

No. 733,600.

PATENTED JULY 14, 1903.

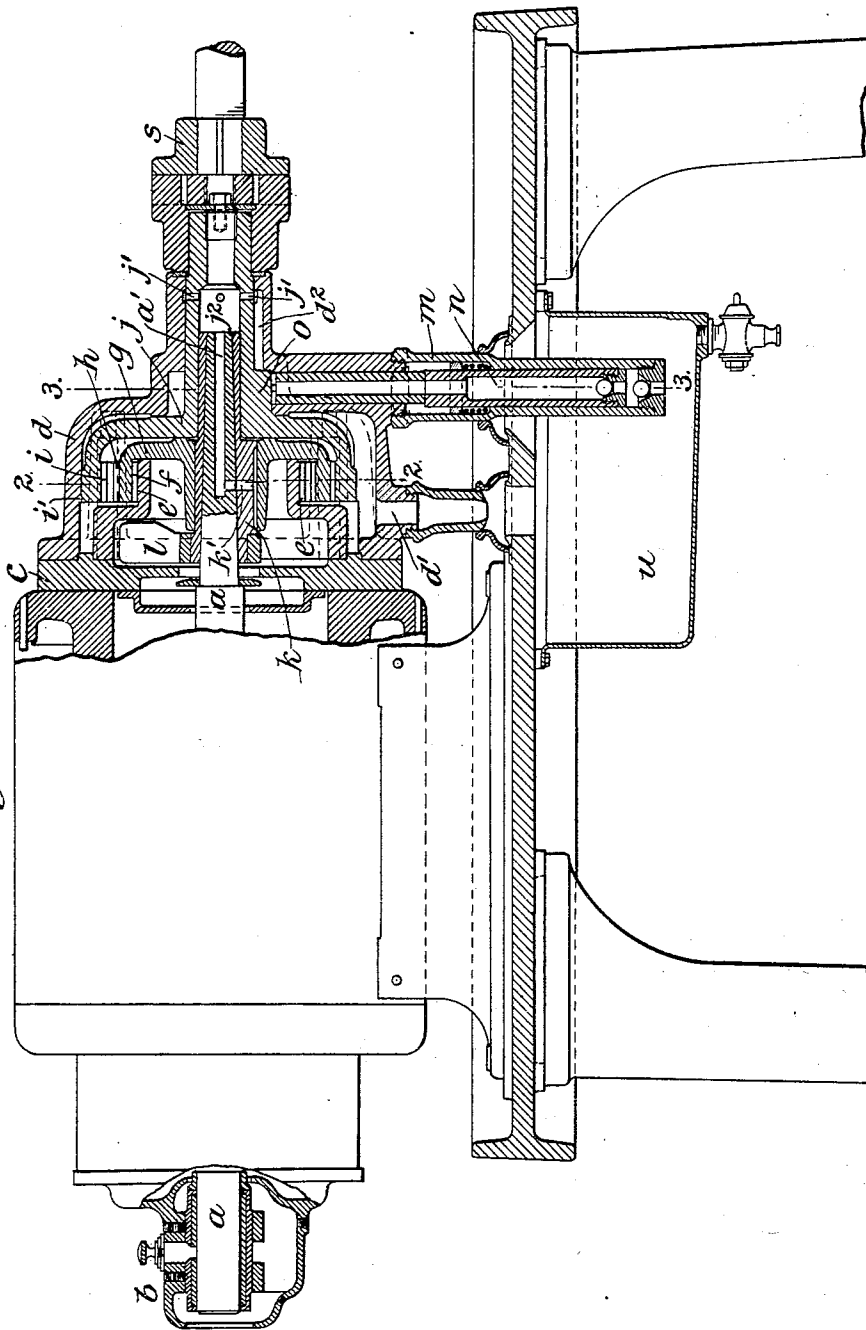
J. SCHNEIBLE.
POWER TRANSMITTING DEVICE.

APPLICATION FILED MAR. 24, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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2 SHEETS—SHEET 2.

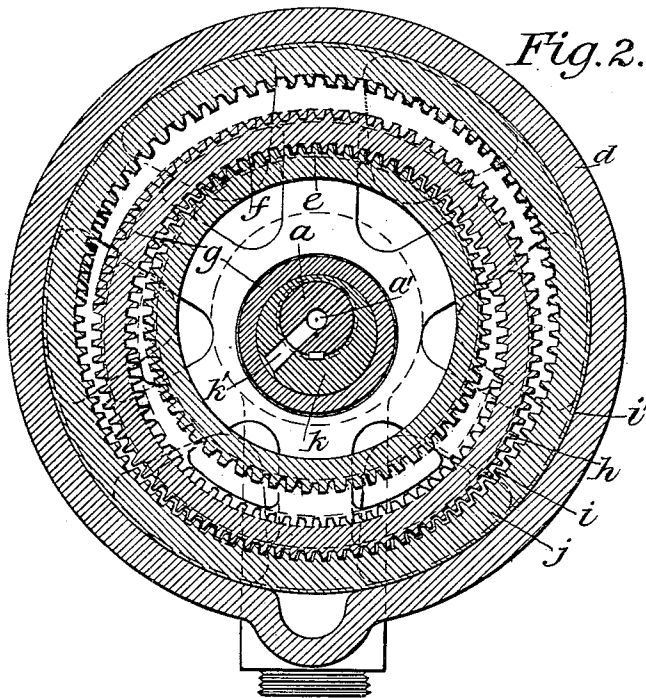


Fig. 2.

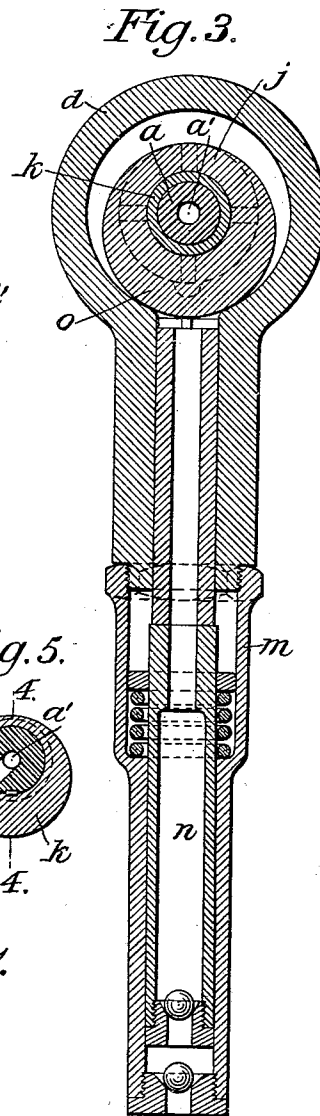


Fig. 3.

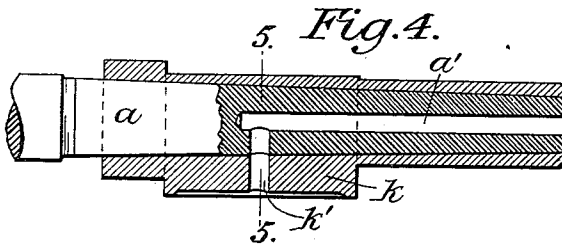


Fig. 4.

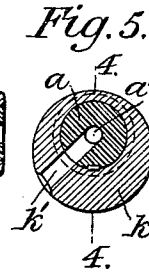


Fig. 5.

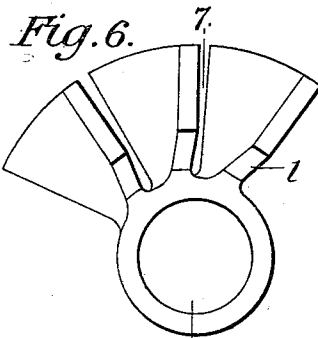


Fig. 6.

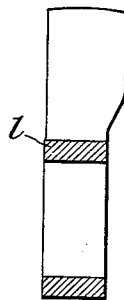


Fig. 7.

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JOSEPH SCHNEIBLE, OF NEW YORK, N. Y.

POWER-TRANSMITTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 733,600, dated July 14, 1903.

Application filed March 24, 1903. Serial No. 149,238. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SCHNEIBLE, a citizen of the United States, residing in the borough of Manhattan, city of New York, State of New York, have invented certain new and useful Improvements in Power-Transmitting Devices, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates generally to power-transmitting devices by which a considerable change of speed is secured through the use of differential gearing. Such power-transmitting devices as usually constructed heretofore have consumed much power in overcoming friction, and the parts thereof have not been readily accessible for inspection, repair, &c. In the present case it has been sought to so form the parts and to so arrange them in relation to each other that the difficulties alluded to shall be overcome. It has also been sought to provide for the certain and efficient lubrication and cooling of the working parts, to make the device as a whole very compact and easy of application, and generally to improve the construction.

The invention is illustrated in a convenient and practical embodiment thereof in the accompanying drawings, in which—

Figure 1 is a view, partly in elevation and partly in vertical central section, showing the improved transmitting device applied directly to a motor. Fig. 2 is a detail view, in transverse section, on the plane indicated by the line 2 2 of Fig. 1, on a larger scale. Fig. 3 is a detail view, in transverse section, on the plane indicated by the line 3 3 of Fig. 1, on the same scale as Fig. 2. Fig. 4 is a detail view, partly in longitudinal section, on the plane indicated by the line 4 4 of Fig. 5, showing a portion of the driving-shaft and the eccentric mounted thereon. Fig. 5 is a detail view, in transverse section, on the plane indicated by the line 5 5 of Fig. 4. Fig. 6 is a detail view in elevation of the air-circulating fan. Fig. 7 is a detail view in section on the plane indicated by the line 7 7 of Fig. 6.

In the application of the invention represented in Fig. 1 the improved transmitting device is shown as applied to and supported by the armature-shaft *a* of an electric motor, said shaft having a bearing, as usual, in one

end of the motor-casing, as at *b*, while its other end is supported as will be explained hereinafter. The main carrying plate or base *c* of the transmitting device is shown as secured directly to the frame of the motor, together with the cap or casing *d*, which supports the end of the shaft *a*, together with the parts of the transmitting device mounted thereon. The cap *d* when disengaged from the plate *c* may be withdrawn completely from the transmitting device, leaving the working parts thereof in their operative relation. To the plate *c* within the casing *d* is secured an external gear *e*, with which meshes an internal gear *f*, carried by the web of a shell *g*. An external gear *h* is also carried by the shell *g*, the gears *f* and *h* being extended from the web of the shell *g* in the same direction, so that both of these gears shall occupy the same relation with respect to the transverse plane of the gear *e*, and for convenience in description these several gears, as well as the gear *i* and the journal-bearing *i'* of the gear *i* in the casing *d*, may be said to stand in the same transverse plane. The gear *i*, which is an internal gear in mesh with the external gear *h*, is in turn carried by a shell *j*, which when the shaft *a* represents the source of power or driver is itself the driven member of the transmitting device. It is supported upon the shaft *a* and in the cap *d*, as represented in Fig. 1. The shell *j* does not bear directly upon the shaft *a*, but is mounted upon an eccentric *k*, which is formed with or fixed to the shaft *a* and preferably has a long sleeve which has a bearing within the shell *j*. At its other end the sleeve of the eccentric is preferably provided with a fan *l*, which rotates with the shaft *a* of the motor in the chamber provided therefor within the support of the gear *e* and provides for a constant movement of the air within the motor and within the transmitting device to cool both.

It will be understood that, as common in differential gears of this class, the gear *f* has a greater number of teeth than the gear *e* and that the gear *i* has a greater number of teeth than the gear *h*, while the shell *g*, carrying the gears *f* and *h*, is loose on the eccentric *k*. As is well understood, therefore, the gear *i* has a very slow forward movement as compared with the gear *e*. It will be ob-

served that the location of the several gears e , f , h , and i and the journal-bearing of the gear i in the casing in the same transverse plane as already described eliminates all those torsional strains which in other gears of this nature materially reduce the ease of transmission. Furthermore, the arrangement of the gears as described permits the whole transmitting device to be very compact, besides permitting such an arrangement of the parts thereof as enables them to be assembled easily and to be separated easily when necessary for inspection or repair.

It has been attempted heretofore in gears of this character to insure proper lubrication of the working parts by making the casing oil-tight, so that the gears might dip continually in lubricant. When, however, the driver rotates at a very high speed, as it does in practically all cases in which a reducing-gear of this description is desirable, the oil is completely driven off from the bearings near the center, so that they quickly become dry and heated. Furthermore, the oil within the casing has no opportunity to be cooled, being always in contact with parts which become more or less heated under all conditions and has no opportunity to clear itself by settlement. In this case it is sought to force the oil to circulate, even through the bearings nearest the center, and to permit the oil to pass out of the gear-casing away from the working parts, so that it may become somewhat cooled, and may therefore further aid in keeping cool the working parts of the device. To this end the casing d is provided with an opening d' , through which the oil may escape readily from the casing into a tank or reservoir u , which may be secured beneath the bed-plate upon which the motor rests. A pump m , having a spring-lifted hollow plunger n , is arranged to be operated by a cam or eccentric o on the shank of the slowly-rotating shell j , the pump operating to lift the oil from the tank u and to deliver it through a channel d'' in the shank of the cap or cover d and holes j' , through the shank of the shell j , into a space j'' within the same, from which the oil finds its way between the sleeve of the eccentric k and the shell j to the gears h and i . A channel a' may also be formed in the shaft a to conduct the oil from the chamber j'' directly to the eccentric k through a suitable passage k' . The gears e and f will be sufficiently lubricated by the oil which finds its way to them, and the surplus of oil from the gears and bearings eventually works into the casing d and thence through the opening d' back to the tank u , where it is cooled and has opportunity to clear itself. The pump also serves a useful purpose in equalizing the wear on the bearing of the motor-shaft, and especially of the eccentric. The motor-shaft, as usual, has free endwise play, that the armature may adjust itself to its electric orbit, and the pressure of the oil in the space j'' against the end of the shaft at each stroke

of the pump forces the shaft, and the eccentric with it, endwise against the tendency of the armature to return to its electric orbit, thereby keeping the shaft in constant movement endwise in its bearings, together with the eccentric, thus distributing the wear and preventing cutting of the bearings by any hard particles which might be introduced.

The mode of operation of the improved transmitting device will be readily understood from the description of its several parts, and their operation and relation require no further explanation herein.

I claim as my invention—

1. The combination of an eccentric mounted to rotate, a fixed gear concentric with the axis of rotation of the eccentric, a driven gear concentric with the same axis and an internal and external gear mounted loosely on said eccentric and engaging the fixed gear and the driven gear, the several gears being in the same transverse plane, substantially as described.

2. The combination of an eccentric mounted to rotate, a fixed gear concentric with the axis of rotation of the eccentric, a driven gear concentric with the same axis, and an internal and external gear mounted loosely on said eccentric and engaging the fixed gear and the driven gear, the several gears and the eccentric being in the same transverse plane, substantially as described.

3. The combination of a casing, an eccentric mounted to rotate within the casing, a fixed gear concentric with the casing, a driven gear having a journal-bearing in the casing, and an internal and external gear mounted loosely on said eccentric and engaging the fixed gear and the driven gear, the several gears and said journal-bearing being in the same transverse plane, substantially as described.

4. The combination of a casing, an eccentric mounted to rotate in said casing, a fixed gear concentric with the casing, a driven gear having a journal-bearing in the casing, and an internal and external gear mounted loosely on said eccentric and engaging the fixed and the driven gear, the several gears, the eccentric and said journal-bearing being in the same transverse plane, substantially as described.

5. The combination of an eccentric mounted to rotate, a fixed gear concentric with the axis of rotation of the eccentric, a sleeve mounted loosely on the eccentric and having a web, a driven gear concentric with the same axis, and internal and external gears carried on the same side of said web and engaging the fixed gear and the driven gear, all of said gears being in the same transverse plane, substantially as described.

6. The combination of a shaft, a fixed gear concentric with the shaft, an eccentric mounted on said shaft, a sleeve mounted loosely on said eccentric and carrying in the same plane therewith an internal gear in engagement

with said fixed gear and an external gear, and a second sleeve supported by said shaft and carrying an internal gear in engagement with said external gear, substantially as described.

7. The combination of a shaft, a casing, a fixed gear within the casing concentric with said shaft, an eccentric on said shaft, a sleeve mounted loosely on said eccentric and carrying an internal gear in engagement with said fixed gear, and an external gear, and a second sleeve having a bearing within said casing and carrying a gear in engagement with said external gear and also having a journal-bearing in the casing in the same plane with said gears, substantially as described.

8. The combination of a casing comprising a base and a cap, a shaft extended through the base, an eccentric on said shaft, a gear fixed on said base concentric with the casing, a sleeve mounted loosely on said eccentric and carrying an internal gear in engagement with said fixed gear, and an external gear, and a driven member having a bearing in the casing and carrying an internal gear in engagement with said external gear, substantially as described.

9. The combination of a casing comprising a base and a cap, a shaft extended through the base, an eccentric on said shaft, a gear fixed on said base concentric with the cap, a sleeve mounted loosely on said eccentric and carrying an internal gear in engagement with the fixed gear, and an external gear and a second sleeve supported upon the shaft and having a bearing in the cap, said second sleeve carrying an internal gear in engagement with said external gear, substantially as described.

10. The combination of a casing comprising a base and a cap, a shaft extended through the base, a fan secured to the shaft to rotate therewith within the casing, an eccentric mounted on the shaft within the casing, a gear fixed on said base concentric with the shaft, an external and internal gear mounted to rotate loosely on said eccentric, and a driven gear mounted to rotate concentrically with the shaft and in engagement with said external gear, substantially as described.

11. The combination of an electric motor, a casing comprising a base-plate which forms the end plate of the motor and a cap, the motor-shaft being extended through said base-plate, a gear fixed to said base-plate concentric with the shaft, an eccentric secured to the shaft, an external and internal gear mounted loosely on said eccentric in engagement with said fixed gear internally, and a driven gear mounted to rotate within the casing and in engagement with said external gear, substantially as described.

12. The combination with a fixed gear, an eccentric mounted to rotate, a driven gear, and an internal and external gear mounted loosely on said eccentric and engaging said fixed gear and driven gear, of a casing sur-

rounding and supporting said gears and having openings for the escape and admission of oil, an oil-tank external to the casing, and means to circulate the oil between said tank and casing, substantially as described.

13. The combination with a shaft, a fixed gear, an eccentric mounted to rotate with said shaft, a driven gear, an internal and external gear mounted loosely on said eccentric and engaging said fixed gear and driven gear, of a casing surrounding and supporting said gears and having openings for the escape and admission of oil, an oil-tank external to said casing, a pump to circulate oil between said tank and casing, and an eccentric mounted to rotate with said driven gear to drive said pump, substantially as described.

14. The combination with a shaft, a fixed gear, an eccentric mounted to rotate with said shaft, a driven gear and an internal and external gear mounted loosely on said eccentric and engaging said fixed and driven gear, of a casing surrounding and supporting said gears and having openings for the escape and admission of oil, an oil-tank external to the casing, and means to circulate oil between said tank and casing, an oil-conduit being formed from the opening for the admission of oil to the casing through holes formed in the hub of said driven gear, through a channel in said shaft and through a hole in said eccentric and between the gears to the opening for the escape of oil from the casing, substantially as described.

15. The combination with an electric motor having an armature-shaft free for endwise movement, differential transmitting-gearing driven by said shaft and comprising a slowly-rotating gear, and a relatively fixed casing inclosing the end of the shaft, of a pump operated by said slowly-rotating gear and communicating with said casing, whereby the pressure within said casing against the end of the shaft tends to move the latter against the tendency of the shaft to return to the electric orbit of the armature, substantially as described.

16. The combination with an electric motor having an armature-shaft free for endwise movement, and differential transmitting-gearing driven by said shaft and comprising a slowly-rotating gear having a shell inclosing the end of said shaft and forming a chamber within the same at the end of the shaft, of a pump operated by said slowly-rotating gear and communicating with said chamber, whereby the pressure within said casing against the end of the shaft tends to move the latter against the tendency of the shaft to return to the electric orbit of the armature, substantially as described.

This specification signed and witnessed this 16th day of March, A. D. 1902.

JOSEPH SCHNEIBLE.

In presence of—

ANTHONY N. JESBERA,
LUCIUS E. VARNEY.