No. 831,879. PATENTED SEPT. 25, 1906.

J. K. KOONS.

GEARING.

APPLICATION FILED MAR. 16, 1906.

3 SHEETS—SHEET 1.

Fig. 1

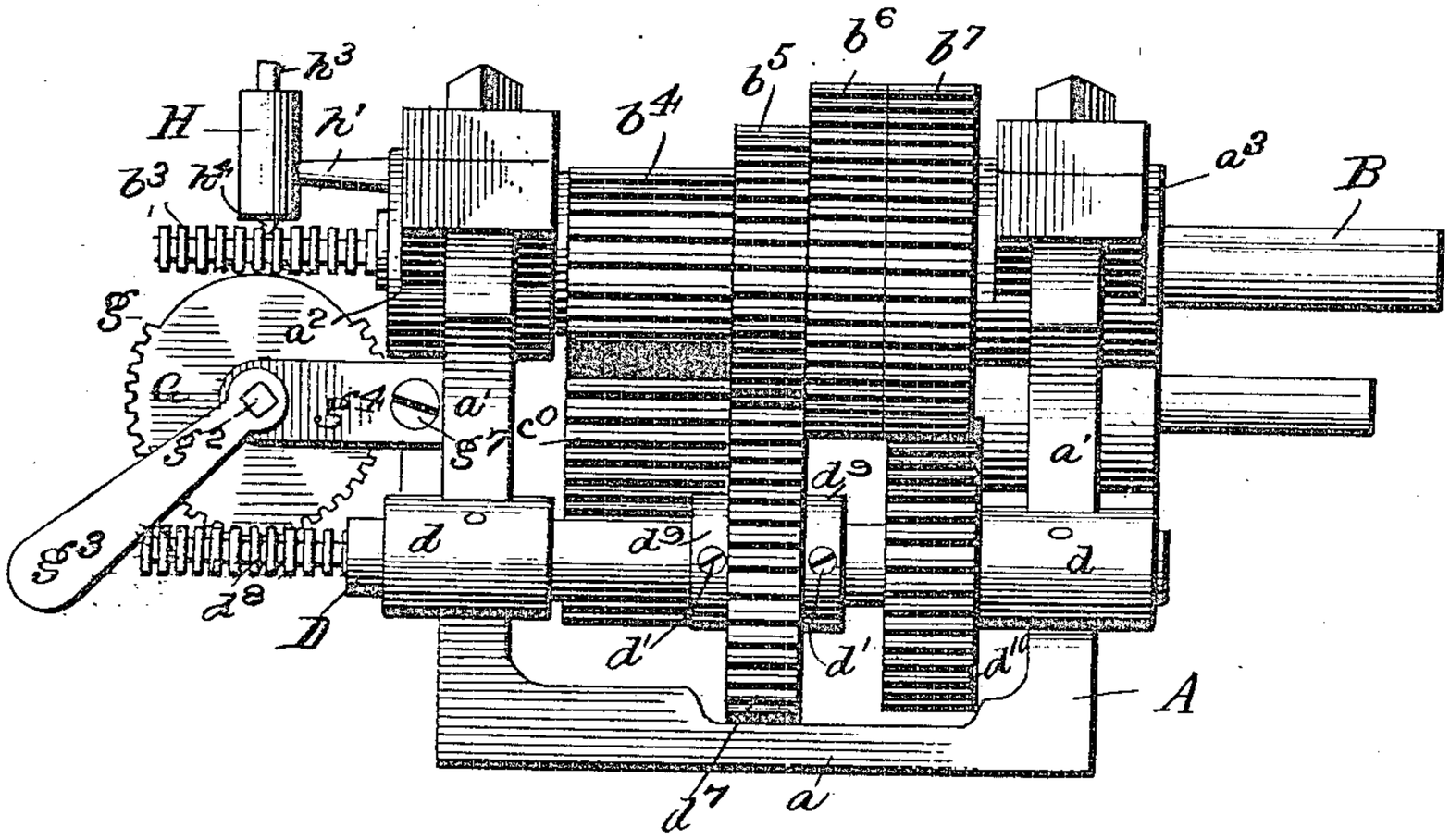
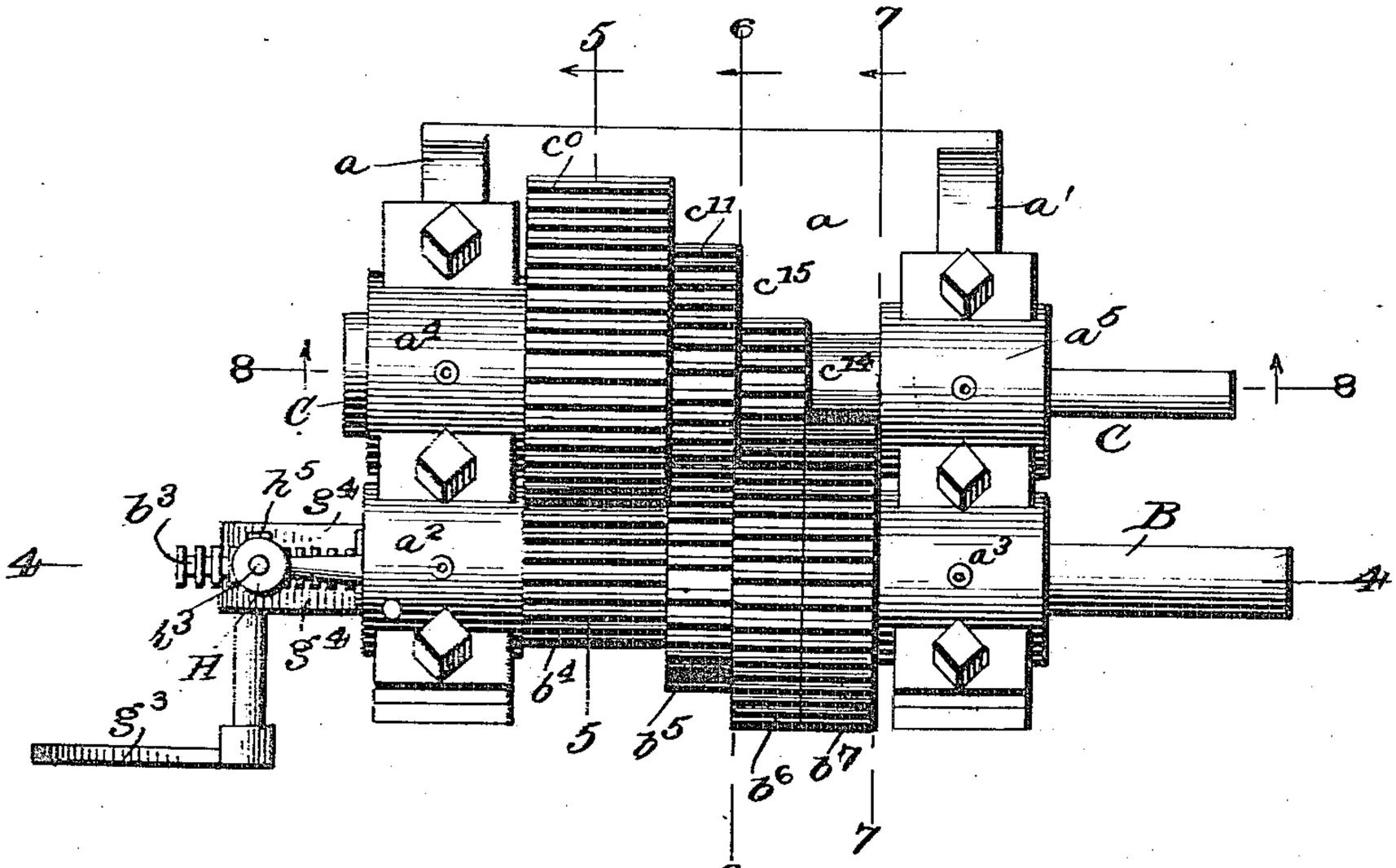


Fig. 2



WITNESSES:

E. C. Duffey

C. E. Tranor

INVENTOR

JOSEPH K. KOONS

BY Munn & Co.

ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 3

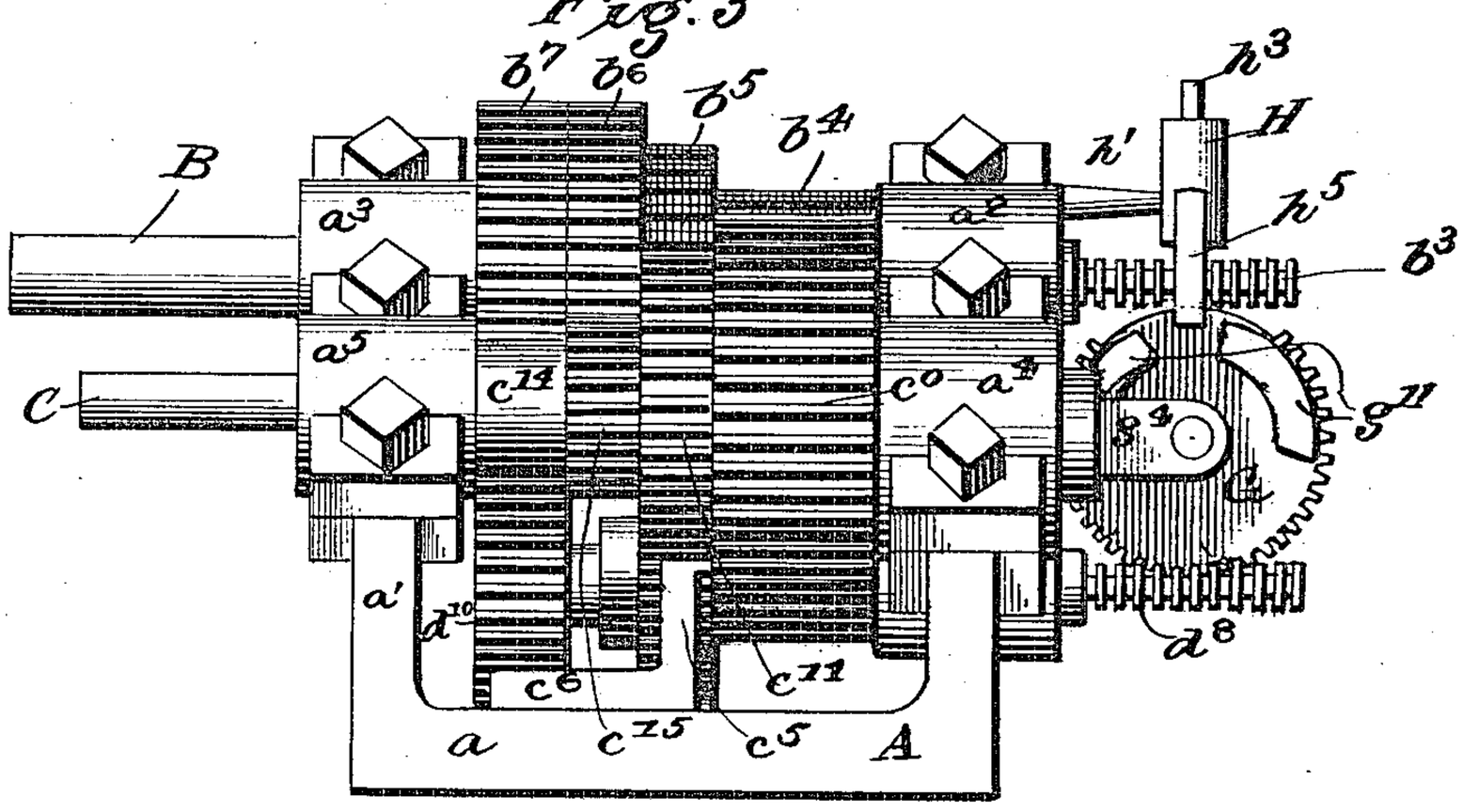
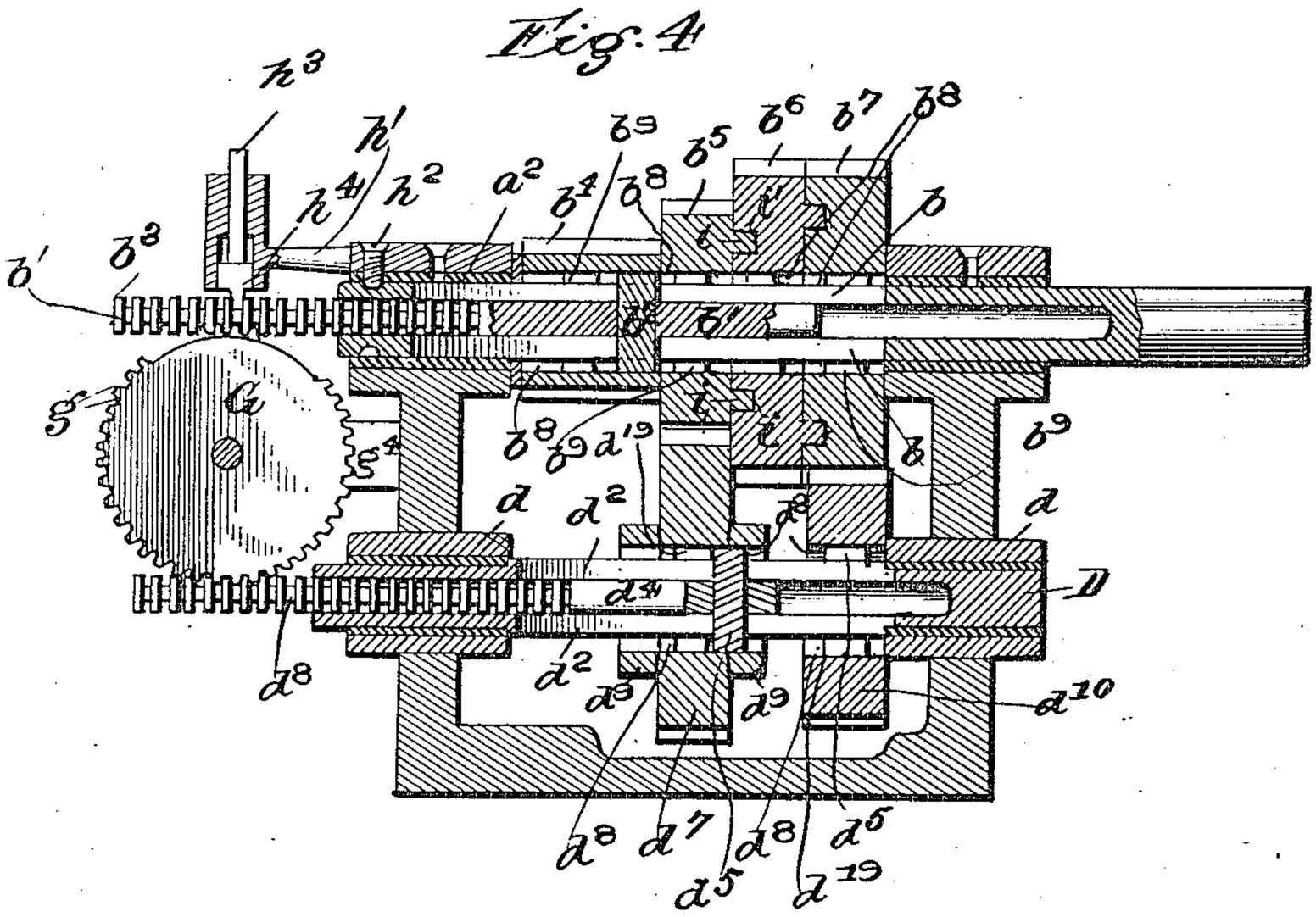


Fig. 4



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C. E. Tranor

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BY Munn & Co.
ATTORNEYS

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3 SHEETS—SHEET 3.

Fig. 5

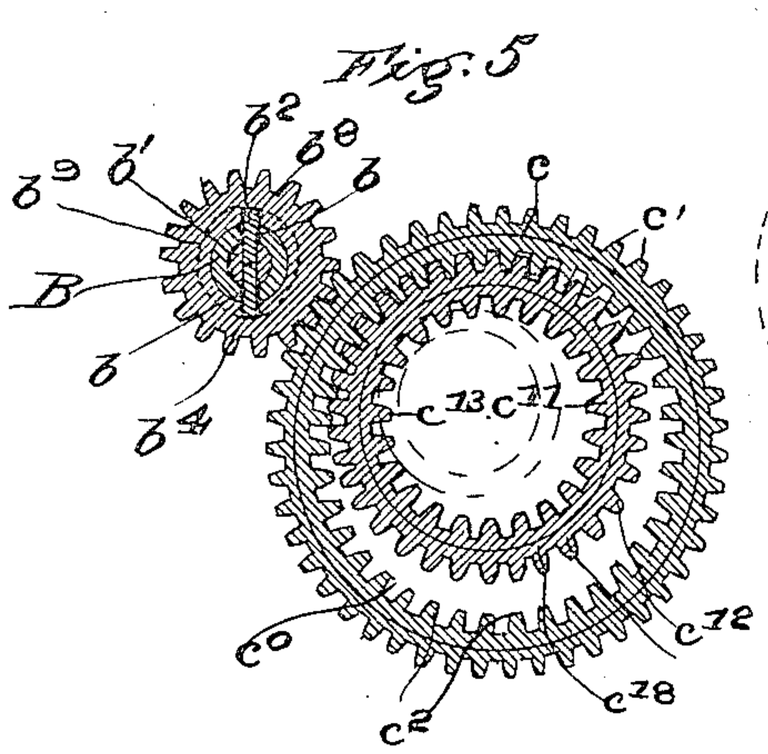


Fig. 6

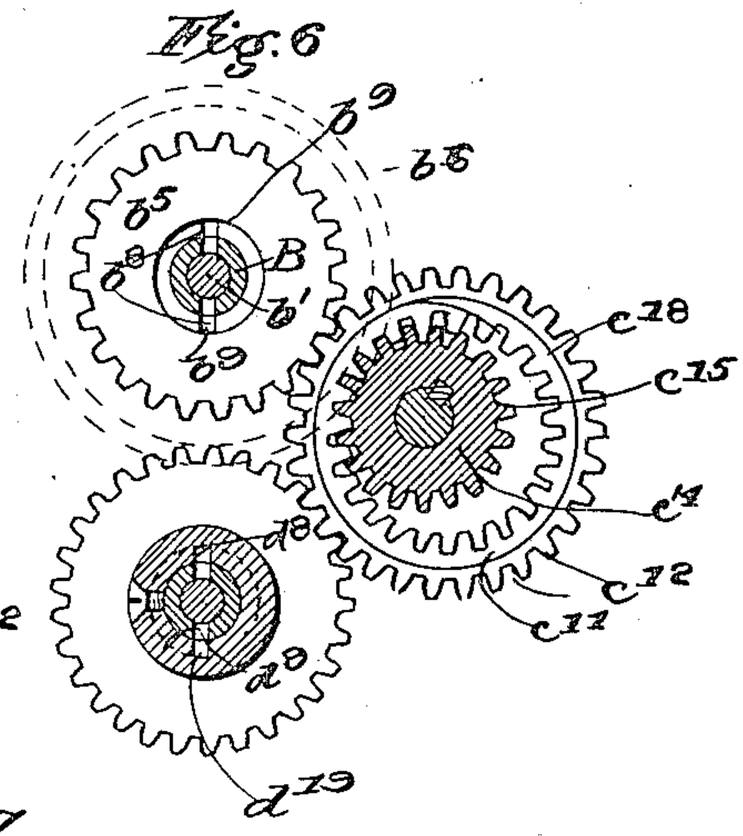


Fig. 7

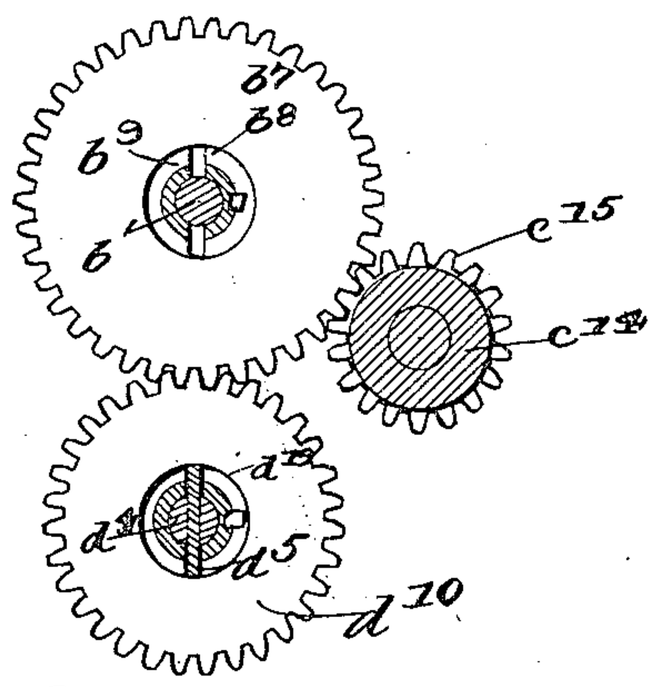
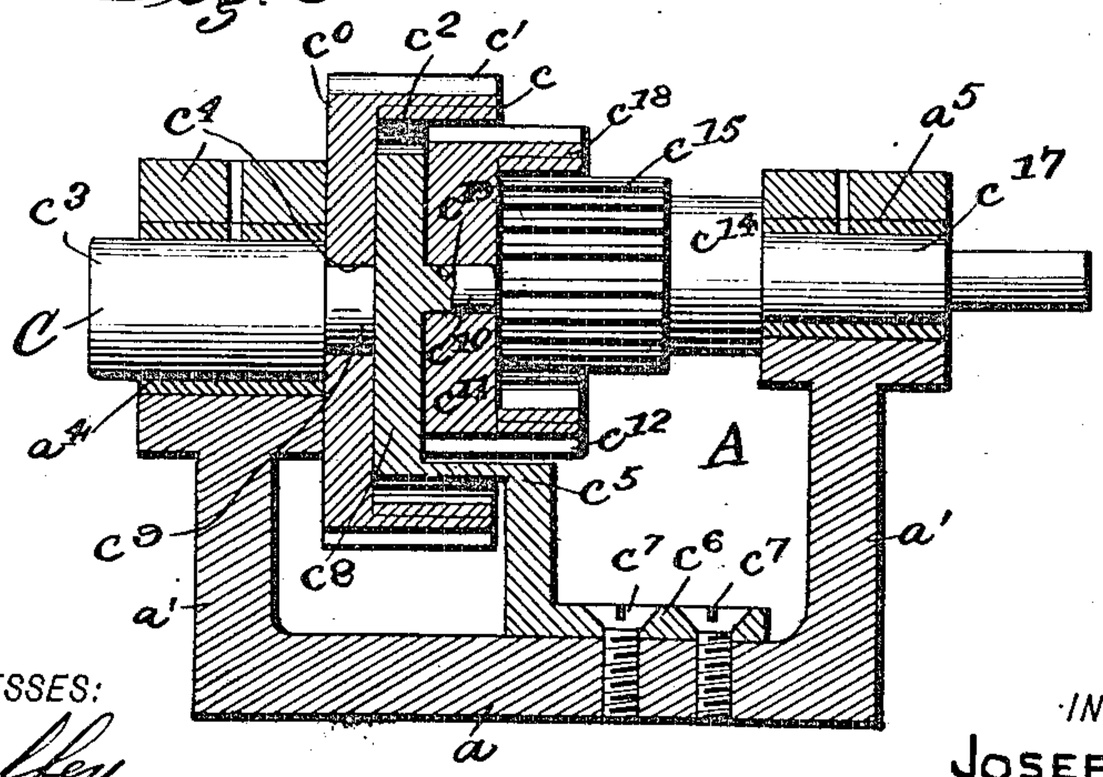


Fig. 8



WITNESSES:

E. C. Duffey

C. E. Frazier

INVENTOR

JOSEPH K. KOONS

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH KENNARD KOONS, OF MONTGOMERY, PENNSYLVANIA.

GEARING.

No. 831,879. Specification of Letters Patent. Patented Sept. 25, 1906.

Application filed March 16, 1906. Serial No. 306,421.

To all whom it may concern:

Be it known that I, JOSEPH KENNARD KOONS, a citizen of the United States, and a resident of Montgomery, in the county of Lycoming and State of Pennsylvania, have made certain new and useful Improvements in Gearing, of which the following is a specification.

My invention is an improvement in gearing; and it consists in certain novel constructions and combinations of parts hereinafter described and claimed.

Referring to the drawings forming a part thereof, Figure 1 is a rear view of my improved gearing. Fig. 2 is a plan view. Fig. 3 is a front view. Fig. 4 is a section on the line 4 4 of Fig. 2. Fig. 5 is a section on the line 5 5 of Fig. 2. Fig. 6 is a section on the line 6 6 of Fig. 2. Fig. 7 is a section on the line 7 7 of Fig. 2, and Fig. 8 is a section on the line 8 8 of the same figure.

In the present embodiment of my invention the gearing is mounted in a bracket A, comprising a base a and upturned sides a', the said sides sloping toward the front and provided with bearings a^2 a^3 a^4 a^5 for the reception of the driving and transmission shafts, respectively.

The driving-shaft B, journaled in the bearings a^2 a^3, is provided with a longitudinal opening having oppositely-arranged parallel slots b communicating therewith. A pin b' is slidably mounted in the opening and is provided with oppositely-disposed lugs or keys b^2, projecting through the slots, the outer end of the pin being provided with a plurality of circular notches b^3 for a purpose to be hereinafter described. The driving-shaft B is provided with a plurality of loose gears, comprising a small gear b^4, a medium gear b^5, and a large gear b^6, and with a fixed gear b^7 of the same diameter as the large gear b^6.

The transmission mechanism C comprises a wheel c^0, having a flange c, provided with external teeth c', meshing with the gear b^4 on the driving-shaft. The flange is also provided with internal teeth c^2, and the wheel is provided with a bearing-pin c^3, resting in the bearing a^4. The inner side of the wheel is provided with a recess c^4 for receiving a pin c^9 upon the body portion c^8 of a bracket c^5, the said bracket having a foot c^6 secured to the base of the mounting-bracket A by the screws c^7. Another pin c^{10} upon the opposite side of the body portion of the bracket from the pin c^9 engages a recess c^{19} at the center of a wheel c^{11}, the said wheel being also provided with a flange c^{18}, having external teeth c^{12}, meshing with the internal teeth c^2 on the flange of the wheel c^0, and with internal teeth c^{13} for a purpose to be hereinafter described. A roller c^{14} is provided with external teeth c^{15}, meshing with the internal teeth of the flange c^{18} and with a bearing-pin c^{17}, resting in the bearing a^5 of the mounting-bracket. The external teeth c^{12} of the wheel c^{11} also mesh with the intermediate gear b^5 upon the driving-shaft, while the teeth c^{15} of the roller c^{14} mesh with the teeth of the large gear b^6, the smooth part of the roller coming opposite the teeth of the fixed gear.

A counter-shaft D is journaled in brackets d, connected with the rear of the frame, the said shaft having a longitudinal opening and being provided with longitudinal oppositely-arranged slots d^2 communicating therewith. A pin d^4 is slidably mounted within the longitudinal opening and is provided with lugs or keys d^5, projecting through the slots, and the outer end of the pin is provided with a plurality of circular recesses or notches d^8 for a purpose to be hereinafter described. Upon the counter-shaft D is secured a fixed gear d^{10}, meshing with the fixed gear of the driving-shaft, and a loose gear d^7, meshing with the external teeth of the wheel c^{11}, forming a part of the transmission mechanism. The loose gear d^7 is prevented from moving longitudinally of the counter-shaft by collars d^9, arranged upon either side thereof and secured to the shaft by the screw d'.

Each of the gears upon the driving-shaft and each of the gears upon the counter-shaft is provided at each end around the opening through which passes the shaft with a circular recess b^8 d^8 and with oppositely-arranged keyways b^9 d^{10}, whereby to permit the passage of the lugs or keys on the pins b' d^4.

The recesses of two adjacent gears coact to form a passage sufficient to permit the rotation of the keys or lugs upon the pins between the gears without engaging them. The provision of the recess prevents the simultaneous engagement of any two gears upon the same shaft.

A wheel G, provided on a part of its periphery with teeth g for engaging the circular notches of the pins b' d^4, is journaled in brackets g^4, connected to the mounting by a screw g^7, and is provided at one end with a square portion g^2 for engagement by a wrench g^3.

It will be evident from the description that when the wheel G is rotated in either direction one of the pins will be moved inwardly and the other will be moved outwardly.

For the purpose of locking the pin b' to prevent movement thereof I provide a casing H integral with an arm h', secured to the mounting by screws h^2 and provided with a pin h^3, slidably mounted therein, the pin having a tooth h^4 for engaging one of the circular recesses or notches and a handle h^5 for manipulating the pin. Upon the face of the wheel G are arranged a plurality of cams g^{11}, adapted to engage the handle h^5 for retaining the pin h^3 in such position that the tooth h^4 will be out of contact with the notches b^3 of the pin b'.

From an inspection of Fig. 4 it will be seen that when the key d^5 upon the pin d^4 is just entering into locking engagement with the loose gear d^7 upon the counter-shaft D the teeth of the gear-wheel G are disengaged from the pin b' and the cams g^{11} are in such position, Fig. 3, that the handle h^5 of the pin h^3 will drop therebetween, thus automatically locking the pin b' and preventing further movement of the same until the key again disengages the loose gear from the shaft. When the loose gear d^7 is locked to the counter-shaft, it is impossible to connect any of the loose gears with the driving-shaft; but when said loose gear d^7 is disconnected the driving-shaft may be connected with any of its loose gears. The locking-pin h^3 is retained out of engagement with the pin b^3 at all times, except when the counter-shaft is connected with its loose gear.

By properly manipulating the wheel G any of the gears b^4 b^5 b^6 may be connected with the driving-shaft, or all of the loose gears may be disconnected from the driving-shaft and the loose gear connected with the counter-shaft whereby to reverse the direction of rotation of the transmission mechanism.

The peculiar construction of the transmission mechanism permits of a sharper graduation of the ratio between the differential gears and at the same time provides a certain amount of flexibility in the connection between said shaft and the driving-shaft, while the arrangement of the pins bearing the keys absolutely prevents the simultaneous coupling of the counter-shaft and the driving-shaft to the transmission mechanism.

In Fig. 4 the loose gears on the driving-shaft are shown as provided with ribs i, fitting into grooves i' on the adjacent gear, whereby to strengthen said gears.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In mechanism of the class described, and in combination, a driving-shaft, a fixed gear and a plurality of loose gears of different diameters on the driving-shaft, a transmission mechanism comprising a plurality of wheels of different diameters having flanges provided with internal and external teeth, the internal teeth of the flange on one wheel meshing with the external teeth on the flange of the preceding wheel, and the external teeth on the flanges of each wheel meshing with a loose gear on the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with the external teeth on one of the wheels of the transmission mechanism, a device for connecting any of the loose gears on the driving-shaft to said shaft, a device for connecting the loose gear and the counter-shaft, and a connection between said connecting devices whereby the connection of any of the loose gears to the driving-shaft will release the loose gear from the counter-shaft.

2. In mechanism of the class described, and in combination, a driving-shaft, a plurality of gears having different diameters loosely mounted thereon, means for connecting any of said gears to the shaft, a fixed gear on said shaft, a transmission mechanism, comprising gears of different diameters meshing with the loose gears of the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with a gear of the transmission mechanism, and means for simultaneously connecting said loose gear with the counter-shaft and for releasing the loose gears from the driving-shaft, whereby to reverse the motion of the transmission mechanism.

3. In mechanism of the class described and in combination, a driving-shaft, a fixed gear and a plurality of loose gears of different diameters on the driving-shaft, a transmission mechanism comprising a plurality of gears of different diameters meshing with the loose gears of the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with a gear of the transmission mechanism, connecting devices for connecting the loose gears with their respective shafts, and means whereby the connecting of any of the loose gears with the driving-shaft will disconnect the loose gear and counter-shaft.

4. In mechanism of the class described and in combination, a driving-shaft, a fixed gear and a plurality of loose gears on the driving-ing-shaft, a transmission mechanism comprising gears meshing with the loose gears of the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with one of the gears of the transmission mechanism, means for connecting and disconnecting any one of

the loose gears with the driving-shaft, means for connecting and disconnecting the loose gear with the counter-shaft, and a connection between said connecting means whereby to prevent the simultaneous connection of any of the loose gears on the driving-shaft and the loose gear on the counter-shaft.

5. In mechanism of the class described and in combination, a driving-shaft, a fixed gear and a plurality of loose gears of different diameters on the driving-shaft, a transmission mechanism comprising a plurality of gears of different diameters meshing with the loose gears of the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with a gear of the transmission mechanism, connecting devices for connecting the loose gears with their respective shafts, and means for preventing simultaneous connection of any of the loose gears.

6. In apparatus of the class described and in combination, transmission mechanism comprising a plurality of gears, a driving-shaft, a plurality of loose gears and a fixed gear on the driving-shaft, means for connecting any of the loose gears with said driving-shaft, a counter-shaft and a fixed gear on the counter-shaft meshing with the fixed gear on the driving-shaft, a loose gear on the counter-shaft meshing with a gear of the transmission mechanism, means for connecting said gear with the counter-shaft, means for operating both of said connecting means, and means for locking said first-named means in inactive position during the operation of the second means.

7. In apparatus of the class described and in combination, a driving-shaft, a transmission mechanism, and a counter-shaft normally driven by the driving-shaft, means for connecting the driving-shaft to the transmission mechanism, independent means for connecting the counter-shaft to the transmission mechanism, a single means for operating both of said connecting means, and intermediate devices between said connecting means whereby when the driving-shaft is connected with the counter-shaft the connecting means for connecting the driving-shaft and transmission mechanism is locked in inoperative position.

8. In apparatus of the class described and in combination, a driving-shaft, a transmission mechanism, and a counter-shaft normally driven by the driving-shaft, means for connecting the driving-shaft to the transmission mechanism, means for connecting the counter-shaft to the transmission mechanism, and automatic means for locking said first-named means in inactive position during the operation of said last-named means.

9. In mechanism of the class described and in combination, a driving-shaft, a fixed gear and a plurality of loose gears of different diameters on the driving-shaft, said gears being provided with an annular rib engaging an annular groove on the adjacent gear, a transmission mechanism comprising a plurality of gears of different diameters meshing with the loose gears of the driving-shaft, a counter-shaft, a fixed gear on the counter-shaft meshing with the fixed gear of the driving-shaft, a loose gear on the counter-shaft meshing with a gear of the transmission mechanism, connecting devices for connecting the loose gears with their respective shafts, and means for preventing the simultaneous connection of any of the loose gears.

JOSEPH KENNARD KOONS.

Witnesses:
P. F. HARTRANFT,
H. JUSTIN WYNN.