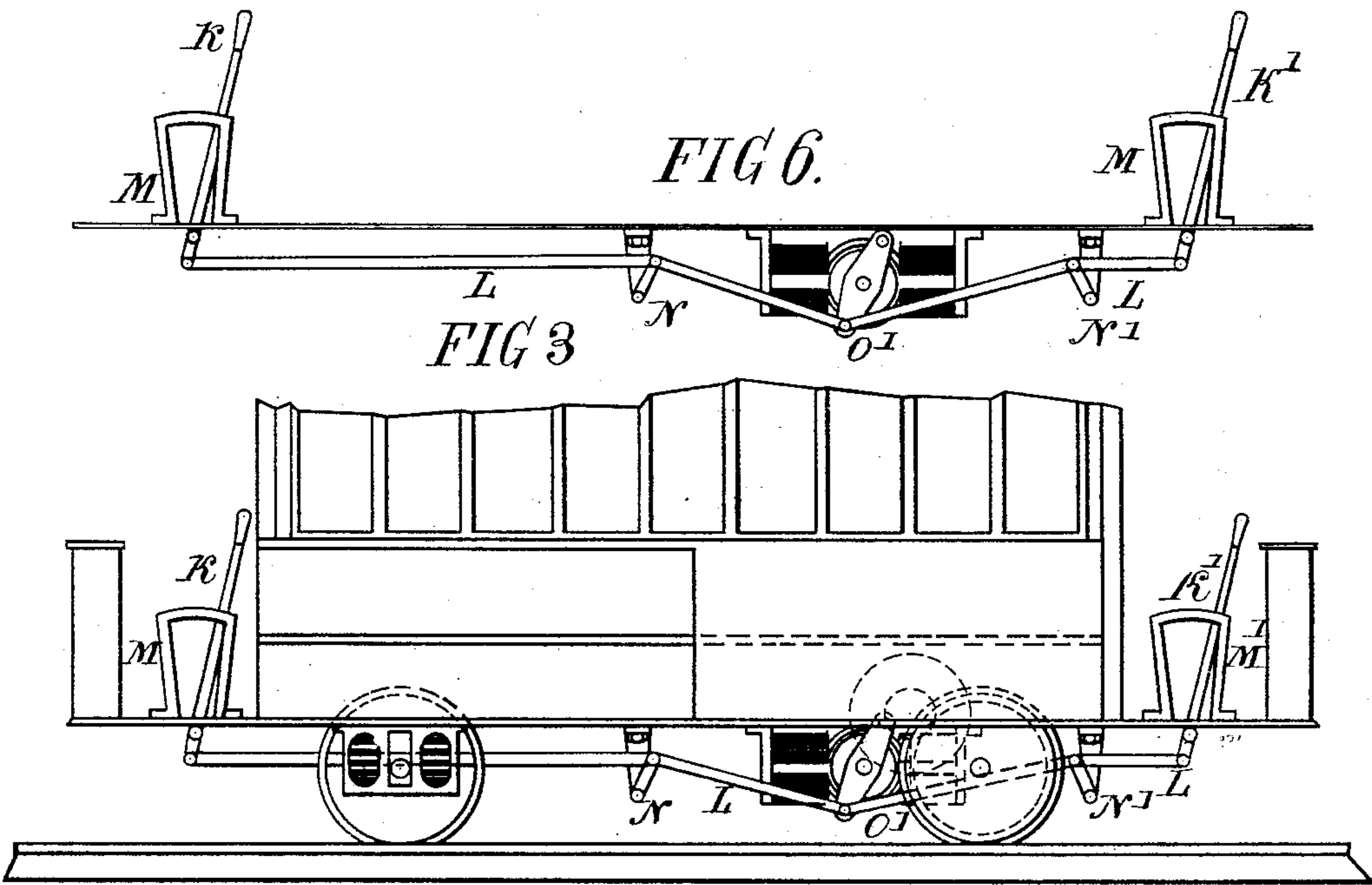
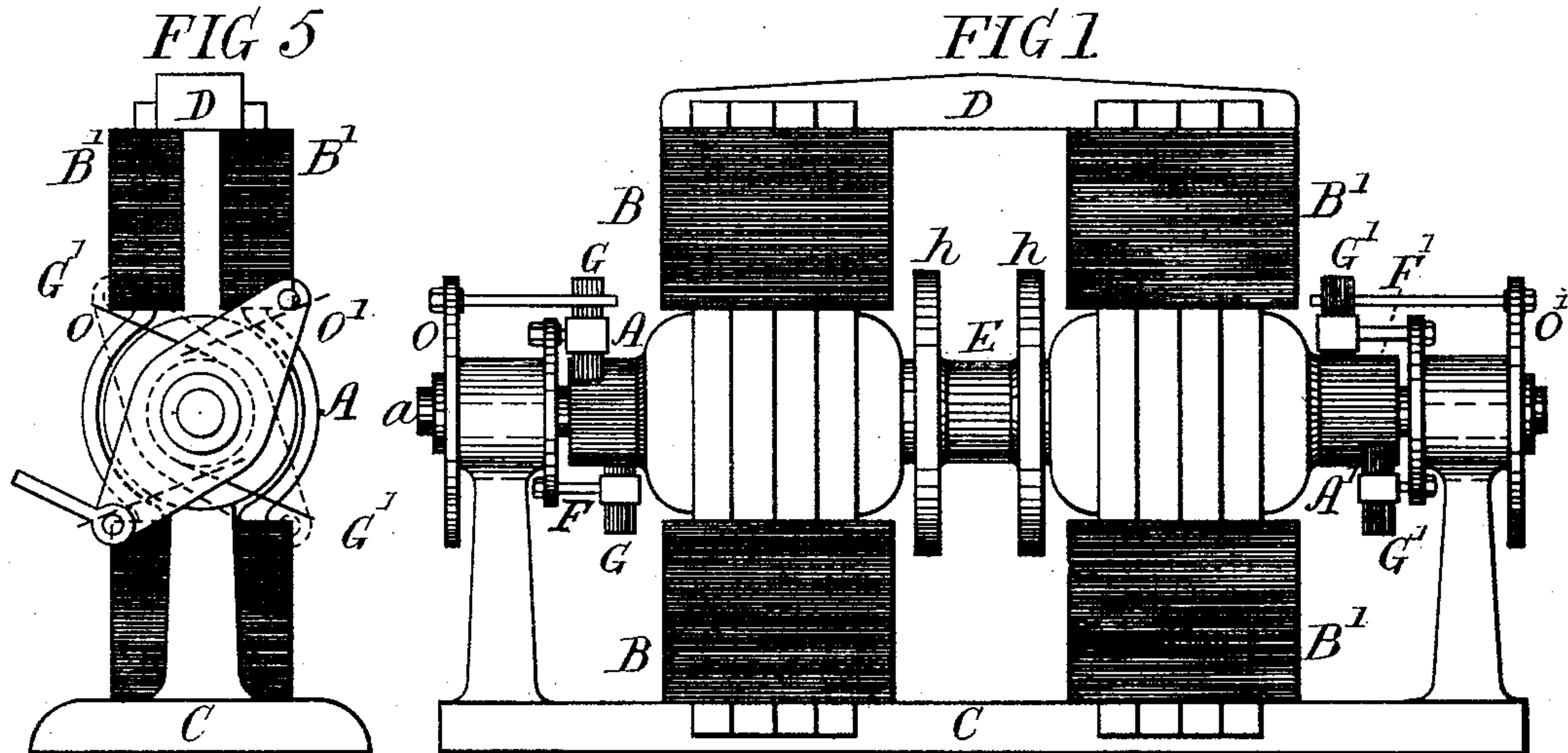


A. J. JARMAN.

COMPOUND ELECTROMOTOR FOR ELECTRIC RAILWAYS.

No. 386,543.

Patented July 24, 1888.



Witnesses,
James Edward Leurrie,
Conrad Henry Marks.

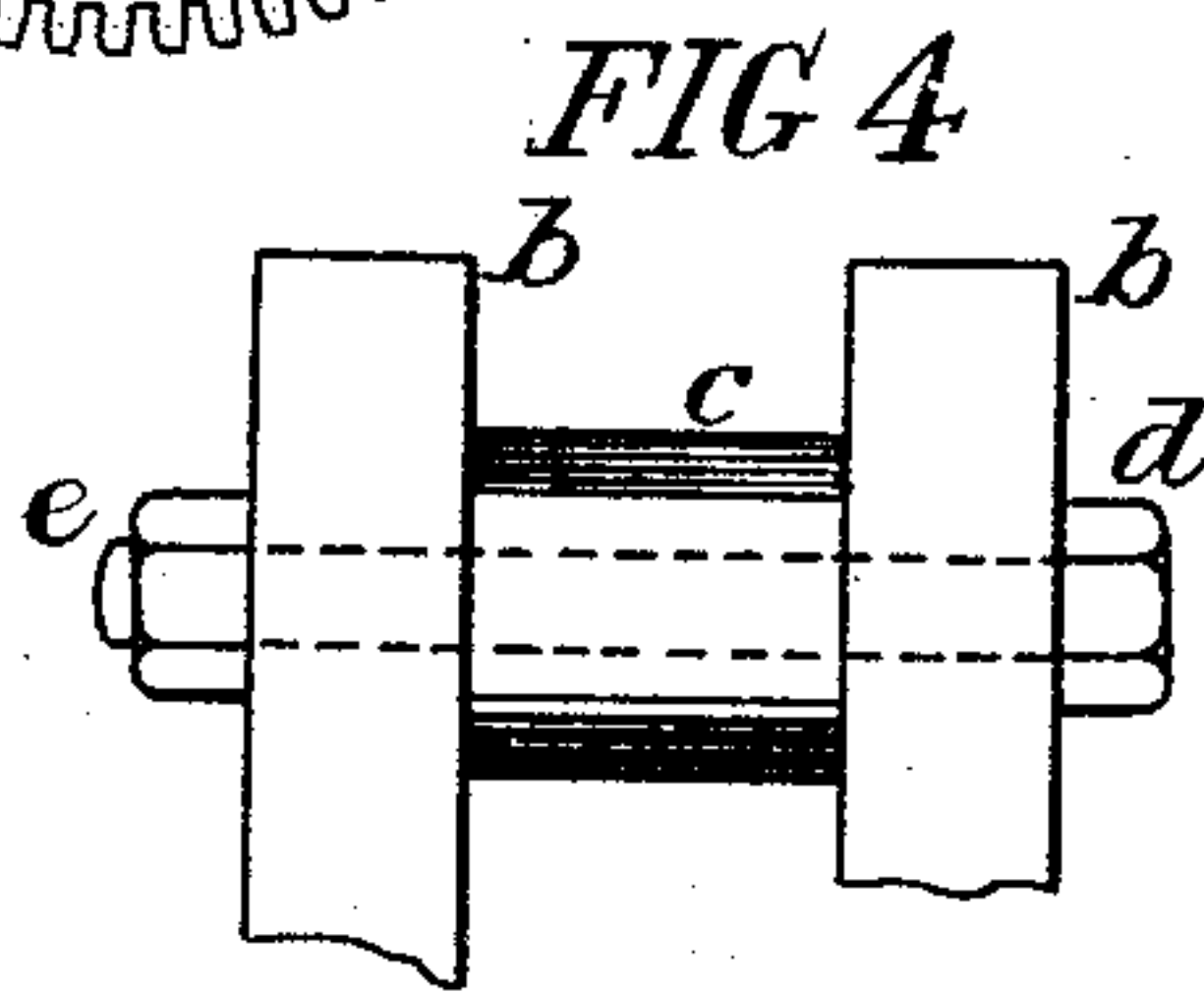
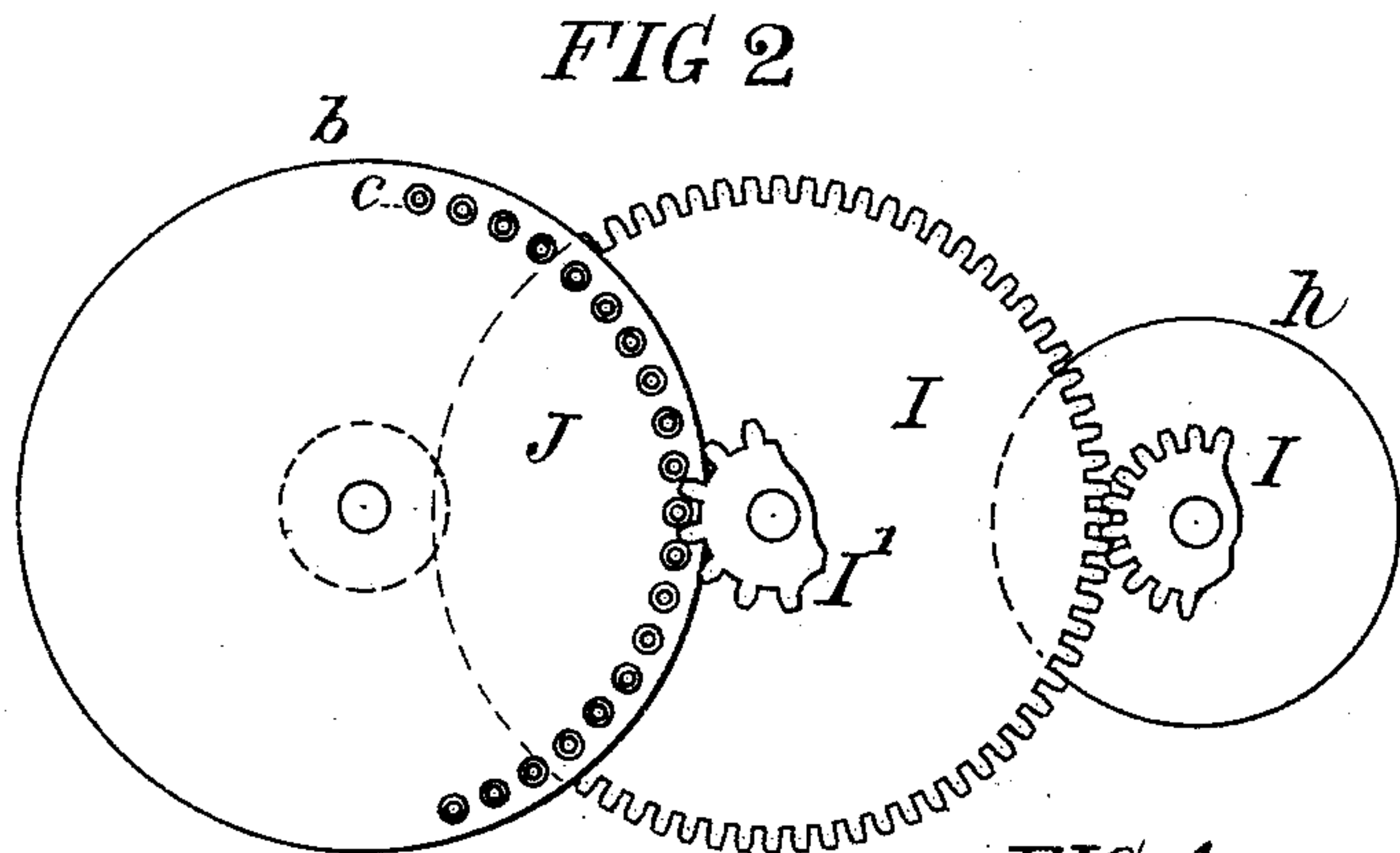
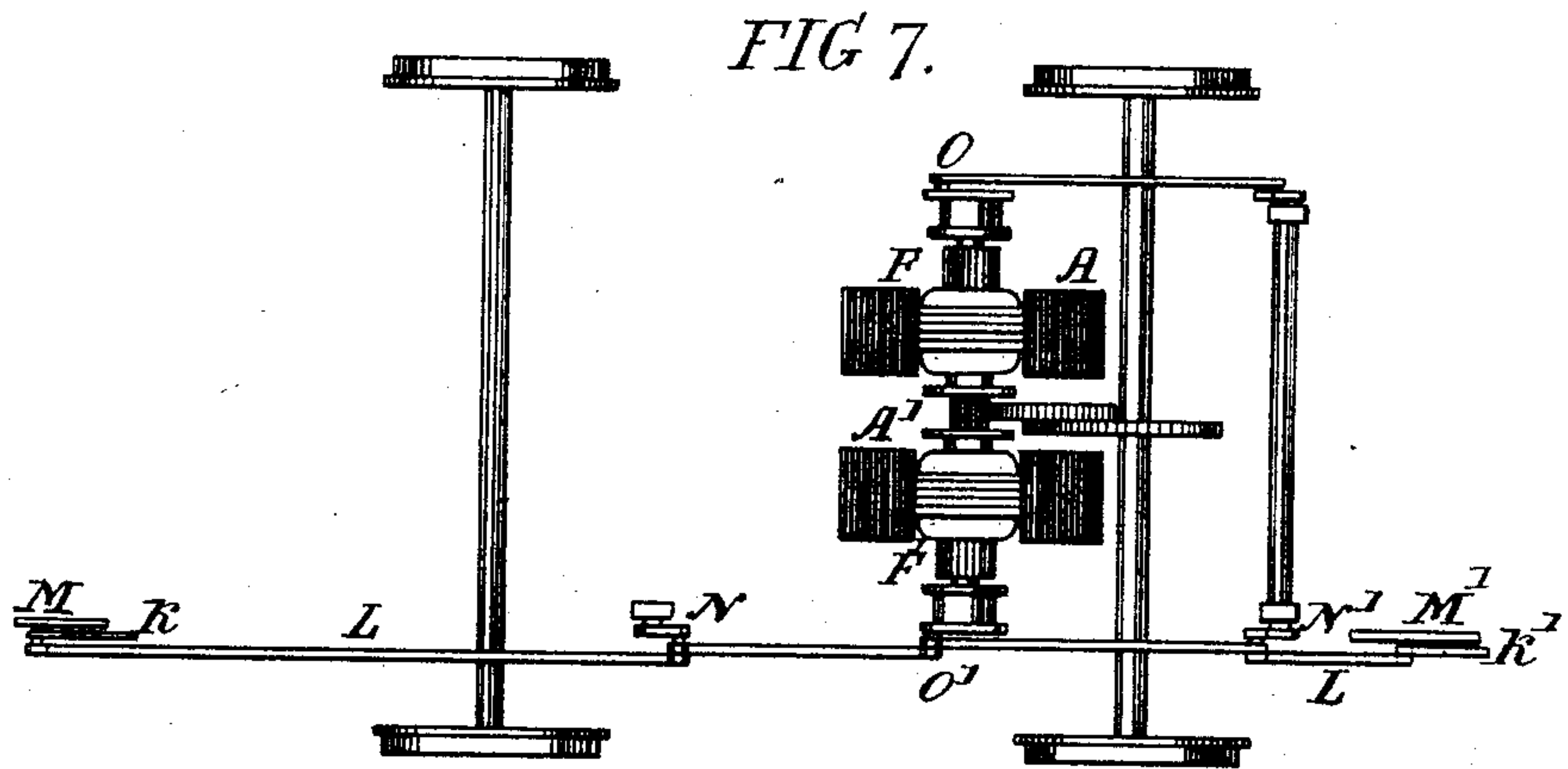
Inventor,
Alfred James Jarman,
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UNITED STATES PATENT OFFICE.

ALFRED JAMES JARMAN, OF LONDON, ENGLAND.

COMPOUND ELECTROMOTOR FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 386,543, dated July 24, 1888.

Application filed November 24, 1886. Serial No. 219,854. (No model.) Patented in England February 26, 1886, No. 2,783.

To all whom it may concern:

Be it known that I, ALFRED JAMES JARMAN, a subject of the Queen of Great Britain, residing at 82 Keelett Road, Brixton, S. W., London, England, have invented certain new and useful Improvements in Electromotors and Gearing for Transmitting Power Therefrom to Vehicles, (for which I have received Letters Patent in Great Britain, No. 2,783, dated February 26, 1886;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in an improved electromotor and gearing for regulating and transmitting power from same to tram-cars and other similar vehicles.

The said invention consists in the construction and combination of devices, hereinafter particularly set forth.

Figure 1 is an elevation of a motor embodying my invention. Fig. 2 is an elevation of the gearing employed. Fig. 3 is an elevation of a tram-car, showing the motor and gearing in position. Fig. 4 is an enlarged view showing method of fastening roller-teeth. Fig. 5 is an end elevation of the motor. Fig. 6 is a side elevation of the levers, motor, and intermediate devices detached from the car. Fig. 7 is a plan view of the same. Fig. 8 is a side view of the motor detached.

Similar letters refer to similar parts in all the figures of the drawings.

I fix two armatures, A A', Figs. 1 and 5, upon the same axle or spindle, *a*, and employ two sets of field-magnets, B B', fitted to one common base, C, and yoked together at the top by a stretcher, D, so forming a double electromotor. A toothed wheel, E, is fitted upon any convenient part of spindle *a* for communicating power from the motor to the axle of tram-car. I prefer to inclose this pinion on either side by plates *h*, which may be made of steel or other suitable metal. These plates prevent any oscillation or lateral play of said pinion.

The pinion E may be cast solid, or it may be clogged with vulcanized fiber or horn-beam, or roller-teeth, as described, for wheel J may be employed. The pinion or wheel E (see Fig. 2) engages with the wheel I, which again engages by

means of pinion I' with J, keyed upon the axle of the car. This wheel J, I prefer to construct with two disks, *b b*, (see also Fig. 4,) of any suitable metal, steel rollers C C, mounted upon steel bolts *d*, fitted with nuts *e*, as shown more particularly in Fig. 4, being used in place of teeth. A very noiseless motion is thus obtained and worn teeth can be readily replaced.

Each armature A A' has a separate commutator, F F', and set of brushes, G G', which are so arranged as that each motor shall turn in a direction opposite to that of its fellow. Thus one armature, A', propels the car in the forward direction, the other armature, A, in the backward. The brush being lifted off the idle armature, no current can pass through it, and it acts solely as a fly-wheel to the driven one. If, now, the brush be lifted from the driven one and lowered upon that acting as a fly-wheel, the motion of the car will be reversed, and it is evident that if the brushes be lowered upon the separate commutators a current will flow in opposite directions through each armature, and so produce a powerful brake. A very substantial advantage is derived from this method of compounding or coupling together two separate motors and dividing the work between them. The idle armature is cooled by the current of air engendered by its rotation, and heating up is avoided, each armature being thereby placed in the condition most suitable for developing its highest efficiency.

The levers K K', Figs. 3, 6, 7, pivoted upon either car-platform, are furnished with a quadrant or rack, M M', and connected by light rods L L to the rocking shafts N N', and brush-tilting plates with rods O O', which are mounted upon the bearing-pillars of the motor, both levers K K' being connected together, as shown in Figs. 3, 6, 7 by the rods L L. The lever K', Figs. 3, 6, 7, is in the forward position, and the brushes G' G' (see Figs. 5, 8) in contact with the commutator F', one or both, as may be desired, of the opposite brushes, G G, upon the commutator F being lifted by the opposite tilting plate O. The idle armature A is now merely acting as a fly-wheel to the driving one, A'. If, now, the lever K or K' be pulled over, the tilting plates O O' will assume the position shown by the dotted lines, Fig. 5, the brush G'

being lifted off the commutator F', and the brush G being allowed to fall upon the commutator F, the circuit is broken through armature A' and completed through A, the direction of the motor being thereby reversed. Again, if the lever be brought to the central position of the quadrant, both brushes fall upon their respective commutators, and the current traversing each motor in an opposite direction a very effective electrical brake is obtained.

Both brushes G G' are actuated by the same shaft, N'. (See Figs. 6, 7.) Only one set of levers, K K', are required to cause the motor to go forward, backward, or, by permitting both brushes to fall at the same moment upon the commutators F F', to exert a braking action, as described.

The electricity for operating the motor can be obtained through the rails of the line ordi-

rect from any generator of electricity or from primary or storage batteries.

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

The combination of levers K K', rods L L, rocking shafts N N', the tilting plates O O', and the brushes G G', with the electromotor and gearing for giving motion electrically to the car in a forward or backward direction by alternately lifting the said brushes or for electrically creating a braking action, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED JAMES JARMAN.

Witnesses:

JNO. BOULLON,

T. SMITH,

Clerks to Messrs. Grain & Sons, Notaries, 46 Lombard St., London, England.