

No. 843,471.

PATENTED FEB. 5, 1907.

W. J. LLOYD.

GEARING.

APPLICATION FILED JULY 12, 1906.

3 SHEETS—SHEET 1.

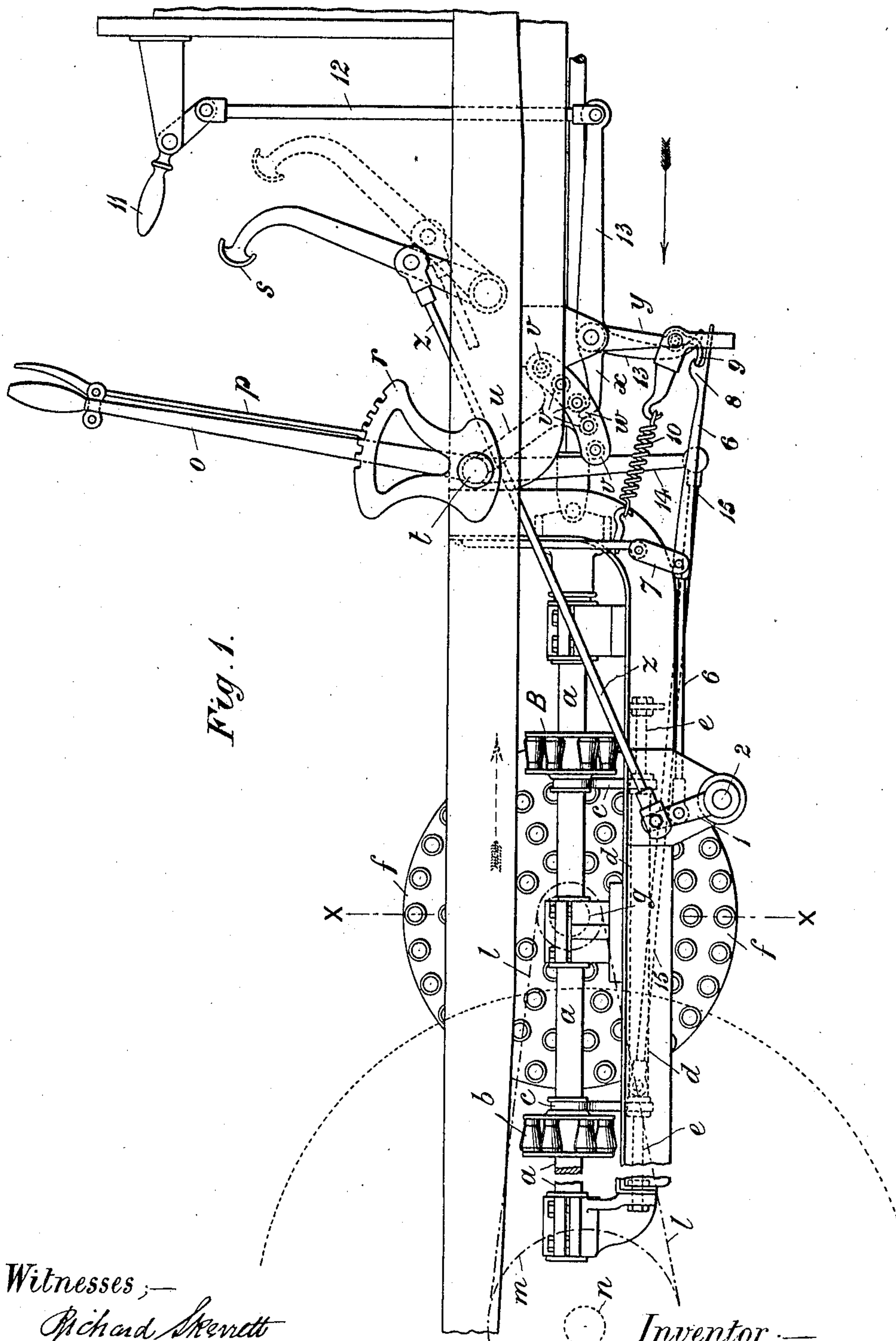


Fig. 1.

Witnesses;—

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William J. Bowker

Inventor;—

Walter John Lloyd

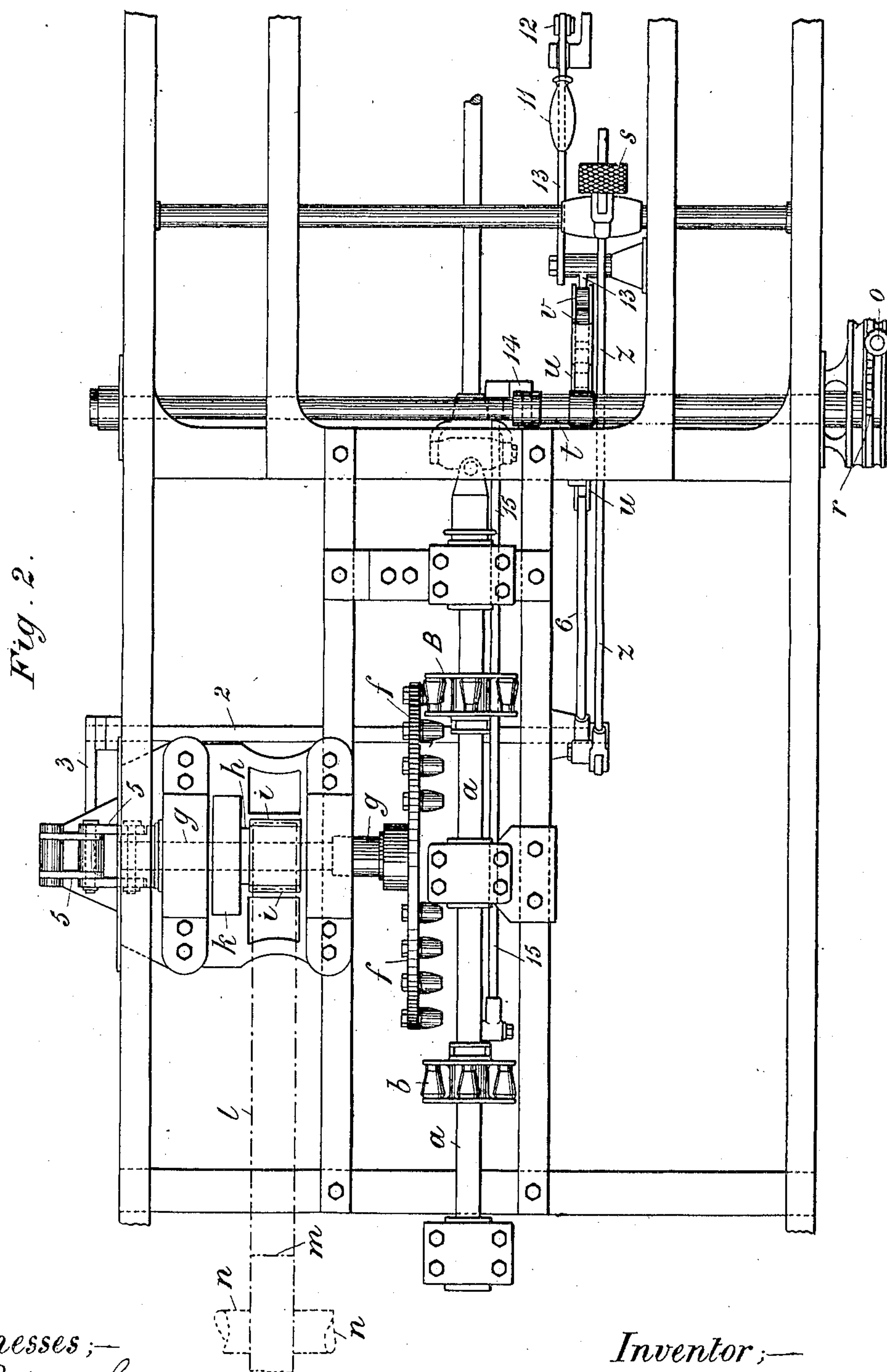
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Witnesses;—  
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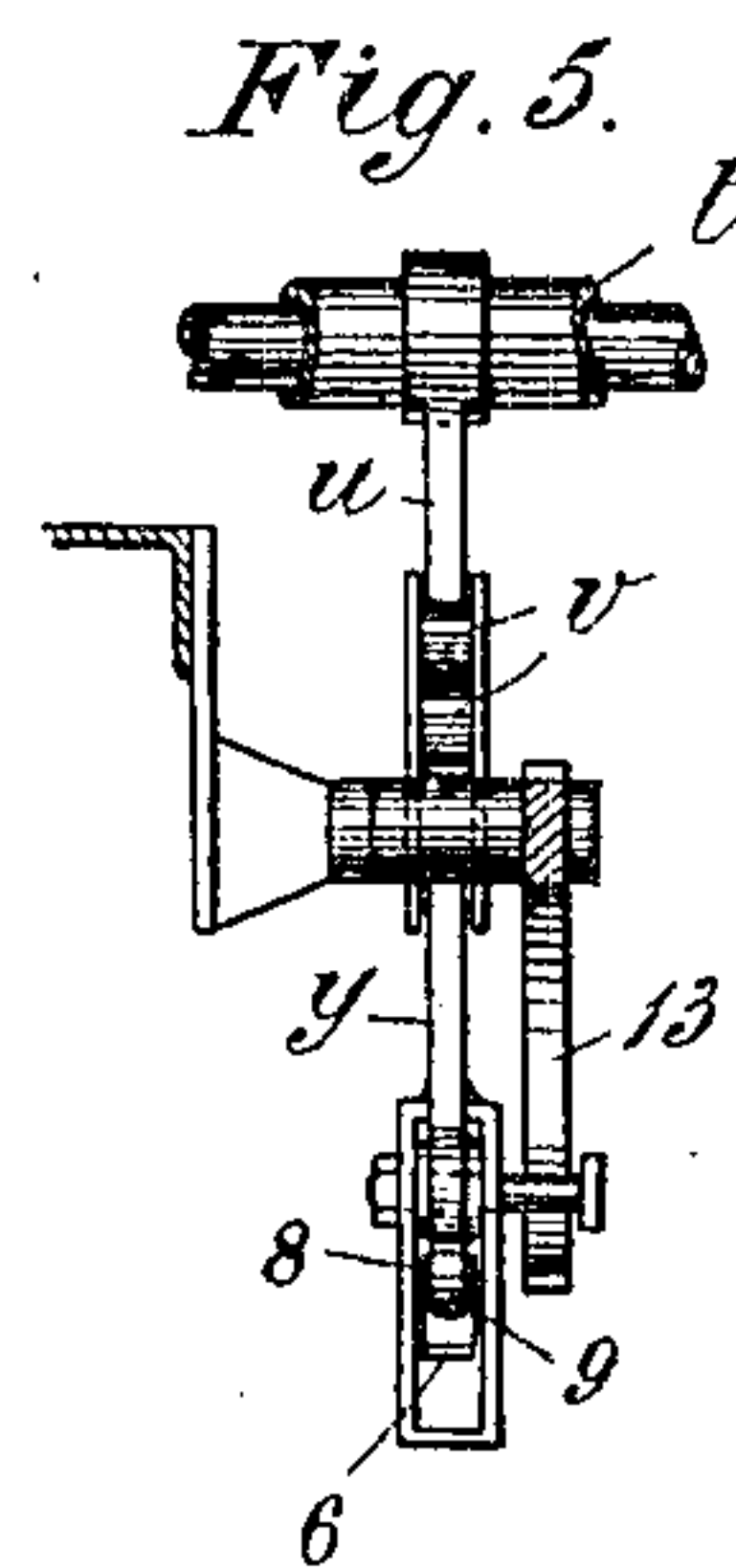
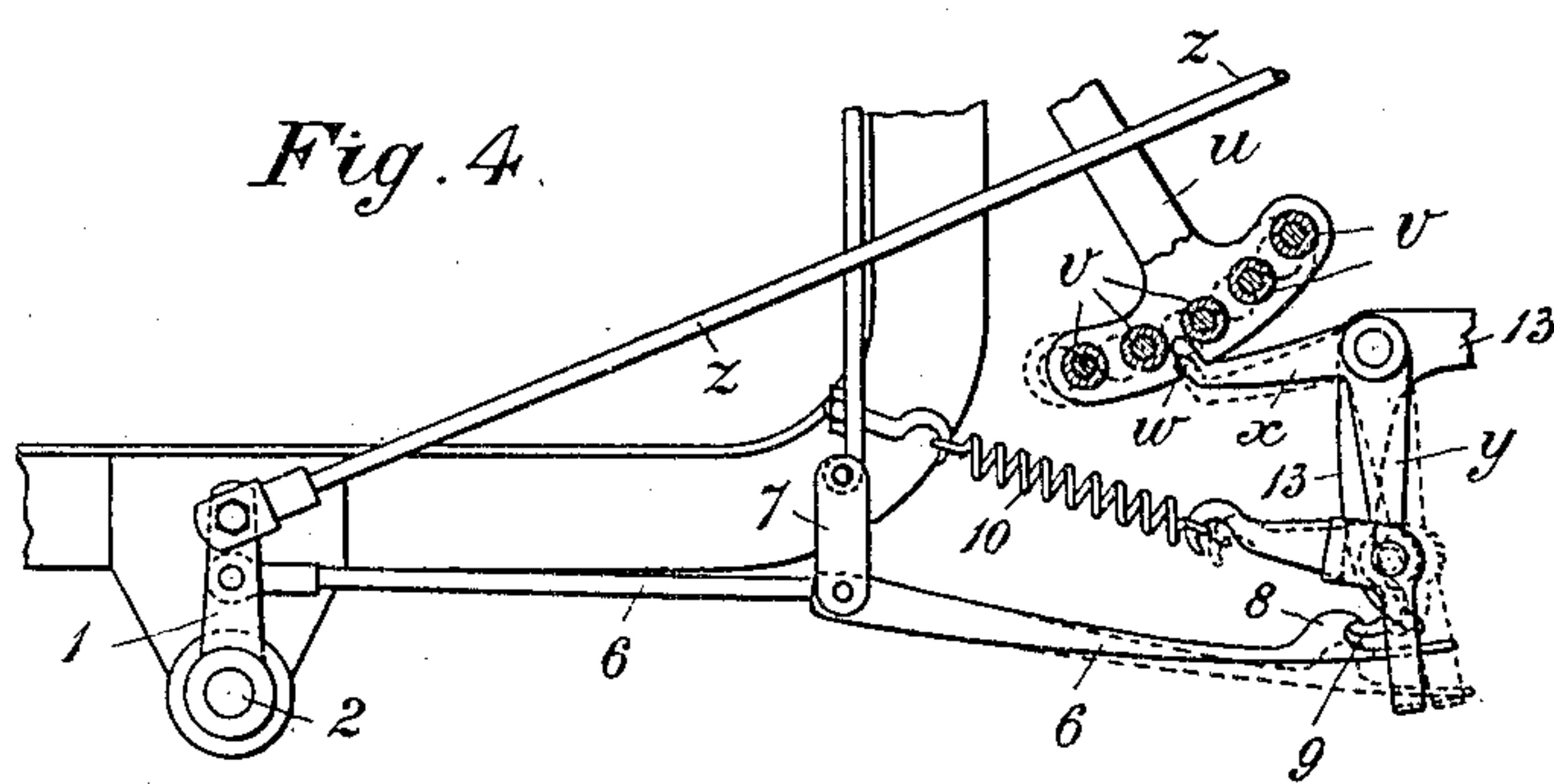
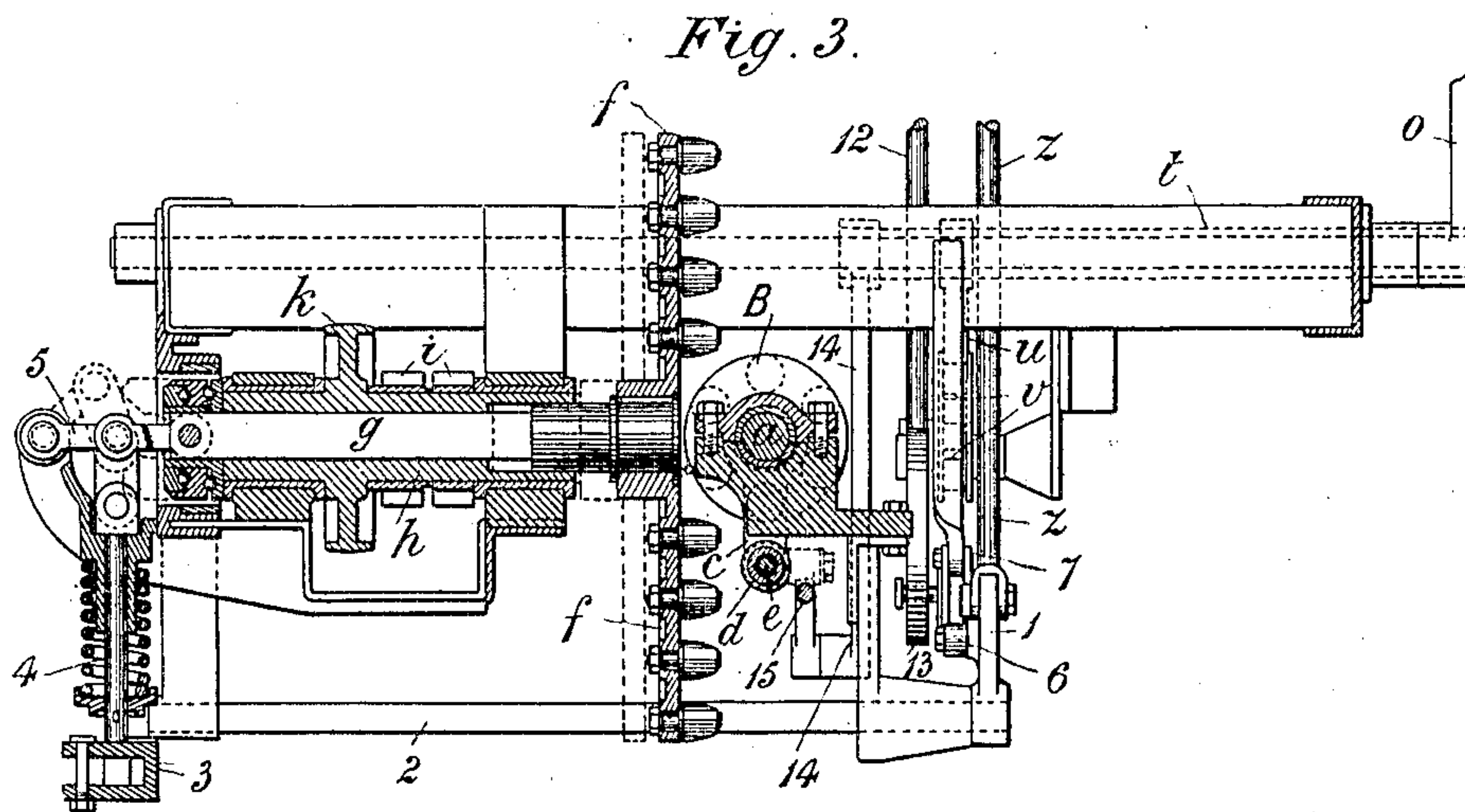
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3 SHEETS—SHEET 3.



Witnesses;—

Richard Skerrett  
William J. Bowker

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Walter John Lloyd



# UNITED STATES PATENT OFFICE.

WALTER JOHN LLOYD, OF BIRMINGHAM, ENGLAND.

## GEARING.

No. 843,471.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed July 12, 1906. Serial No. 325,923.

*To all whom it may concern:*

Be it known that I, WALTER JOHN LLOYD, a subject of the King of Great Britain, residing at Quadrant Cycle Works, Sheepcote street, Birmingham, England, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

The said invention consists of the improvements hereinafter described in the driving and reversing mechanism of motor road-vehicles and other motor-propelled bodies—such, for example, as motor-boats—the said improvements having for their principal objects to dispense with ordinary spur-wheels, pinions, and bevel-wheels commonly employed in the said driving and reversing mechanism; to obtain a gear which is practically noiseless when working as well as when changes in the gear are being effected and which is free from backlash; to prevent inadvertent or accidental extreme changes of speed—that is, a change from the lowest to the highest speed or the reverse while the vehicle is in motion—and to obtain a direct drive from the principal or driving shaft to the secondary or chain-wheel shaft with all speeds as well as when reversing.

I will describe the said invention as arranged for the driving of a motor road-vehicle in which four different forward speeds and a single reverse of the same speed as the slowest forward speed are provided; but I wish it to be understood that more or fewer than four forward speeds may be used without increasing the number of gear-wheels employed.

I will describe the said invention in connection with the accompanying drawings, Figure 1 of which illustrates a portion of the frame of the motor-car, showing the improved driving and reversing gear in side elevation. Fig. 2 is a plan of the same. Fig. 3 is a cross-section on the dotted line X X, Fig. 1. Fig. 4 represents a portion of the arrangement in side elevation with the parts in their unlocking positions. Fig. 5 is an end elevation of certain of the parts at the right-hand end of Fig. 1 looking in the direction of the arrow in the said Fig. 1.

The same letters of reference indicate the same parts in the several figures of the drawings.

*a* is the driving-shaft of the gear, which shaft is in line with and is connected directly to and disconnected from the motor-shaft (not shown) by means of a clutch, as is usual.

*B b* are pin or lantern wheels on a square portion of the shaft *a*. The said pin or lantern wheels *B b* are connected together by means of the depending arms *c c* and tube or sleeve *d* on the guiding-rod *e* parallel with and below the driving-shaft *a*.

By sliding the tube *d* in one direction along the guiding-rod *e* by the means hereinafter described the forward-driving lantern-wheel *B* can be brought into gear with one or other of the four concentric circles of roller-pin teeth on the large disk or wheel *f*, keyed to the secondary shaft *g*, and by sliding the said tube *d* in the opposite direction on the rod *e* the reversing lantern-wheel *b* can be brought into gear with the outer circle of roller-pin teeth on the large disk or wheel *f*.

On a preferably square or angular portion of the secondary shaft *g* is a sleeve or hollow shaft *h*, having upon it a chain-wheel *i* and brake-drum *k*. The chain-wheel *i* is geared by means of a driving-chain *l* (indicated in dotted lines in Figs. 1 and 2) to the chain-wheel *m* of the ordinary balance-gear on the back or driving axle *n* of the motor road-vehicle.

The lantern-wheels *B b*, the teeth of which have the form of conical rollers, are at such a distance apart that in one position to which they can be brought by the turning of the hand or operating lever *o* neither of the said wheels *B b* gears with the large roller-carrying pin-wheel *f* of the secondary shaft *g*, the motor-car in this position of the parts of the gear being permitted to run independently of the driving mechanism, or, as it is commonly called, with a "free engine." In the positions of the parts of the gear represented in the drawings the driving mechanism is arranged for forward driving at its slowest speed, the wheel *B* for forward driving being in gear with the outer circle of roller-carrying pins of the wheel *f*. By bringing the pin-wheel *B* into gear with one or other of the inner circles of roller-carrying pins the speed of the large wheel *f* and its shaft *g* can be increased to the desired extent. For the reverse or backward driving of the vehicle the two connected gear-wheels *B b* are moved in the direction of the dotted arrow in Fig. 1 until the wheel *b* is brought into gear with the outer circle of roller-carrying pins of the wheel *f*.

On each operation of the mechanism for changing the speed or direction of motion of



the car the secondary shaft *g* is first moved endwise by the means hereinafter described, so as to take the large wheel *f* out of gear with the forward-driving wheel or pinion B or reversing wheel or pinion *b*.

I provide for giving motion to the tube or sleeve *d* and wheels B *b*, connected thereto, the ordinary hand-lever *o*, with locking rod or bar *p*, working over the notched quadrant *r*, and in addition thereto a foot-lever *s*. The tubular shaft or spindle *t*, to which the hand-lever *o* is keyed or fixed and which is partially rotated in one or other direction on the turning of the hand-lever *o*, has near its middle a depending arm 14, the lower end of which is connected through the connecting-rod 15 to the tube *d*. Also on the said shaft *t* is a second arm *u*, the outer end of which is of a quadrant form and carries a series of equidistant or nearly-equidistant rollers or teeth *v*.

With one or other (or one of the pairs) of rollers or teeth *v* a locking projection *w* on the nearly-horizontal arm *x* of the bell-crank lever *x y* normally engages and renders impossible the turning of the hand-lever *o*. The locking projection *w* is partially withdrawn, as is represented in Fig. 4, so as to permit the movement of the operating-lever *o* by pressure of the foot on the foot-lever *s*, the said lever *s* being forced into the dotted position indicated in Fig. 1 for effecting the endwise movement of the secondary shaft *g*, hereinbefore referred to. The angular motion of the foot-lever *s* effects, through the connecting rod *z* and crank or arm 1, the partial rotation of the cross-shaft 2 and turning of the crank or arm 3, to the outer end of which is connected the spring-pressed lifting-rod 4 with toggle or link arrangement 5 at top. The pair of links of the toggle arrangement 5 in the normal positions of the parts occupy the position represented in full lines in Fig. 3; but on the raising of the lifting-rod 4 the links take the position indicated in dotted lines in the said Fig. 3, and thereby effect the endwise motion of the secondary shaft *g*.

Jointed to the crank or arm 1 is a rod 6, supported at or about its middle by the rearwardly-inclined link depending from the frame of the car. The front part of the rod 6 is of elastic steel and has near its extreme end a hook 8, (see Figs. 1 and 4,) with which engages the hooked end 9 of the arm *y* of the bell-crank lever *x y*. When the arm or crank 1 is turned by the pressure of the foot on the foot-lever *s*, the rod 6 is forced forward, and thereby effects the turning of the bell-crank lever *x y* into the position represented in Fig. 4, which results in the freeing or unlocking of the operating hand-lever *o*. In this position of the parts the depending link 7 is practically vertical and exerts a downward force, tending to disengage the hooks 8 9. Consequently on the movement in one or other di-

rection of the operating hand-lever the roller-tooth *v* of the arm *u* in passing over the projection *w* effects a movement of the bell-crank lever *x y* independent of the rod 6, the said bell-crank lever *x y* taking the position indicated in dotted lines in Fig. 4 and the spring-arm of the rod 6 dropping under the pressure of the depending link 7 until the hook 8 is clear of the hook 9. On the roller-tooth *v* passing the projection *w* the spring 10 causes the engagement of the projection *w* with the space between the next pair of roller-teeth *v*.

In the way described it will be understood that when the vehicle is in motion the speed can only be changed gradually, or by step-by-step increments or decrements, and the accidents which frequently happen from time to time by a sudden and too excessive change of speed are averted. To permit the gear to be changed when the car is not in motion from any speed to which it may have been set when the vehicle came to rest to any other speed or to free engine, I provide a hand-lever 11, connecting-rod 12, and secondary lever 13, the latter being so arranged that one of its arms will effect the turning of the bell-crank lever *x y* when the hand-lever 11 is operated into its non-locking position.

The hand-lever 11 and parts in connection therewith are for the following purpose: Assuming that the motor-car has been brought to rest with the driving-pinion B in gear with one of the innermost circles of roller-teeth on the disk *f* and it is desired to start the vehicle at the slowest speed or to reverse, it is only necessary to actuate the hand-lever 11 with one hand and to put the foot of the operator on the lever *S*, when the hand-lever *o* can be moved to any desired extent, the pinion B being carried through several gears at one operation.

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

1. A mechanism of the class described, consisting of a driving-shaft, pinions slidable in unison on said shaft and rotative with the latter, a secondary slidable shaft, a disk carried by said shaft and having a series of concentrically-arranged rollers thereon, means associated with the slidable shaft and driven thereby to impart motion to a vehicle, means for shifting the pinions to bring one of the same in position for engagement with the disk, and means for imparting sliding motion to the secondary shaft.

2. A mechanism of the class described, consisting of a driving-shaft, pinions slidable in unison on said shaft and rotative with the latter, a secondary slidable shaft, a disk carried by said shaft and having a series of concentrically-arranged rollers thereon, means associated with the slidable shaft and driven thereby to impart motion to a vehicle, means for shifting the pinions to bring one of the



same in position for engagement with the disk, means for imparting sliding motion to the secondary shaft, and means for locking the means for shifting the pinions against movement of the latter with respect to the disk.

3. In a mechanism of the class described, a driving-shaft, a pair of lantern-wheels rotatable therewith and slidable longitudinally on said shaft, a shiftable secondary shaft, a disk having a series of concentrically-arranged rollers thereon, said secondary shaft being at right angles to the driving-shaft, a driven wheel associated with and actuated by said driving-shaft for imparting motion to a vehicle, a foot-lever having connection with the secondary shaft, means having connection with the lantern-wheels to move the same in unison, and means for locking and releasing the latter means.

4. In combination with a vehicle, a driving-shaft, a pair of lantern-wheels slidable

longitudinally on the shaft and rotatable with the same, each of said lantern-wheels having connection and being adapted to move in unison, a secondary shaft having a disk carried thereby, a series of rollers arranged in circles concentrically on said disk, a foot-lever associated with said secondary shaft for moving the same toward and from the driving-shaft, a lever having a segment provided with spaced rollers and having connection with the lantern-wheels, and a hand-operable lever having means for engagement in the spaces between the wheels carried by the segment to lock the first-mentioned lever against movement.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WALTER JOHN LLOYD.

Witnesses:

RICHARD SKERRETT,  
WILLIAM JAMES BOWKER.