

(No Model.)

3 Sheets—Sheet 1.

P. N. STOVER.
GEARING FOR BICYCLES.

No. 564,948.

Patented July 28, 1896.

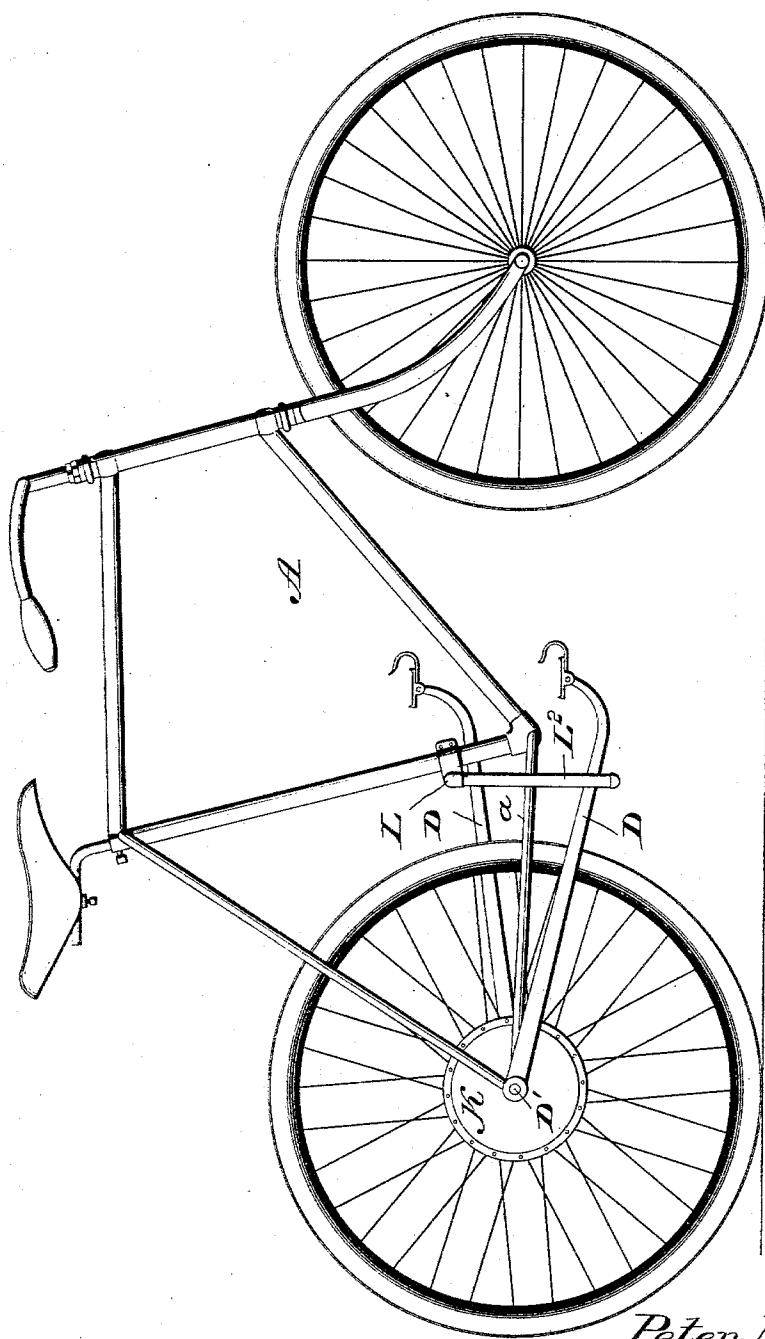


Fig. 1.

WITNESSES
L. S. Elliott.
W. S. Pease.

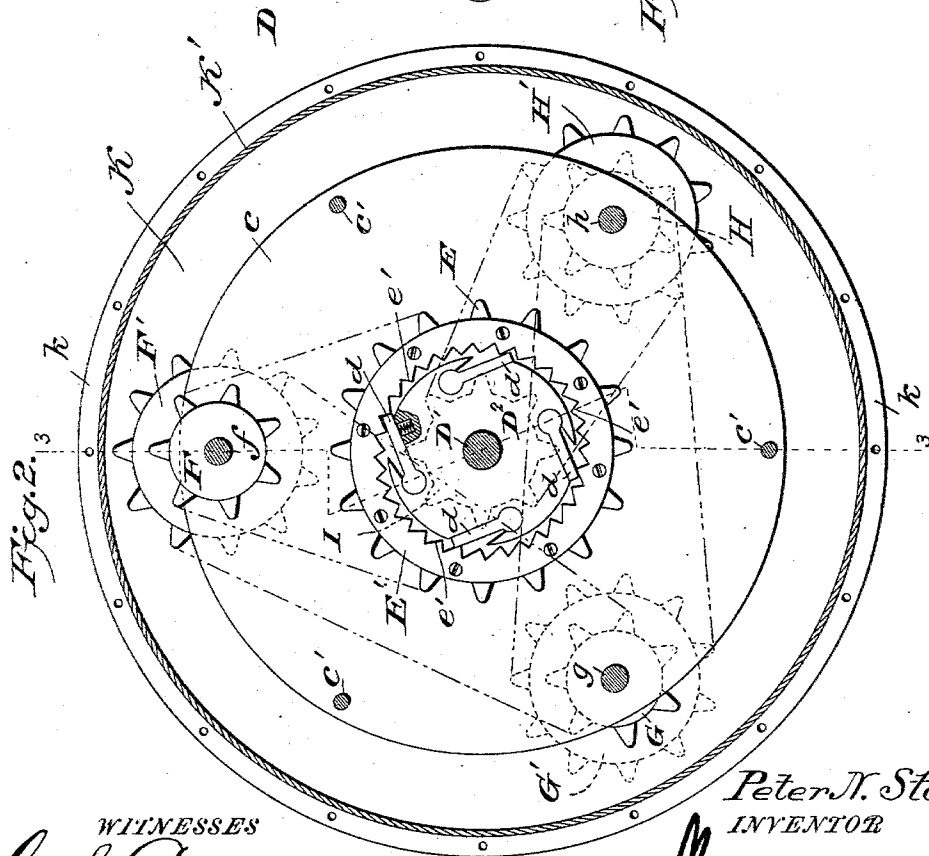
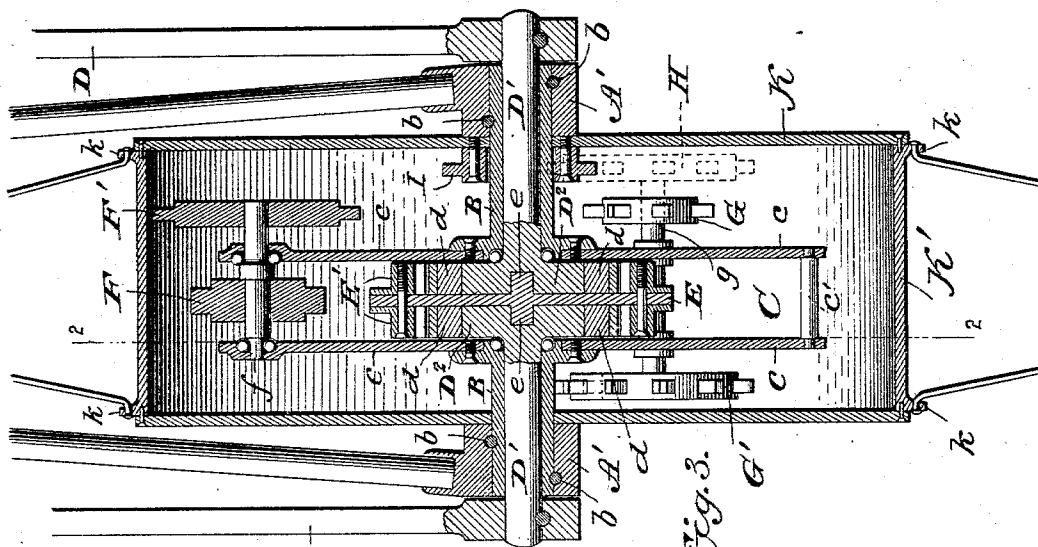
Peter N. Stover
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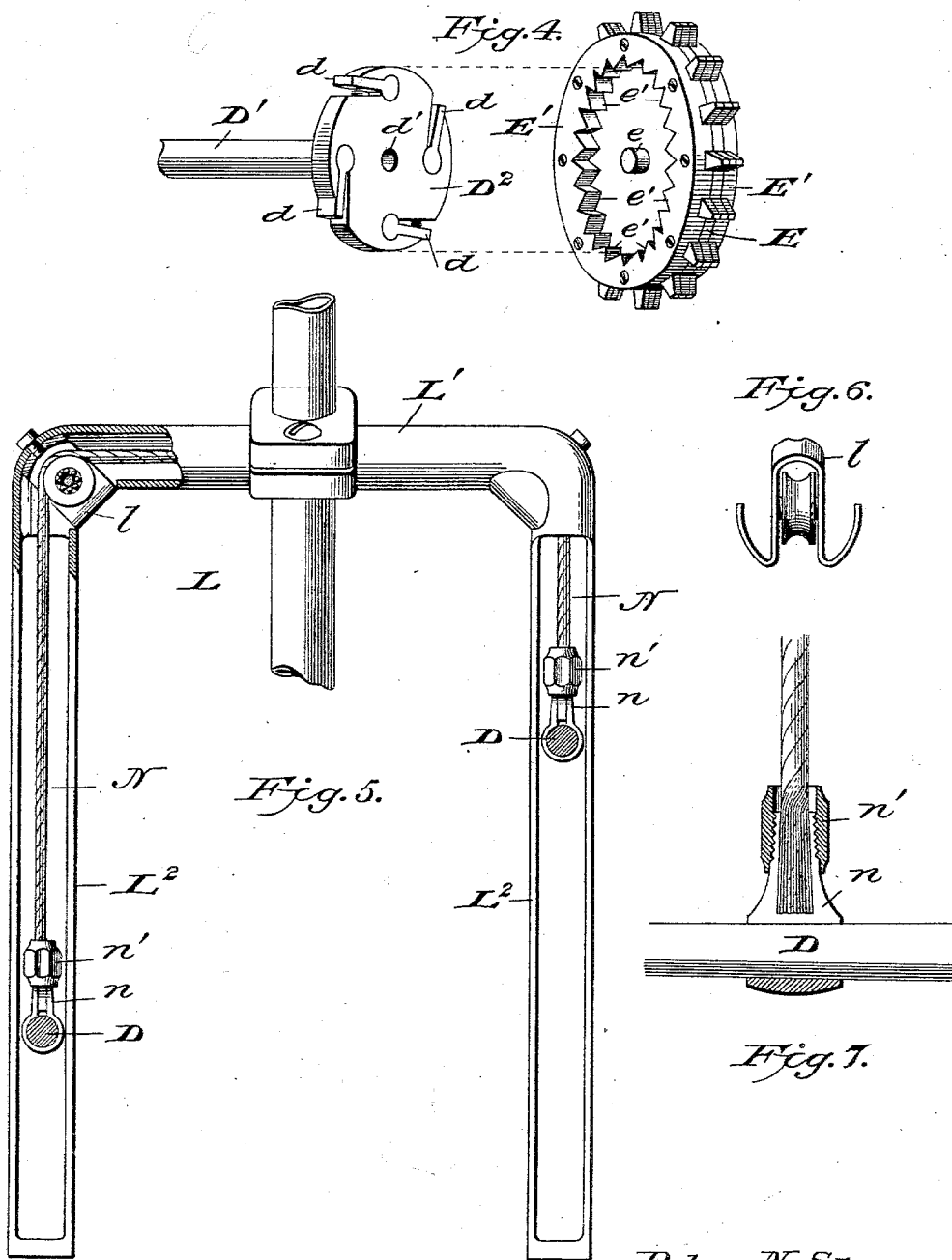
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UNITED STATES PATENT OFFICE.

PETER N. STOVER, OF SAGINAW, MICHIGAN, ASSIGNOR OF FOUR-NINTHS
TO MARK E. STOVER AND FRANK S. SPENCER, OF SAME PLACE.

GEARING FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 564,948, dated July 28, 1896.

Application filed February 15, 1896. Serial No. 579,402. (No model.)

To all whom it may concern:

Be it known that I, PETER N. STOVER, a citizen of the United States of America, residing at Saginaw, East Side, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Gearing for Bicycles; 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improved manner of driving a bicycle or analogous machine through the medium of treadles which connect with gearing inclosed within a casing, so that a depression of either one of the treadles will cause one or more revolutions of the driving-wheel.

The invention consists more especially in the construction and combination of the parts, as will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation showing a bicycle with my improvements applied thereto. Fig. 2 is a vertical sectional view on the line 2 2 of Fig. 3. Fig. 3 is a vertical sectional view on the line 3 3 of Fig. 2. Fig. 4 is a detail perspective view of the combined ratchet-disk and sprocket-wheel and one of the shafts carrying pawls which engage therewith. Fig. 5 is a front elevation, partly in section, of the guide-bars for the treadles, showing the manner of connecting the treadles to each other so that they will move in unison; and Figs. 6 and 7 are detail views.

The main frame A of the bicycle is of the usual type, the shaft-hanger at the junction of the rear fork *a* with the seat-post and lower tubing being dispensed with. The ends of the members of the rear fork *a* are connected to the bars which extend to the upper end of the seat-post by means of suitable forgings A', having transverse openings to receive sleeves B B, which are connected at their inner ends to the side pieces *c c* of a frame C, said sleeves being held in rigid engagement

with the forgings by locking pins or keys *b*. The side pieces *c c* of the frame C are connected to each other by cross-bars *c'* and are provided with bearings for a plurality of shafts, preferably three in number, according to the gear or distance it is proposed the bicycle shall be driven upon each depression of a treadle.

D D designate the treadles or foot-levers, which are rigidly attached to the outer ends of shafts D' D', which pass through the sleeves B, and said shafts have formed on their inner ends a disk D², the edge of which is cut away at intervals tangentially to receive spring-actuated pawls *d*. Each disk is provided centrally with a recess *d'*, forming axial bearings for the stub-shafts *e* of a sprocket-wheel disk E, which lies between said disks when the parts are assembled. On each side of the sprocket-wheel disk E is attached a ring E', having internal ratchet-teeth *e'*, with which the pawls *d* of the disks D² engage, and projections which form lateral extensions of the teeth on the disk E. It will be noted, by reference to Fig. 2, that the arrangement of the pawls *d* with respect to the teeth *e'* is such that only one of said pawls will be in positive engagement with a ratchet-tooth while the others are at different distances from their respective or adjoining teeth. This is attained by making the pawls *d* of different lengths, and in connection with my improvements has a decided advantage of taking up lost motion and preventing "backlash," for it does not matter at what point the depression of a treadle may cease there will be a positive engagement of one of the pawls with a ratchet-tooth, so that there is not the lost motion that usually occurs from the employment of pawls and ratchets, and consequently there is less wear upon the parts.

It will be understood that the shafts D' are rocked alternately by the depression of the treadles, and this movement will cause a constant rotation of the sprocket-wheel E by reason of the ratchet-rings E' being attached thereto and engaged by the pawls *d*, as hereinbefore described. Over the sprocket-wheel E passes a chain, which also passes over a smaller sprocket-wheel F, mounted on a transverse shaft *f*, having suitable bearings in the

side pieces *c* of the frame C, said shaft carrying another sprocket-wheel *F'*, which is of larger diameter than the sprocket-wheel *F*, and is geared to a smaller sprocket-wheel *G*,
 5 keyed to a transverse shaft *g*, also journaled in the frame C and provided with a larger sprocket-wheel *G'*, connected by chain to a smaller sprocket-wheel *H* on a shaft *h*, journaled in the frame C. The shaft *h* is provided with a larger sprocket-wheel *H'*, over
 10 which passes a chain extending to a sprocket-wheel *I*, mounted upon one of the sleeves B and rigidly connected to a frame or housing K, which forms the hub of the rear or driving
 15 wheel.

Instead of using only three sets of sprocket-wheels, as shown in Fig. 2 and hereinbefore described, I may employ additional sets, carrying out the same manner of connecting
 20 them to each other.

The housing or hub K consists of side pieces or disks which are mounted upon the sleeves B and are connected by a rim *K'*, having extended flanges *k*, to which the spokes of the
 25 rear wheel are connected. This housing or hub is made dust-proof, and the shape or configuration of the inner stationary frame C may be changed to triangular shape or otherwise, according to the number of sets of
 30 sprocket-wheels employed.

It will be noted that the frame C remains stationary with respect to the frame of the bicycle, while the housing or hub K revolves about the same. It will also be noted that
 35 in the employment of this style of gearing short sprocket-chains are used, and when they are once adjusted the wear or stretching of the same will be very slight and not to the same degree as a longer chain; but the usual
 40 adjusting means for the shafts *f*, *g*, and *h* may be employed for regulating the tension of said chains, if so desired.

L designates a frame which is adjustably attached to the seat-post of the bicycle-frame, and consists of a horizontal bar *L'*, having depending members *L²* *L²* cut away front and rear to receive the treadles D, the downward
 45 movement of the treadles being limited by transverse pieces formed at the ends of said depending members. At the angles of the frame L the tubing is cut away to receive
 50 brackets *l*, which carry grooved rollers or pulleys, said brackets having upturned ends which embrace the tubing and reinforce the frame at this point. The brackets are
 55 secured to the frame in any suitable manner, so that they can be readily removed for the purpose of lubricating the bearings of the rollers.

Over the grooved rollers or pulleys passes a flexible connection N, which is connected at its ends to the foot-levers or treadles by means of clamps *n*. These clamps encircle
 60 the treadles and are provided with clamping-nuts *n'*. By this arrangement the foot-levers or treadles are connected to each other so that a downward movement of one will raise

the other, and the frame L is adjustable upon the seat-post, so that the height of the treadles from the ground can be varied. This
 70 adjustment, with the vertical adjustment of the saddle, allows a great range of adjustment with a single frame and gives the rider the option of having the treadles either high
 75 or low. The forward ends of the treadles are provided with pedals of any suitable construction.

The treadle movement I consider much more healthful and a greater saving of power, and one in which a greater force can be applied than by the ordinary crank movement. The construction I have shown and described permits the rider to give any desired extent of downward movement that he may desire, and being a direct push greater power can
 80 be applied with less exertion than with the crank movement. The force or downward movement upon one of the treadles serves to raise the other, and thus the use of springs to restore the treadles to their normal position is dispensed with. Springs are undesirable in bicycle construction, as they are
 85 liable to weaken or break in use, and practical demonstration has shown that cog-wheels are impracticable for successful use in gear
 90 for bicycles, as they are liable to rapid wear, and, when closely fitting, give an undue amount of friction, besides having other objectionable qualities.

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

1. As an improvement in driving-gear for bicycles, the combination, of independent driving-shafts, a sprocket-wheel common to
 105 both shafts and driven thereby, and a plurality of sprocket-wheels of different sizes mounted on shafts supported in a stationary frame, the last sprocket-wheel of the series being attached to a rotary housing or hub,
 110 substantially as shown and for the purpose set forth.

2. A driving-gear for bicycles consisting of a stationary frame carrying a plurality of shafts upon which are mounted sprocket-wheels of different sizes, a rotary frame or
 115 hub having a sprocket-wheel attached thereto, a sprocket-wheel having ratchet-rings attached thereto, and independent driving-shafts supporting the said sprocket-wheel
 120 and carrying pawls which engage the ratchet-rings thereof, substantially as shown and for the purpose set forth.

3. A driving-gear for bicycles comprising a frame suitably connected to the main frame
 125 of the bicycle, so as to be in fixed engagement therewith, a plurality of shafts mounted in said frame and carrying sprocket-wheels of different sizes, shafts having their ends located within the frame and serving as supports for a central sprocket-wheel which is
 130 adapted to be driven by either shaft, a rotary casing or housing inclosing the gearing and provided with a sprocket-wheel, and chains

for connecting the sprocket-wheels, for the purpose set forth.

4. The combination in a gearing for bicycles, of sleeves rigidly attached to the main frame and connected at their inner ends to a frame carrying a series of shafts upon which are mounted sprocket-wheels of different sizes; a rotary casing mounted upon the sleeves and provided with a sprocket-wheel, together with driving-shafts having disks on their inner ends carrying pawls and centrally recessed; a sprocket-wheel having ratchet-rings and stub-shafts journaled in the recesses in the disks, substantially as shown and described.

5. In a gearing for bicycles, the combination, of sleeves rigidly attached to the main frame of the bicycle, a frame rigidly connected to the inner ends of the sleeves, a plurality of shafts mounted in the frame and carrying sprocket-wheels of different sizes; shafts mounted in the sleeves and provided with disks having spring-actuated pawls and central recesses; a sprocket-wheel having ratchet-rings attached thereto and provided with stub axles or shafts which bear in the recesses in the disks; together with a casing or hub loosely mounted on the sleeves and provided with a sprocket-wheel connected thereto, and chains for connecting the sprocket-wheels, substantially as shown and for the purpose set forth.

6. The combination in a bicycle, of a frame having a frame connected thereto by sleeves, driving-shafts mounted in the sleeves and engaging a sprocket-wheel which is connected by chains to sprocket-wheels mounted on shafts journaled in the inner frame and to a sprocket-wheel attached to the hub of the driving-wheel; together with treadles attached to the shafts, said treadles being connected to each other, substantially as shown and for the purpose set forth.

7. The combination in a bicycle having a driving-gear substantially as shown, of treadles extending from said driving-gear; together with a frame clamped to the frame of the bicycle and consisting of a tube bent or constructed to present a horizontal portion and members depending from the ends thereof, said depending members being slotted to receive the treadles and provide guides therefor, grooved rollers located at the angles of the frame, and a flexible connection passing through the tube or frame over the rollers and attached at its ends to the treadles, substantially as shown and described.

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

PETER N. STOVER.

Witnesses:

JNO. P. O'DONNELL,
GEO. W. SMITH.