N° 3234 A.D. 1901

Date of Application, 14th Feb., 1901

Complete Specification Left, 14th Nov., 1901—Accepted, 13th Feb., 1902

PROVISIONAL SPECIFICATION.

"Improvements in or relating to Electric Ignition Devices for Explosion Engines".

I, WILHELM MAYBACH, Engineer, of Cannstatt, Kingdom of Würtemberg, in the Empire of Germany, do hereby declare the nature of this invention to be as follows:—

This invention relates to "improvements in or relating "to electric ignition devices for explosion engines", and has for its object to provide means by which the moment of ignition may be advanced or retarded, whilst maintaining the ignition sparks at a uniform degree of intensity.

In electric ignition devices provided with a magneto-machine for supplying the electric current, varying the moment at which the spark is produced causes the latter to be produced at a moment when the magneto-machine is not in the best position for producing current (supposing it to be in its best position when the moment of sparking is normal) so that the spark produced is often inefficient. To obviate this difficulty the field-magnet of the magneto-machine has sometimes been provided with movable pole pieces adapted to be moved relatively to the armature when the moment of ignition is varied, but this device necessitates an inconveniently large field-magnet.

By means of this invention this difficulty is dispensed with, a field-magnet and pole pieces of ordinary construction being employed and means provided by which the position of the armature is altered relatively to its driving mechanism when the moment of sparking is changed.

According to one method of carrying out this invention the rod which cooperates with the cam in the well-known manner for separating the sparking points is pivotted at that end remote from the cam so that it may be swung in the path of the cam and thus made to engage the cam at an earlier or later period as may be desired. To swing the rod a bell-crank-lever is provided one arm of which is connected to the rod by means of a link. The other arm of the bell-crank lever has pivotted to it a sleeve through which is passed one end of a bent lever. The end of the bent lever remote from the sleeve is pivotted to any convenient support and the end passed through the sleeve is connected to an operating lever in any convenient manner.

The armature of the magneto-machine is mounted upon a shaft carrying a toothed wheel which in the usual manner gears with a second toothed wheel upon a driving shaft. The toothed wheel upon the driving shaft is carried on the latter by means of a feather so that it can slide axially, and the teeth of the wheels are set obliquely upon the peripheries of the wheels. The wheel upon the driving shaft is provided with a clutch ring connected to the operating lever mentioned above for varying the moment of producing the spark so that when the operating lever is moved the wheel will be made to slide along the shaft in one direction or the other. The operation of this device is as follows:—

When the operating lever is moved the bent lever is made to turn upon its pivot so that it slides through the sleeve on the bell-crank-lever at the same time displacing the bell-crank-lever which in turn operates the rod which engages the cam for separating the sparking points. At the same moment the wheel of

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the magneto-machine upon the driving shaft is made to slide along its shaft so that it moves relatively to the wheel on the magneto-machine and this movement causes the position of the wheel of the magneto-machine to be altered relatively to the driving shaft owing to the teeth on the periphery of each wheel being cut obliquely as described. The movement of the wheel on the magneto-machine will obviously cause the position of the armature relatively to the field-magnet and driving shaft to be varied, and this movement may be so calculated that it shall be always in the best position relatively to the field-magnets for producing the most efficient spark at whatever time the spark is made to occur. If preferred in place of cutting the teeth upon the magneto-machine wheels obliquely ordinary toothed wheels may be used, the wheel upon the driving shaft being made to engage a spiral key-way so that when shifted longitudinally upon the shaft it will revolve about the latter causing the position of the armature to be changed as before.

It will be understood that this invention is not limited to the above described methods for carrying it out as many modifications may be introduced in the mechanism for advancing or retarding the moment of ignition and simultaneously altering the position of the magneto-machine armature.

Dated this 14th day of February, 1901.

BOULT, WADE & KILBURN,
Agents for the Applicant.

COMPLETE SPECIFICATION.

"Improvements in or relating to Electric Ignition Devices for Explosion Engines".

I, WILHELM MAYBACH, Engineer, of Cannstatt, Kingdom of Würtemberg, in the Empire of Germany, 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 "improvements in or relating to electric ignition devices for explosion engines", and has for its object to provide means by which the moment of ignition may be advanced or retarded, whilst maintaining the ignition sparks at a uniform degree of intensity.

In electric ignition devices provided with a magneto-machine for supplying the electric current, varying the moment at which the spark is produced causes the latter to be produced at a moment when the magneto-machine is not in the best position for producing current (supposing it to be in its best position when the moment of sparking is normal) so that the spark produced is often inefficient. To obviate this difficulty the field-magnet of the magneto-machine has sometimes been provided with movable pole pieces adapted to be moved relatively to the armature when the moment of ignition is varied, but this device necessitates an inconveniently large field-magnet.

By means of this invention this difficulty is dispensed with, a field-magnet and pole pieces of ordinary construction being employed and means provided by which the position of the armature is altered relatively to its driving mechanism when the moment of sparking is changed.

According to one method of carrying out this invention the rod which co-operates with the cam in the well-known manner for separating the sparking points is pivotted at that end remote from the cam so that it may be swung in the path of the cam and thus made to engage the cam at an earlier or later period as may be desired. To swing the rod a bell-crank lever is provided one

arm of which is connected to the rod by means of a link. The other arm of the bell-crank lever has pivotted to it a sleeve through which is passed one end of a bent lever. The end of the bent lever remote from the sleeve is pivotted to any convenient support and the end passed through the sleeve is connected to an operating lever in any convenient manner.

The armature of the magneto-machine is mounted upon a shaft carrying a toothed wheel which in the usual manner gears with a second toothed wheel upon a driving shaft. The toothed wheel upon the driving shaft is carried on the latter by means of a feather so that it can slide axially, and the teeth of the wheels are set obliquely upon the peripheries of the wheels. The wheel upon the driving shaft is provided with a clutch ring connected to the operating lever mentioned above, for varying the moment of producing the spark, so that when the operating lever is moved the wheel will be made to slide along the shaft in one direction or the other.

The operation of this device is as follows:—

When the operating lever is moved the bent lever is made to turn upon its pivot so that it slides through the sleeve on the bell-crank lever at the same time displacing the bell-crank lever which in turn operates the rod which engages the cam for separating the sparking points. At the same moment the wheel of the magneto-machine upon the driving shaft is made to slide along its shaft so that it moves relatively to the wheel on the magento-machine and this movement causes the position of the wheel of the magneto-machine to be altered relatively to the driving shaft owing to the teeth on the periphery of each wheel being cut obliquely as described. The movement of the wheel on the magneto-machine will obviously cause the position of the armature relatively to the field-magnet and driving shaft to be varied, and this movement may be so calculated that it shall be always in the best position relatively to the field-magnets for producing the most efficient spark at whatever time the spark is made to occur. If preferred in place of cutting the teeth upon the magneto-machine wheels obliquely ordinary toothed wheels may be used, the wheel upon the driving shaft being made to engage a spiral key-way so that when shifted longitudinally upon the shaft it will revolve about the latter causing the position of the armature to be changed as before.

In the accompanying drawings,

Figure 1 is an elevation in part section of an ignition device constructed according to one method of carrying out this invention;

Figure 2 is an elevation in part section of the same device viewed from the left of Figure 1;

Figure 3 is a plan of the mechanism in part section; and

Figure 4 is a plan of a modified construction of ignition device;

Like letters indicate like parts throughout the drawings.

On a driving shaft a is mounted a cam b adapted to strike the end c of a rod d connected to a sparking device of known construction. The sparking device is made to operate earlier and later relatively to the position of the cam b by swinging the end of the rod d nearer to or further from the cam.

The mechanism for swinging the rod d comprises a rock shaft e carrying an arm f operatively connected by a rod g to one end of a bent lever or arm h. The free end of the lever h is pivotted at h^1 to any convenient support. Free to slide upon the arm h is a sleeve i pivotted to one arm of a bell-crank lever k. The bell-crank lever k is in turn pivotted at k^1 to a convenient support and its other arm connected by a link l with the end c of the rod d.

The rock-shaft e also carries an arm m connected by a rod n to one of a lever o. The lever o is pivotted at o^1 to the frame of the mechanism and engages a clutch ring o^2 free to slide upon the driving shaft a. The clutch ring o^2 is secured to the boss of a toothed wheel p which gears with a second toothed wheel q mounted on the shaft of an armature r forming part of a magneto-machine. The teeth on the wheels p q are set obliquely on the peripheries of

the wheels and the wheel q is made considerably wider than the wheel p so that the latter may slide with the clutch ring o^2 upon the shaft a without becoming disengaged from the armature wheel.

The operation of this mechanism is as follows:—

If the rock-shaft e is partially rotated in the direction of the arrow, Figure 2, the lever h will be swung about its pivot h^1 by the rod g and will slide through the sleeve i. As the arm slides through the sleeve i the shape of the arm causes the sleeve to be lowered so that that end of the bell-crank lever k to which the sleeve is pivotted is depressed. This movement of the bell-crank lever draws the end c of the rod d further to the left of the cam b so that the cam will strike the end of the rod before arriving at a position strictly vertical to its shaft, causing the spark to take place earlier than when the parts are in the position shown in the drawings.

The same movement of the rock-shaft e causes the wheel p to slide upon the shaft a by means of the arm m, rod n, and lever o. This movement of the wheel p causes the armature r to advance relatively to the shaft a, the amount the armature is advanced depending upon the angle at which the teeth of the wheels are set and the degree of axial movement imparted to the wheel p. It will thus be seen that whenever the sparking is arranged to take place earlier or later the armature will correspondingly be set forwards or backwards relatively to the driving shaft a and that by proportioning the parts which give this additional movement to the armature, the armature may be arranged to be always in the position best adapted for producing a spark at the moment the sparking points are separated.

In the modified construction of ignition device illustrated in Figure 4 the wheels p, q are provided with the usual spur teeth and the adjustment of the armature is obtained by means of a spiral key-way a^1 on the shaft a. The wheel p is provided with a feather to engage the key-way and as the wheel is moved in a longitudinal direction upon the shaft a the key-way advances or sets the wheel back relatively to the shaft. It will thus be seen that the key-way effects the same purpose as the oblique teeth with which the wheels p q are provided according to the construction first described and that by advancing or setting back the wheel p the armature r also is advanced or set back relatively to the moment at which the sparking points are separated.

It will be understood that this invention is not limited to the above described methods for carrying it out as many modifications may be introduced in the mechanism for advancing or retarding the moment of ignition and simultaneously altering the position of the magneto-machine armature.

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

1. In an electric ignition device for an explosion engine varying the moment of sparking and correspondingly shifting the relative position of the armature of the magneto or other electric generator substantially as and for the purpose described.

2. In an electric-igntion device for an explosion engine the combination with mechanism for varying the moment of sparking of mechanism for correspondingly shifting the relative position of the armature of the magneto or other electric generator and means for controlling both mechanisms simultaneously substantially as and for the purpose described.

3. In an electric ignition device for an explosion engine the combination with a wheel q secured to the shaft of an armature r of oblique teeth on the wheel, a second wheel p carried by a driving shaft, oblique teeth on this wheel gearing with those of the wheel q, and mechanism for moving the wheel p in an axial direction upon the driving shaft substantially as and for the purpose described.

4. In an electric ignition device for an explosion engine the combination with a rock-shaft e of an arm f operatively connected with mechanism for moving the

toothed wheel p upon its driving shaft of a second arm on the rock-shaft operatively connected with an arm h pivotted to the frame, a bell-crank lever for moving the operating rod of the sparking device nearer to or further from its operating cam, and a sleeve such as i pivotted to the bell crank lever and engaging the arm h substantially as and for the purpose described.

5. In an electric ignition device for an explosion engine the combination with a toothed wheel secured to the armature shaft of a second toothed wheel in mesh with the first and free to slide axially upon a driving shaft, a spiral key-way on the shaft, and a feather engaging the key-way and the wheel substantially as and for the purpose described.

6. The complete electric ignition device for an explosion engine substantially as described and illustrated in Figures 1, 2 and 3 or Figure 4 of the accompanying drawings.

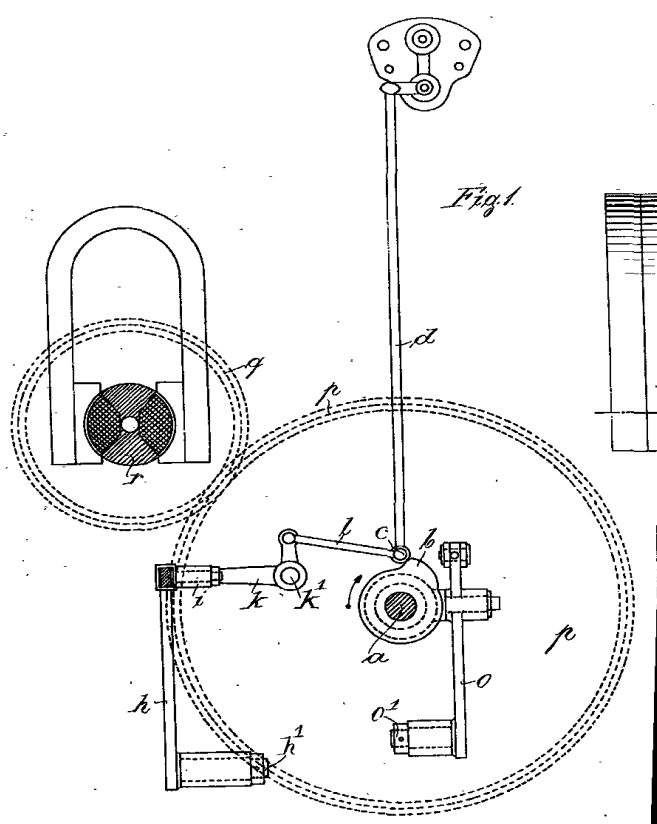
Dated this 14th day of November 1901.

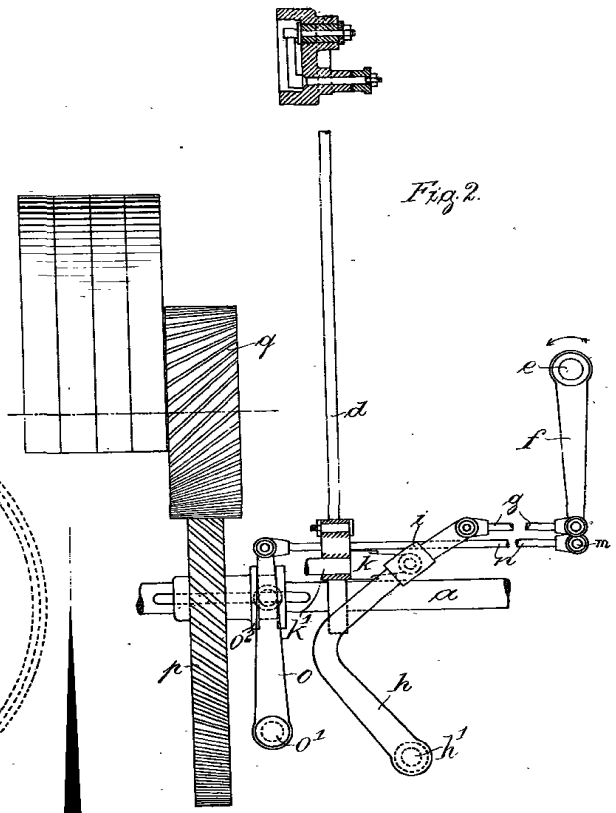
BOULT, WADE & KILBURN,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1902.

A.D. 1901. Feb 14. N° 3234.
MAYBACH'S Complete Specification.

2 SHEETS: SHEET 1





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

Waterlow & Sons, Printers, London

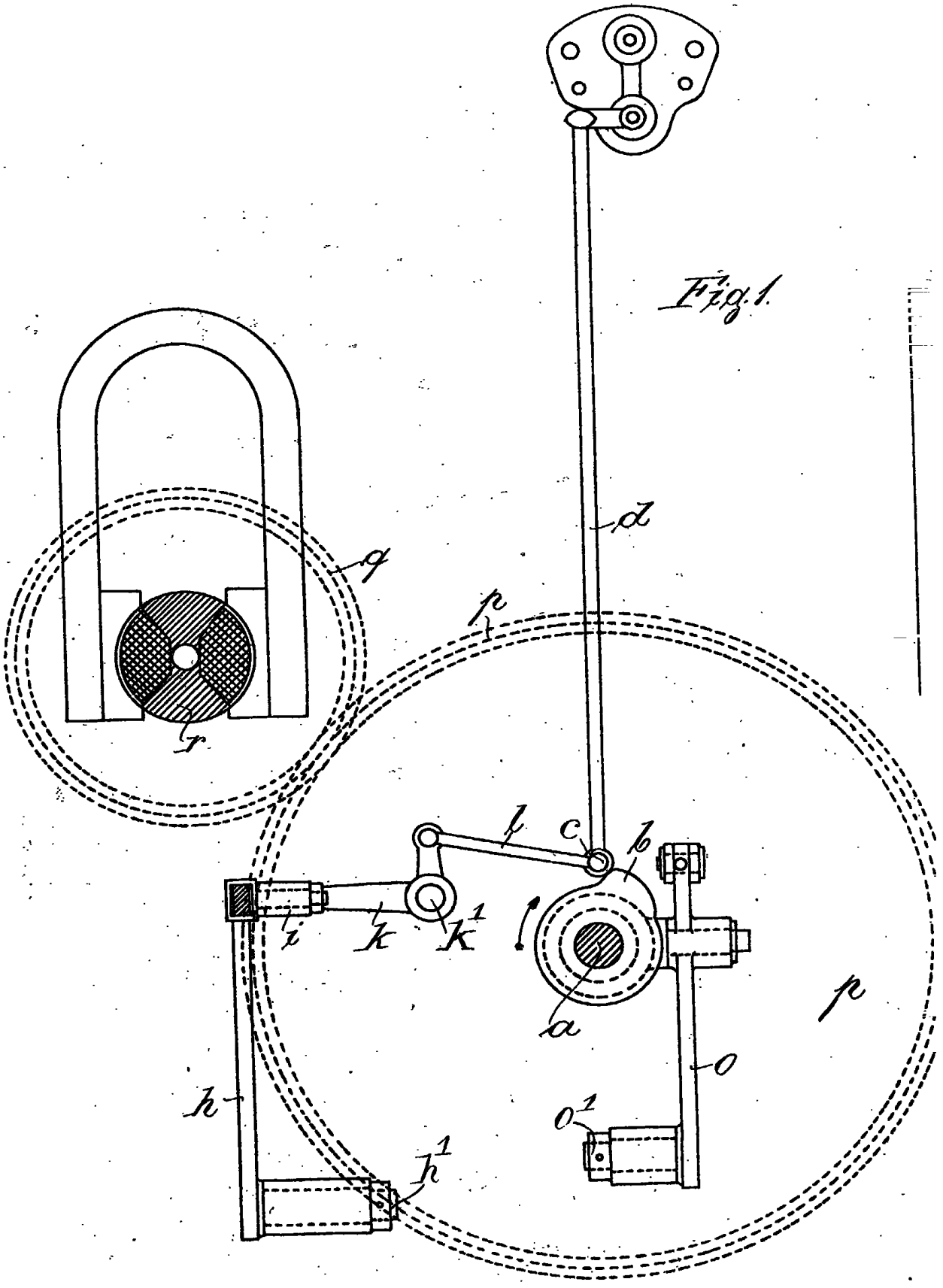


Fig. 1.
d
g
p
f
l
c
b
i
k
k¹
a
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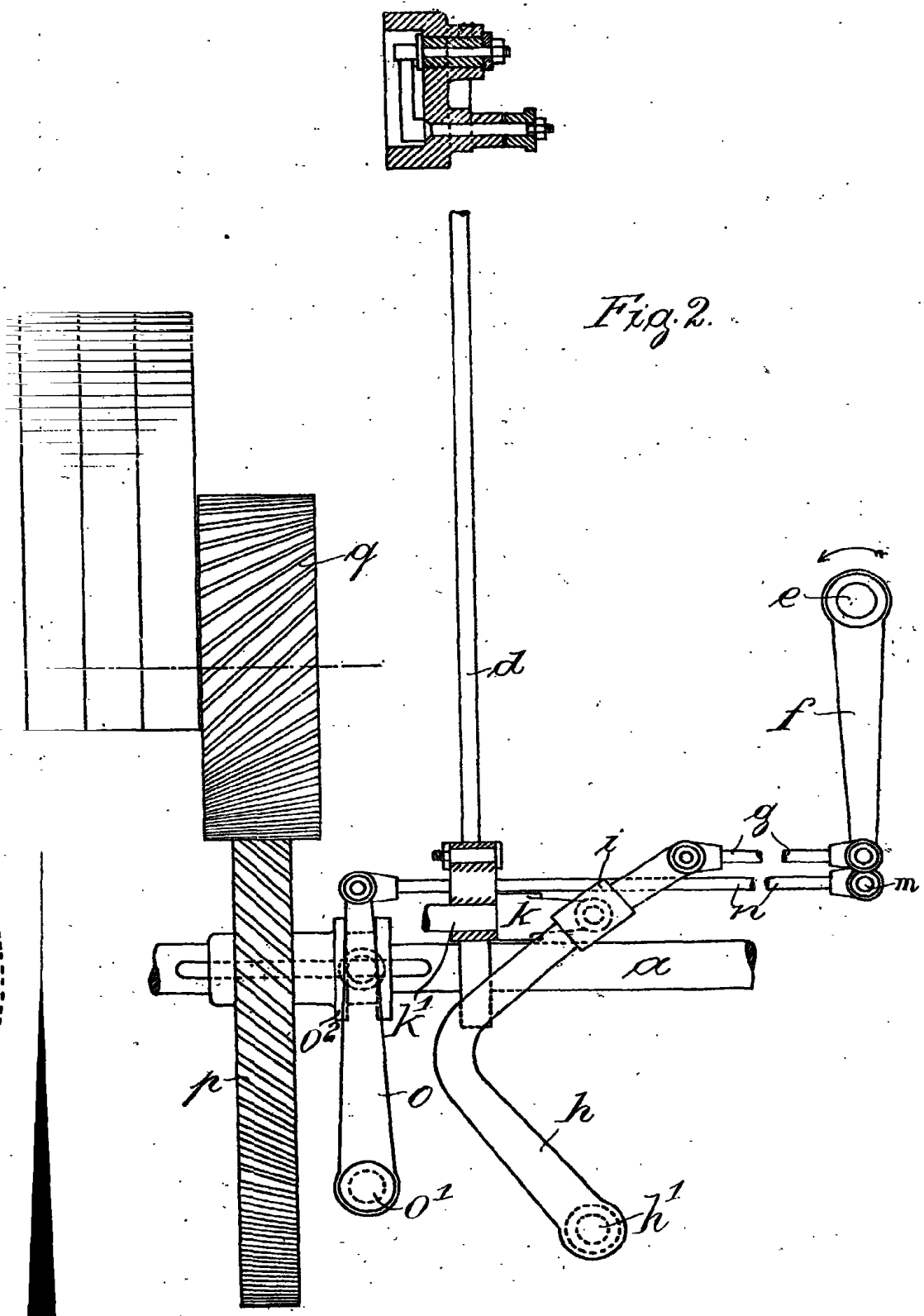

Fig. 2.

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

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A.D. 1901. Feb 14. N° 3234.
MAYBACH'S Complete Specification.

(2 SHEETS)
SHEET 2

Fig. 4

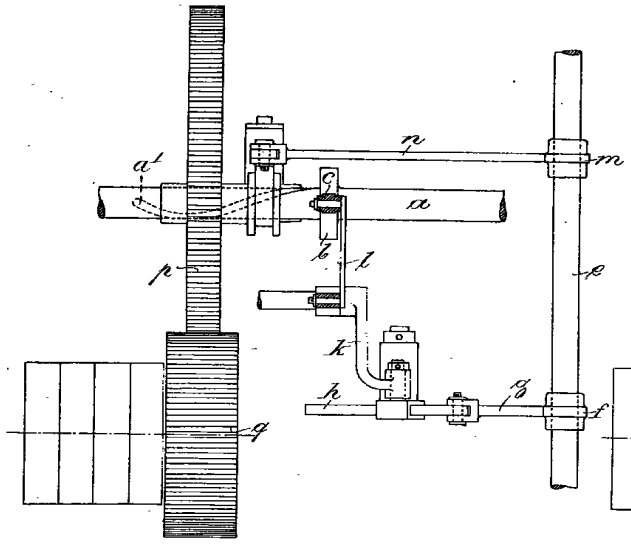

Fig. 3.

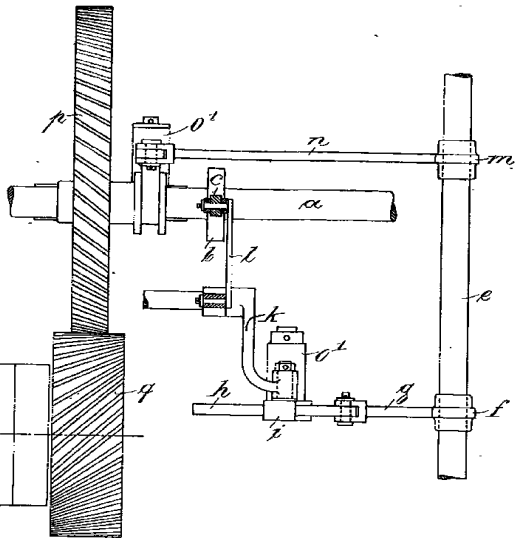

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Fig. 4.

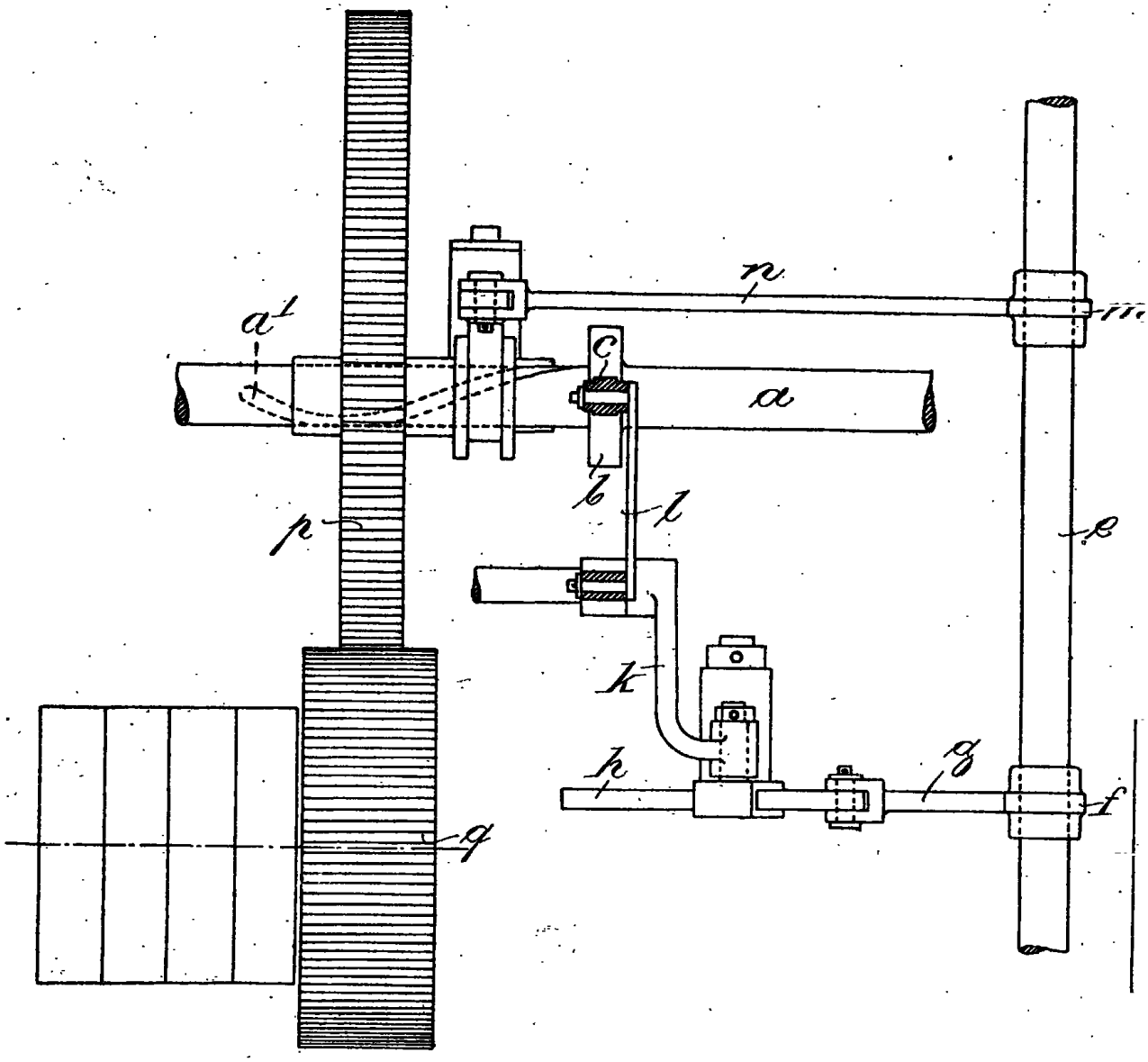
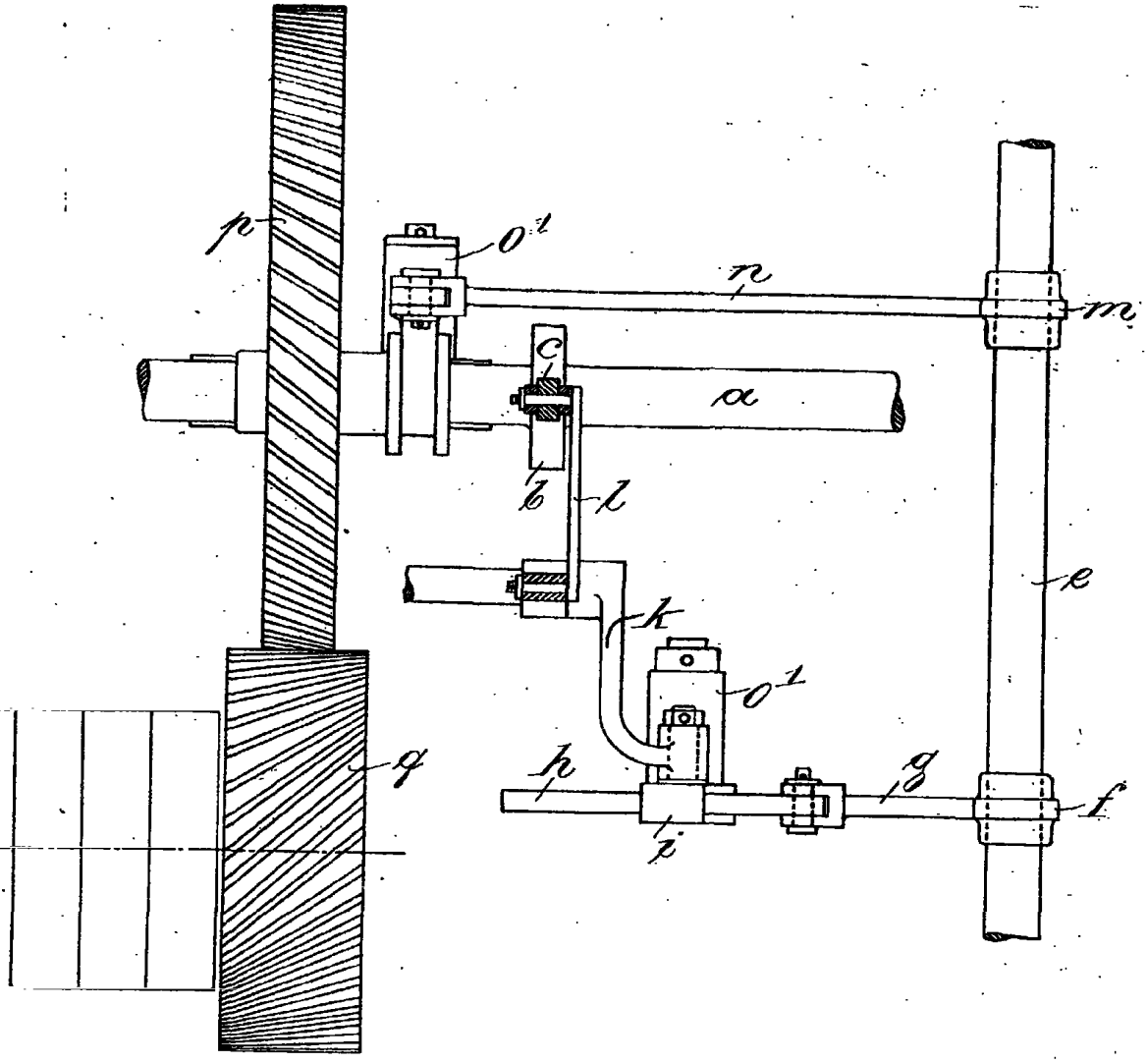


Fig. 3.



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