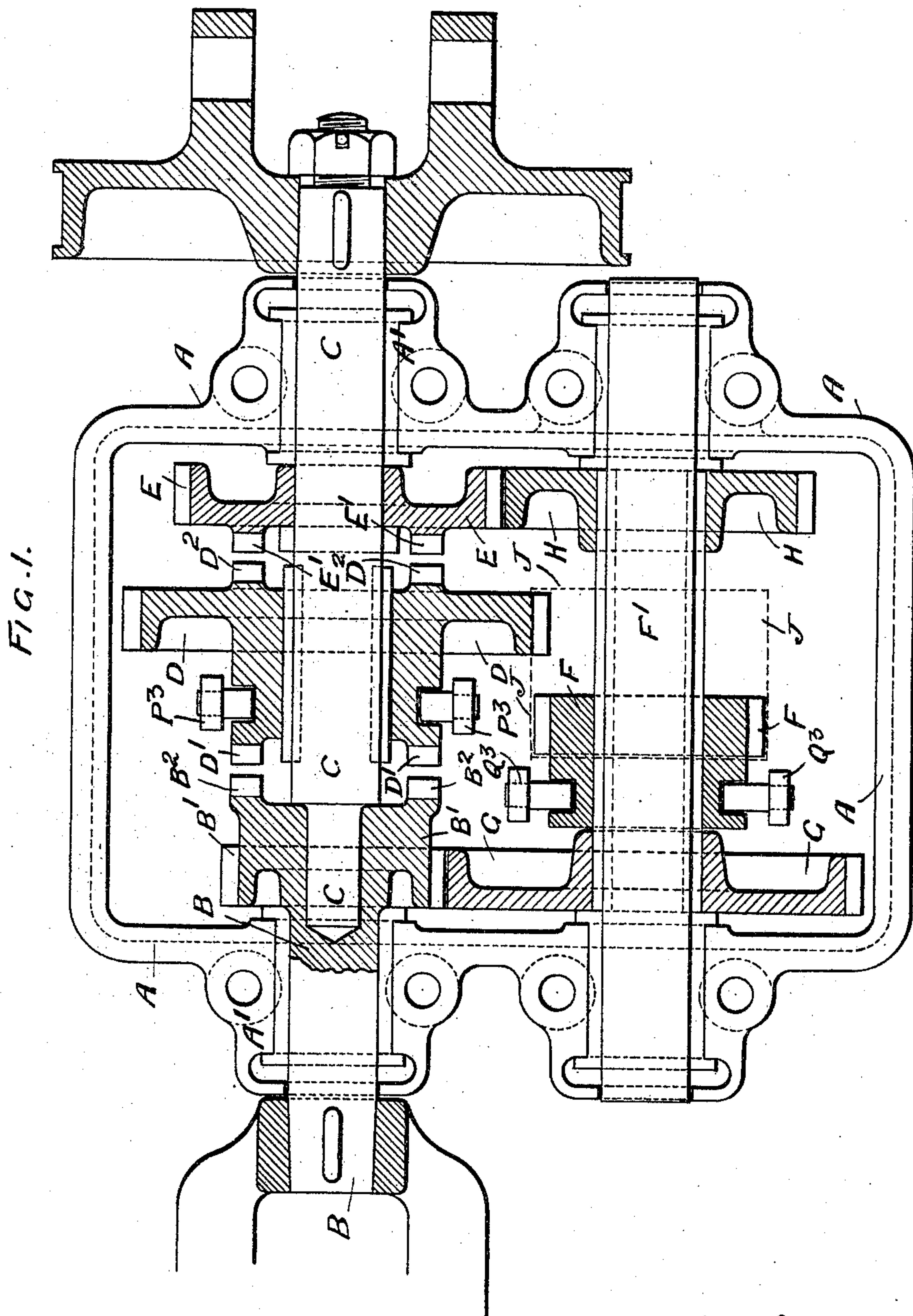
Patented Mar. 18, 1902.

A. GOVAN.
DRIVING GEAR FOR MOTOR VEHICLES.

(Application filed Oct. 17, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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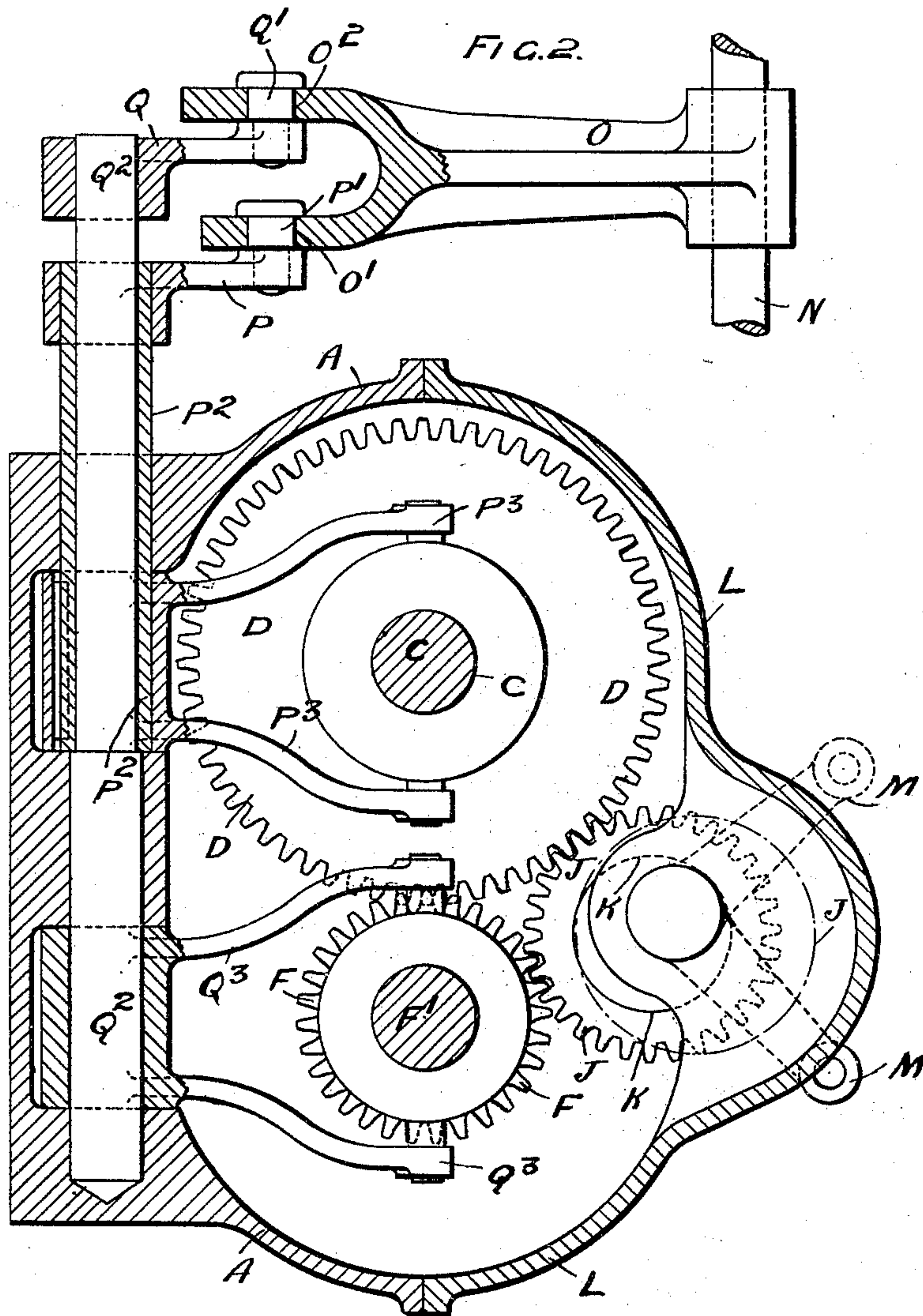
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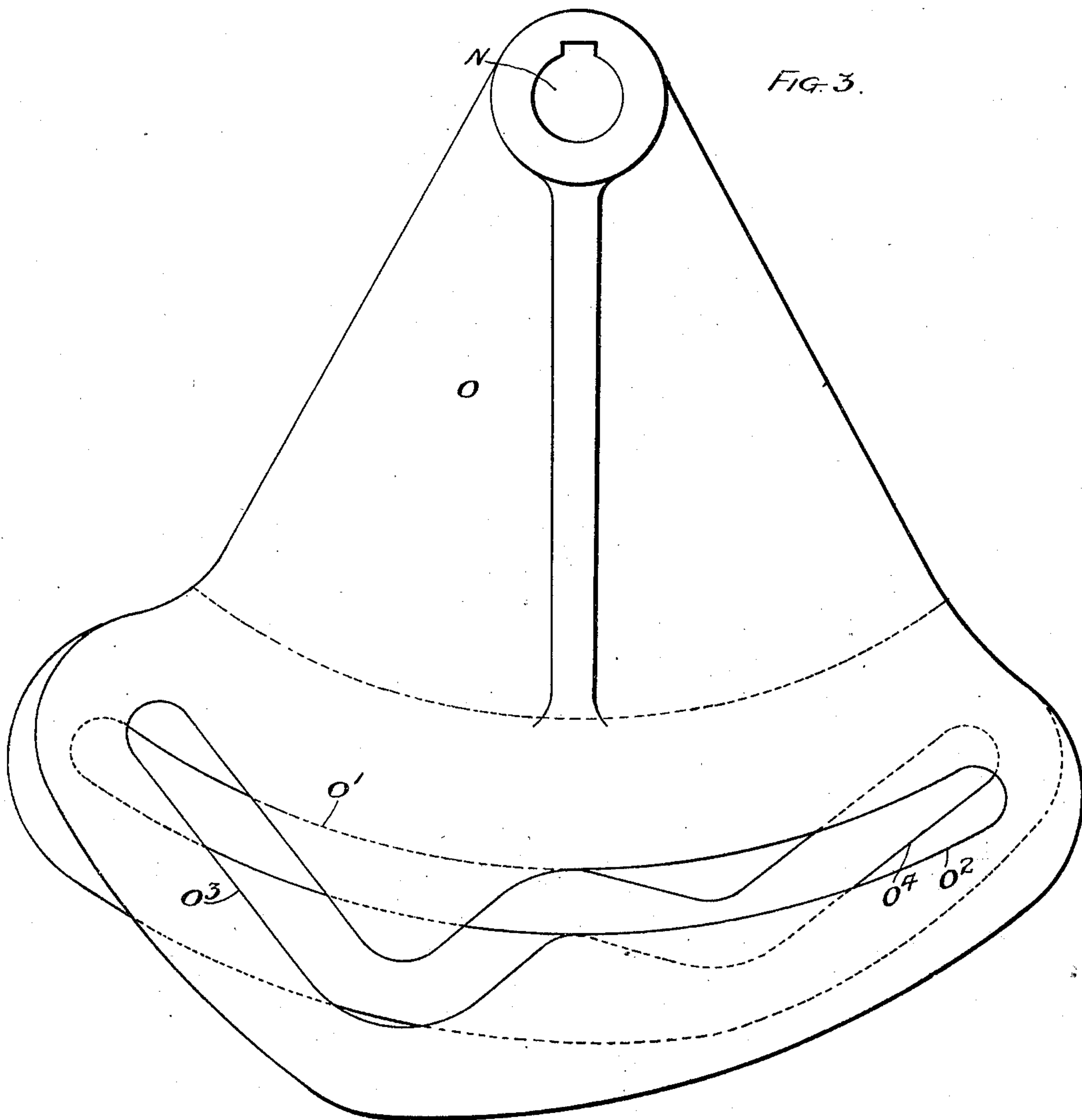
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UNITED STATES PATENT OFFICE.

ALEXANDER GOVAN, OF BRIDGETON, GLASGOW, SCOTLAND.

DRIVING-GEAR FOR MOTOR-VEHICLES.

SPECIFICATION forming part of Letters Patent No. 695,808, dated March 18, 1902.

Application filed October 17, 1901. Serial No. 79,032. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER GOVAN, a citizen of the United Kingdom of Great Britain and Ireland, residing at 47 Hozier street, Bridgeton, Glasgow, Scotland, have invented certain new and useful Improvements in Driving-Gear for Motor-Vehicles and the Like, (for which application for patent has been made in Great Britain, No. 5,945, dated March 21, 1901,) of which the following is a specification.

This invention, which relates to driving-gear for motor-vehicles and the like, has for its object to provide simple and compact gear for transmitting motion from a driving to a driven shaft at varying rates of speed and for throwing out of gear to stop the motor and for reversing its direction of travel, the several changes being effected and controlled, preferably, by means of a single lever-handle. The invention is illustrated by the accompanying drawings, in which—

Figure 1 is a horizontal longitudinal section, and Fig. 2 a transverse vertical section through the casing or gear-box, of a motor-car. Fig. 3 is an elevation of a detail hereinafter particularly referred to.

As shown by these drawings, the several gear-wheels are contained within a dust-excluding box or casing A, through which the motor-shaft B passes at one end and is entered by the end of the driven shaft C, which latter shaft passes through the other end of the box A, both shafts being by preference supported in journal-bearings A' in the box ends. The principal wheel of the train is a spur-wheel D, arranged to slide on feathers on the driven shaft C and having clutch-faces D' D², so that it is capable of being clutched in turn to a spur-wheel B' on the end of the driving or motor shaft B, to a loose wheel E upon its own shaft C, or geared with a spur-wheel F on a counter-shaft F'. This wheel D being shown on the drawings as out of gear with either of the wheels B', E, or F, the gearing is in that position known as the "free-wheel" position—i. e., the motor is acting through the spur-wheel B' on the motor-shaft B, a spur-wheel G on the counter-shaft F', through another spur-wheel H on this shaft F' to a spur-wheel E on the driven shaft C, and as this latter wheel is loose upon its shaft the car is at a standstill. When the car is to be driven

at the ordinary speed—i. e., such as is desirable on level or approximately level roads—the sliding clutch-faced spur-wheel D is brought, by means hereinafter described, so that its clutch-face D' engages with the clutch-face B² of the wheel B' on the motor-shaft B, the shaft C being thus driven directly and at the speed of the motor and the counter-shaft running idly, because of the loose condition of the wheel E on the driven shaft C. When the car is to be driven at a medium speed suitable for ascending inclines or when a slightly-increased power is required, the sliding wheel D is brought with its clutch-face D² into engagement with a clutch-face E' on the loose wheel E on the driven shaft C, the speed of the motor being transmitted from the wheel B' through the larger spur-wheel G on the counter-shaft F', whereby the motor speed is reduced and the power increased proportionately to the diameters of the wheels B' and G, the rotation of the counter-shaft being transmitted to the driven shaft C through the wheel H at its other end by means of the loose wheel E, now clutched to the spur-wheel D. When a still slower speed or greater power of the driven shaft is required, the clutch is moved back to its mid-position, as shown at Fig. 1, out of engagement with either clutch-face B² E', and the spur-wheel F on the counter-shaft F' is traversed, so that it gears with the spur-wheel D, whereupon the speed of the motor is transmitted by the wheel B' on the motor-shaft, the wheels G and F on the counter-shaft F', and the spur-wheel D on to the driven shaft C and at a reduction of speed and increase of power due to the relative diameters of the gear-wheels. The strain of a greatly-increased power being then distributed over a train of wheels, there is consequently less wear and tear upon the gearing. When the direction of motion of the driven shaft C is to be reversed for the purpose of reversing the direction of travel of the car, the spur-wheel F on the counter-shaft F' is moved out of gear with the spur-wheel D on the driven shaft C and into the position shown at Fig. 1, and a loose pinion J, carried on an eccentric stud or short shaft K, having its bearings in lugs on the cover L of the casing A, is thrown, by means of a lever-arm M, into engagement with the spur-wheel D on the

driven shaft C and with the sliding pinion on the counter-shaft F', as shown in full lines at Fig. 2 and in dotted lines at Fig. 1, so that said shaft F' drives the spur-wheel D and the
 5 driven shaft C in the same direction as the counter-shaft F', which latter direction is the reverse of the driving-shaft. The loose intermediate or reversing pinion J is kept in gear by the eccentricity of its stud and the
 10 action of the rotating wheels with which it is in gear.

The several changes of gear may be effected by separate hand-levers; but by a further improvement a single hand-lever is arranged to
 15 change the gear. This lever is mounted on a shaft N, on whose bearings an ordinary notched or suitably-graduated quadrant is fixed, and on the shaft N is keyed a pair of cam-levers or, as shown at Figs. 2 and 3, a
 20 single cam-lever O, having two rims or flanges, each of which is formed with a slot O' O², respectively, each slot being throughout about half its length an arc of a circle whose center is the axis of the hand-lever shaft, while
 25 the other portions O³ O⁴ of the slots act as cams, the cam portions O³ O⁴ of the slots being at opposite ends of the rims or flanges. In one slot O' is fitted a pin P' on the end of a lever P, fixed on a hollow rock-shaft P²,
 30 having on it the lever P³, which throws the clutch-faced wheel D into gear with the driving-wheel B' or the free wheel E to obtain the higher speed or intermediate speed of the driven shaft C, and in the slot O² of the other
 35 rim or flange is the pin Q' of a second lever Q, fixed on a solid rock-shaft Q², extending through the hollow shaft P² and having on it the lever Q³, which effects the sliding movement of the spur-wheel F' on the counter-shaft
 40 F'. The quadrant and hand-lever are so arranged in relation to the slots of the cam-lever O that in one position of the hand-lever the levers P Q on the rock-shafts P² Q² are in line, the pins P' Q' being in eccentric portions of the slots and the driving mechanism out of gear. On a forward movement of the hand-lever to one notch the cam-lever acts on the hollow rock-shaft P² to throw over the clutch-lever P³, and consequently gear
 50 the clutch-faced wheel D with the wheel B' on the driving-shaft, while the lever-pin Q' on the solid rock-shaft Q², being in a concentric portion of its slot, is not acted on, and the driven shaft is rotated at its highest speed.
 55 On drawing the hand-lever in the opposite direction into one notch the intermediate speed is obtained and on moving it to another notch the slowest speed is reached, owing to the solid rock-shaft Q² being acted on.

60 The above-described driving-gear has the following advantages: that it allows of a central drive—i. e., the driven shaft being arranged in line with the motor-shaft—irrespective of the train of wheels employed, and
 65 when the driven shaft is geared direct to the driving-shaft (which condition exists during seventy-five per cent. of the running time) the

other gearing is running idle. The strain and wear upon the gearing are distributed over two pairs of spur-wheels when the medium 70 and slow gears are employed, and consequently the life of the gearing is enormously increased. It is obvious that such an arrangement of driving-gear is applicable for other purposes than driving motor-cars, its 75 construction being no wise altered excepting in regard to the relative proportions of the gear-wheels as circumstances demand.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is— 80

1. In a driving-gear, the combination with a motor-shaft and a driven shaft in line therewith, of a spur-wheel fast on the motor-shaft, a clutch-faced spur-wheel fast on the driven 85 shaft and adapted to slide into engagement with said spur-wheel, a free spur-wheel on the driven shaft, adapted to be engaged by the sliding spur-wheel, a counter-shaft, spur-wheels fast thereon, meshing with the spur-wheels on the motor and driven shafts, a sliding spur-wheel on the counter-shaft adapted to be thrown into and out of gear with the clutch-faced spur-wheel, and an intermediate or reversing spur-wheel capable of being 95 geared with the clutch-faced spur-wheel and with the sliding spur-wheel on the counter-shaft, substantially as set forth.

2. In a driving-gear, the combination with a motor-shaft and a driven shaft in line therewith, of a spur-wheel fast on the motor-shaft, a clutch-faced spur-wheel fast on the driven shaft and adapted to slide into engagement with said spur-wheel, a free spur-wheel on the driven shaft, adapted to be engaged by 105 the sliding spur-wheel, a counter-shaft, spur-wheels fast thereon, meshing with the spur-wheels on the motor and driven shafts, and a sliding spur-wheel on the counter-shaft adapted to be thrown into and out of gear 110 with the clutch-faced spur-wheel.

3. The combination of the driving-shaft, a counter-shaft, connections between the driving-shaft and the counter-shaft, a driven shaft, a spur-wheel carried by the driven 115 shaft, a sliding spur-wheel carried by the counter-shaft and adapted to be thrown into engagement with the spur-wheel on the driven shaft, and a spur-wheel adapted to be thrown into engagement with the spur-wheel on the 120 driven shaft and the sliding spur-wheel on the counter-shaft, to reverse the motion of the driven shaft.

4. The combination of the driving-shaft, a counter-shaft, connection between the driving-shaft and counter-shaft, a driven shaft, a sliding spur-wheel carried thereby and adapted to be thrown into engagement with the driving-shaft, a sliding spur-wheel carried by the counter-shaft and adapted to be 130 thrown into engagement with the sliding spur-wheel on the driven shaft, and a spur-wheel adapted to be thrown into engagement with the sliding spur-wheel on the counter-shaft

and the sliding spur-wheel on the driven shaft to reverse the motion of the latter shaft.

5. The combination of a driving-shaft, a spur-wheel carried by the driving-shaft, a counter-shaft, a spur-wheel mounted on the counter-shaft, connecting with the spur-wheel on the driving-shaft; a driven shaft, a spur mounted loosely on the driven shaft, connection between the counter-shaft and the loosely-mounted spur-wheel on the driven shaft, and a clutch carried by the driven shaft and adapted for engagement with the driving-shaft or for engagement with the loosely-mounted spur-wheel on the driven shaft.

6. In a driving-gear, the combination of a longitudinally-shiftable gear, a lever connected thereto, a rock-shaft to which the said lever is connected, a lever carrying studs, also connected to the rock-shaft, and a lever provided with cam-shaped slots in which the pins work, and means for shifting the slotted lever to shift the gear-wheel.

7. The combination of a plurality of shiftable gear-wheels, levers connected to each gear-wheel, a rock-shaft to which each of said levers is connected, a lever provided with a pin connected to each rock-shaft, and a lever having a plurality of cam-slots in which the pins of the last-mentioned levers work, and means for shifting the slotted lever to shift the sliding spur-wheels.

8. The combination of two longitudinally-shiftable gear-wheels, a lever connected to each gear-wheel, a hollow rock-shaft connected to one of said levers, a rock-shaft connected to the other lever and mounted within the

hollow rock-shaft, a lever carrying a pin connected to each of said rock-shafts, a lever provided with a plurality of cam-slots, in which the pin works, and means for shifting the slotted lever to shift the gears.

9. The combination of a driving-shaft, a spur-wheel carried thereby, a counter-shaft, a spur-wheel carried by the counter-shaft, connecting with the spur-wheel on the driving-shaft, a driven shaft in alinement with the driving-shaft, a spur-wheel loosely mounted on the driven shaft, a second spur-wheel mounted on the counter-shaft, connecting with the loosely-mounted spur-wheel on the driven shaft, a sliding clutch spur-wheel on the driven shaft adapted for engagement with the driving-shaft or with the loosely-mounted spur-wheel on the driven shaft, a sliding spur-wheel on the counter-shaft, a hollow rock-shaft, connections between the hollow rock-shaft and the sliding clutch spur-wheel on the driven shaft, a rock-shaft mounted within the hollow rock-shaft and connected with the sliding spur-wheel on the counter-shaft, a lever carrying pins, connected to each of the rock-shafts, a lever provided with cam-slots in which the pins work, and means for shifting the slotted lever to shift the sliding spur-wheels.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ALEXANDER GOVAN.

Witnesses:

WALLACE FAIRWEATHER,
JNO. ARMSTRONG, Jr.