No. 841,362. PATENTED JAN. 15, 1907.

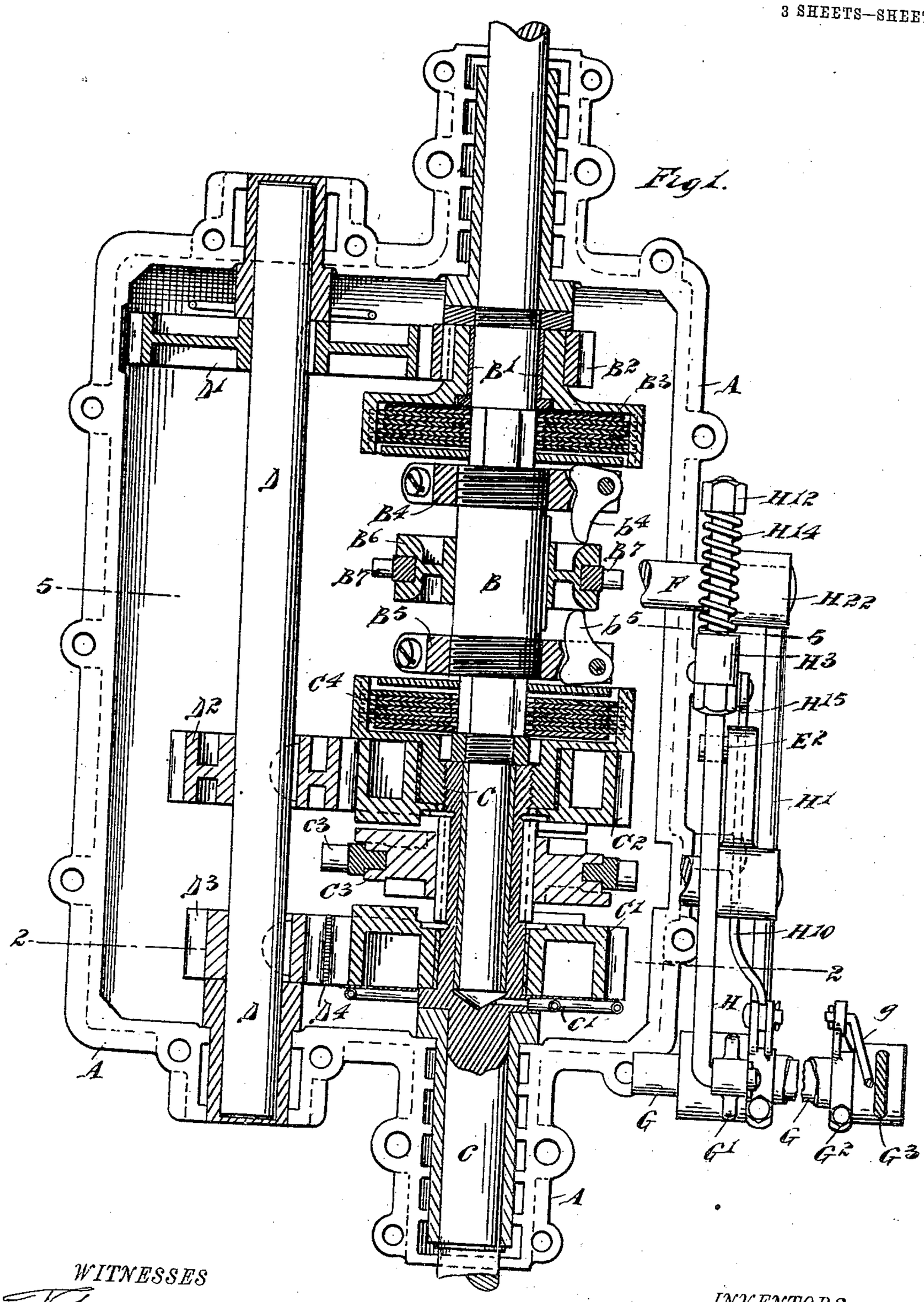
A. R. & F. S. WELCH.

LEVER MECHANISM.

APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 1.

Fig 1.



WITNESSES

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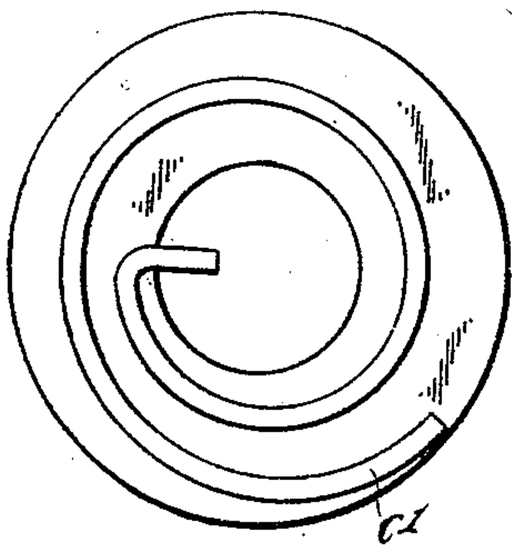
3 SHEETS—SHEET 2.

Fig. 7.



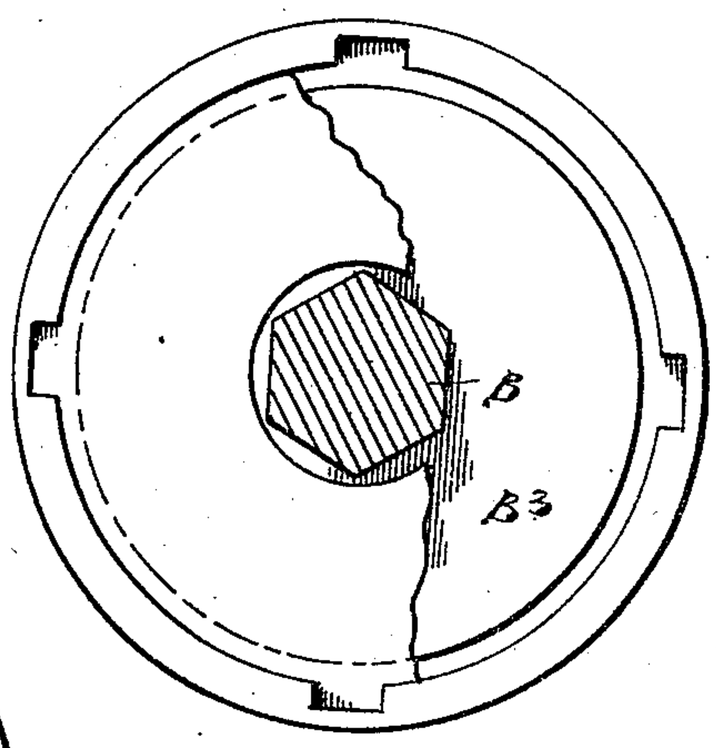


Fig 4.

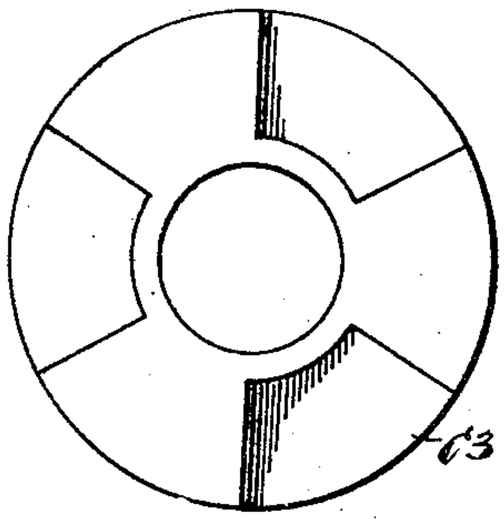


Fig 3.

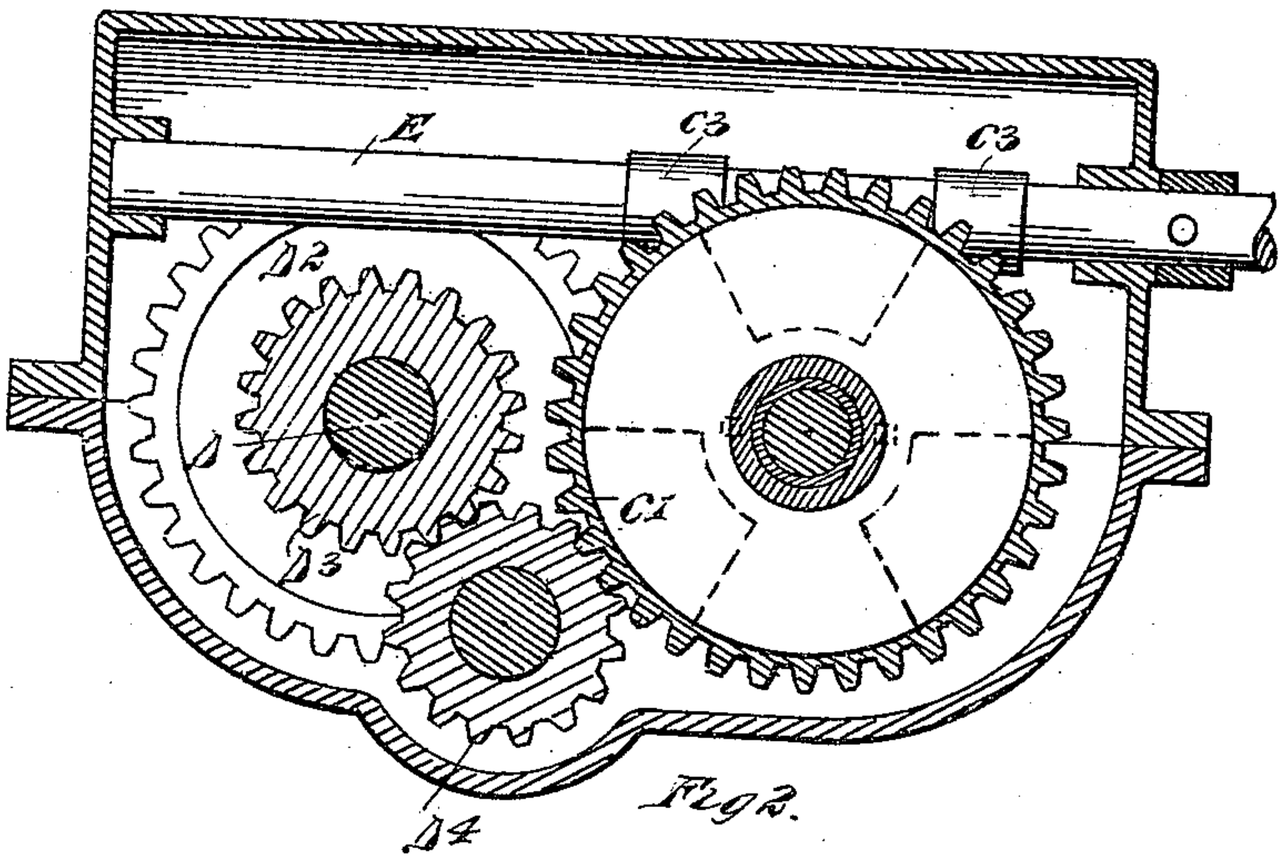


Fig 2.

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3 SHEETS—SHEET 3.

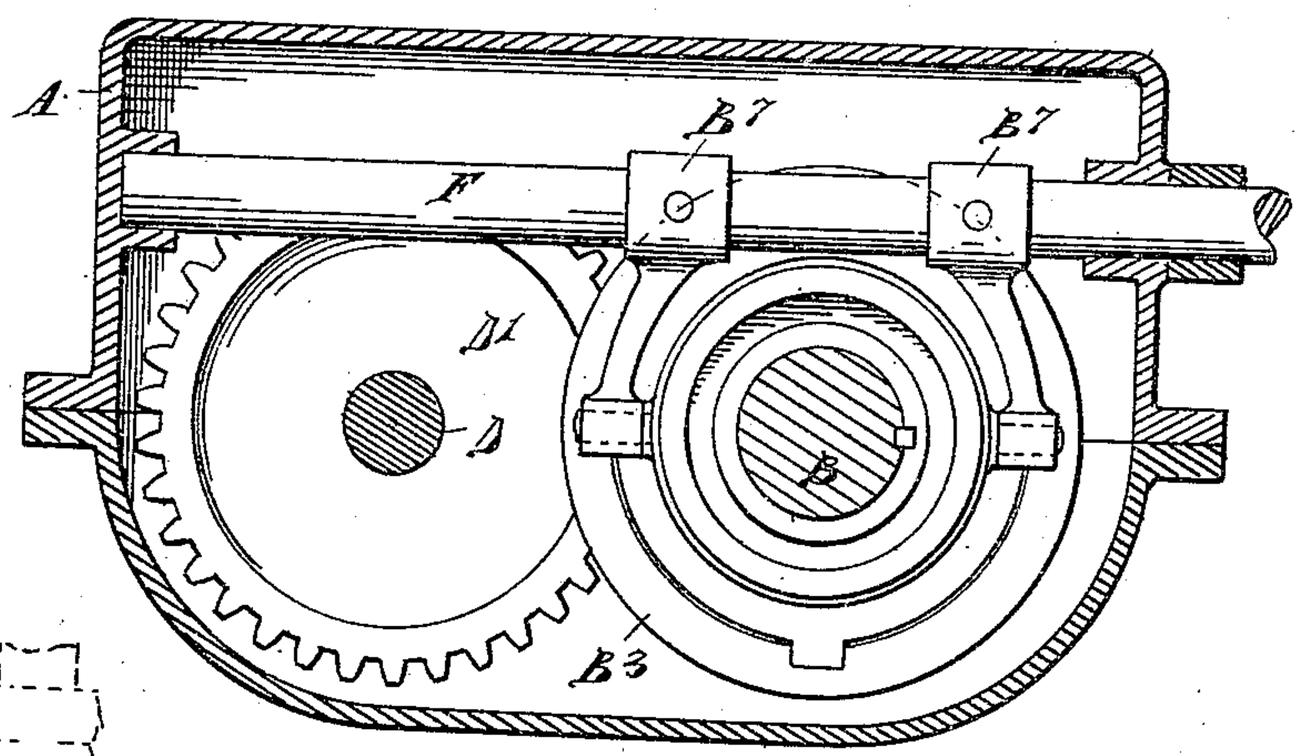

Fig 5.

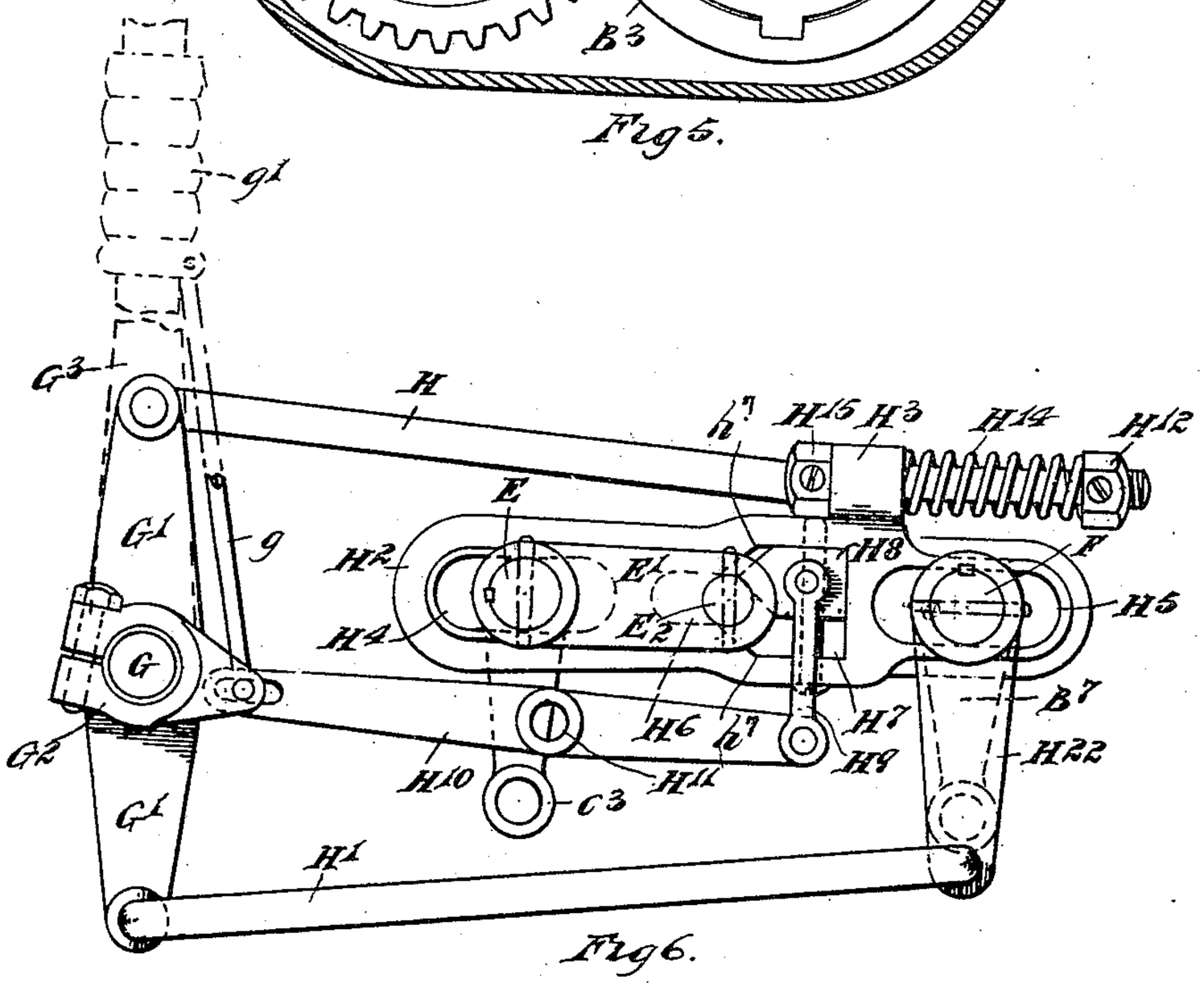

Fig 6.

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ALLIE R. WELCH AND FRED STIMSON WELCH, OF PONTIAC, MICHIGAN.

LEVER MECHANISM.

No. 841,362. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed June 5, 1905. Serial No. 263,723.

To all whom it may concern:

Be it known that we, ALLIE RAY WELCH and FRED STIMSON WELCH, both citizens of the United States, residing at Pontiac, county of Oakland, State of Michigan, have invented a certain new and useful Improvement in Lever Mechanism; and we 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to lever mechanism for change-speed gears for automobiles; and it consists in the improvements hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a plan view of the gear-casing and a gear embodying our invention therein, the latter being shown in section, the upper part of the gear-casing being removed. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is an elevation of one of the clutch-surfaces hereinafter described. Fig. 4 is an elevation showing the construction of the frictional clutch used. Fig. 5 is a section on the line 5 5 of Fig. 1. Fig. 6 is a side elevation of the operating-levers and connecting-rods which shift the gearing to obtain the different speeds. Fig. 7 is an elevation of one face of the gear-wheel C′, illustrating the connection of the spiral tube *c′* therewith.

A is the gear-casing, B is the driving-shaft, C is the driven shaft, and D is a counter-shaft. The shafts B and C are axially in line with each other and are telescoped together at the end.

B′ is a sleeve normally adapted to rotate upon the shaft B.

B^2 is a gear-wheel keyed upon the sleeve B′.

B^3 is a friction-clutch adapted to engage the sleeve B′ with the shaft B.

B^4 is a ring secured upon the shaft B adjacent to the clutch B^3.

B^5 is a ring secured upon the shaft B adjacent to the clutch C^4, hereinafter described.

B^6 is a ring secured upon the shaft B, so as to move longitudinally thereof, but restrained from turning with reference thereto. The inner surfaces of the rim of the ring B^6 are shaped to form cams.

b^4 is one of the three bell-crank levers pivoted upon the ring B^4 and adapted to operate the clutch B^3.

b^5 is one of three bell-crank levers pivoted upon the ring B^5 and adapted to operate the clutch C^4. Said bell-crank levers have arms extending horizontally and are so constructed and pivoted that centrifugal force shall tend to draw them away from the clutch-disks.

The ring B^6 acts upon said bell-crank lever b^4 when moved in a direction to operate one of said clutches and upon the other of said bell-crank levers when moved in the other direction to operate the other of said clutches, and for this purpose it is provided with an internal annular cone surface adapted to pass outside of and contact said horizontal arm.

C′ is a gear-wheel revoluble upon the shaft C and having its inner face formed with engaging teeth.

c′ is a spiral tube the inner end of which communicates with an aperture leading to the joint between the shafts B and C. The outer end of said spiral tube is adapted to swing into the oil contained in the casing and take up a portion of said oil and convey it to the joint in the well-understood manner.

C^2 is a gear-wheel normally adapted to rotate upon the shaft C and having its inner face provided with clutching teeth or projections of the form indicated in Fig. 3.

C^3 is a disk keyed upon the shaft C, but adapted to slide longitudinally thereof, and provided with clutch teeth on both of its surfaces.

c^3 is a forked lever engaging the disk C^3 and adapted to move it longitudinally of the shaft C. When the disk C is moved up toward the gear-wheel C^2, said gear-wheel is locked to the shaft C, and when said disk is moved in the other direction the gear-wheel C′ is locked to said shaft. The clutches are of the multiple-disk friction type, the disks being fitted upon a non-round portion of the shaft and having projections at their outer ends adapted to fit into grooves in the inner side of the flange of the casing, as indicated most distinctly in Fig. 4.

G is a shaft adapted to turn in a bearing upon the casing A.

G′ is a double-armed lever secured to the shaft G.

G^2 is a lever-arm upon the shaft G and adapted to turn relative thereto.

G^3 is a lever by which the shaft G may be turned by the hand of the operator.

g is a connecting-rod pivoted to the end of

the lever G^2 and to a ring g', adapted to slide upon the lever G^3.

The lever-arm G^2 may be set to different angular positions by adjusting the ring g' to different positions along the lever-arm G^3.

H′ is a connecting-rod pivoted at the end of the lower arm of the two-armed lever G′ and to a crank H^{22}, secured to the outer end of the shaft F, which has secured to it the arm B^7, which actuates the ring B^6. (See Figs. 1 and 5.)

E is a shaft pivoted in the casing A and having an arm c^3 attached thereto, which operates the disk C^3.

H^2 is a link having a slot H^4, through which passes the shaft E, and a slot H^5, through which passes the shaft F. The link H^2 is adapted to slide longitudinally upon the shafts E and F, being guided by the walls of the slots H^4 and H^5.

E′ is a crank upon the end of the shaft E and having in its end remote from said shaft the pin E^2.

H^6 is a slot in the link H^2, adapted to slide over the pin E^2 without altering the angular positions of the lever E′.

H^7 is an enlargement of the slot H^6, having walls h^7 branching out at an angle from the walls of the slot H^6.

H^8 is a block adapted to slide vertically in the enlargement H^7 of the slot H^6. The end of the block H^8 which is toward the shaft E is shaped to have sides or walls parallel to the wall h^7. When the block H^8 is at the top of the enlargement H^7, as indicated at Fig. 6, a wall of said block and one of the walls h^7 form together a downwardly-extending prolongation of the slot H^6. When said block is at the bottom of said enlargement, the corresponding walls form an upwardly-extending prolongation of the slot H^6.

H^{10} is a lever pivoted at H^{11} and connected with the block H^8 at one end by a connecting rod or link H^9. At the other end the lever H^{10} is connected to one end of the lever-arm G^2. When the lever-arm G^2 is at its lowest position, the block H^8 is at its upper position, and when said ring is at its upper position the block H^8 is at its lower position. At an intermediate position the block H^8 will be midway in its travel and will prevent the pin E^2 from moving out of the slot H^6.

H is a connecting-rod pivoted to the upper end of the lever G′, passing through a lug H^3 and provided with a nut H^{12} at its outer end and spring H^{14} between said lug and said nut.

H^{15} is a nut upon the connecting-rod H, which limits the movement of the connecting-rod through the lug H^3 in a direction away from the lever G′.

D′ is a gear-wheel upon the counter-shaft D, the teeth of which mesh with the gear-wheel B^2 on the sleeve B′ of the shaft B.

D^2 is a gear-wheel, smaller than D′, upon the counter-shaft D, the teeth of which mesh with the teeth of the gear-wheel C^2 upon the shaft C.

D^3 is a gear-wheel keyed upon the counter-shaft D and engaging, through a gear-wheel D^4, Fig. 2, with the gear-wheel C′.

The operation of the above-described device is as follows: If the lever G^3 is turned toward the right, as shown in Fig. 6, the crank-H^{22} is moved to the left, turning the shaft F in the direction of the hands of a watch and engaging the shaft B directly with the shaft C by means of the clutch C^4. During this motion the link H^2 is pressed toward the right, bringing the shafts F and E and the pin E^2 at the left ends of the slots H^5, H^4, and H^6. In this position the shaft E and the disk C^3, Fig. 1, is held in its intermediate position, and both the gear-wheels C′ C^2 are free to rotate relative to the shaft C. The shaft B is then bound directly to the shaft C, and all the gear-wheels that are in mesh are free to turn in their respective shafts, so that the driving-shaft is connected directly to the driven shaft and a high speed is secured. If the lever G^3 is turned in the opposite direction—that is, to the left, as shown in Fig. 6—the arm H^{22} is moved toward the right, binding the sleeve B′ to the shaft B. (See Fig. 1.) With the block H^8 in the position shown in Fig. 6, the link H^2 being drawn toward the left by the connecting-rod H, the pin E^2 passes downward beneath said block, turning the crank E′ and shaft E in the direction of the hands of a watch and causing the disk C^3, Fig. 1, to engage the gear-wheel C′, binding it to the shaft C. With this connection a motion of the shaft C opposite to that of the shaft B is secured through gear-wheels D^2, D′, D^3, D^4, and C′. If the ring g' is pulled upward, the block H^8 is drawn to its lower position, and the pin E^2 rises upward in the upward extension of the slot H^6, turning the crank E′ and shaft E in the opposite direction to that of the hands of a clock and locking the gear-wheel C^2 to the shaft C. Thus the shaft C turns in the same direction as the shaft B, but at a slower angular velocity, the motion being conveyed through the gear-wheels B^2, D′, D^2, and C^2. In both of the latter cases the lever-arm H^{22} is pulled to the right, binding the sleeve B′ to the shaft B by means of the clutch B^3.

What we claim is—

1. Mechanism for producing various speed combinations, comprising a lever operatively connected with said mechanism, and a part adapted to slide along said lever and connected to said mechanism so as to adjust the same to make one or the other of said combinations.

2. The combination of a shifting crank, a slidable piece adapted to move in the direction of the length of said crank, a block carried by said piece having two cam-surfaces, one or the other of said cam-surfaces being

adapted to act on said crank to shift the same accordingly to the position of said block.

3. The combination of a shifting crank, a piece adapted to slide in the direction of the length of said crank, said piece being provided with two opposing cam-surfaces extending in the direction of its movement and diverging toward their ends, a block upon said sliding piece having cam-surfaces parallel to said diverging portion of the cam-surfaces, said block being adjustable to form an opposing surface to one or the other of the diverging portions of said cam-surfaces.

4. The combination of an operating-lever, a shifting crank, a piece adapted to slide in the direction of the length of said crank, a block upon said sliding piece having two cam-surfaces, one or the other of said cam-surfaces being adapted to act upon the shifting crank according to the position of said block upon said piece, a lever fulcrumed approximately concentric with said operating-lever connected to said block so as to adjust the position of the same, and means for changing the position of the last-named lever.

5. The combination of an operating-lever, a shifting crank, a piece adapted to slide in the direction of the length of said crank, a block upon said sliding piece having two cam-surfaces, one or the other of said cam-surfaces being adapted to act upon the shifting crank according to the position of said block upon said piece, a lever fulcrumed approximately concentric with said operating-lever connected to said block so as to adjust the position of the same, and a sliding part upon the operating-lever connected with the block-shifting lever so as to adjust the position of the same.

6. The combination of an operating-lever, two shifting cranks, one of said shifting cranks being connected to said operating-lever so as always to move in the same direction with the same movement of said lever, and means actuated by said operating-lever for turning the other of said shifting cranks in one way or the other with one motion of the operating-lever.

7. The combination of an operating-lever, a shifting crank, and means actuated by said lever for turning said shifting crank in one way or the other with one motion of the operating-lever.

8. The combination of an operating-lever, a shifting crank, means actuated by said operating-lever for turning said shifting crank in one way or the other with one motion of the operating-lever, and means for adjusting the turning means to turn the shifting crank in the direction desired.

In testimony whereof we sign this specification in the presence of two witnesses.

ALLIE R. WELCH.
FRED STIMSON WELCH.

Witnesses:
FLORENCE S. LOCKWOOD,
FLORA MCLEAN.