(No Model.) 2 Sheets—Sheet 1.

F. SCHRADER.

BICYCLE.

No. 420,922. Patented Feb. 4, 1890.

FIG. 1.

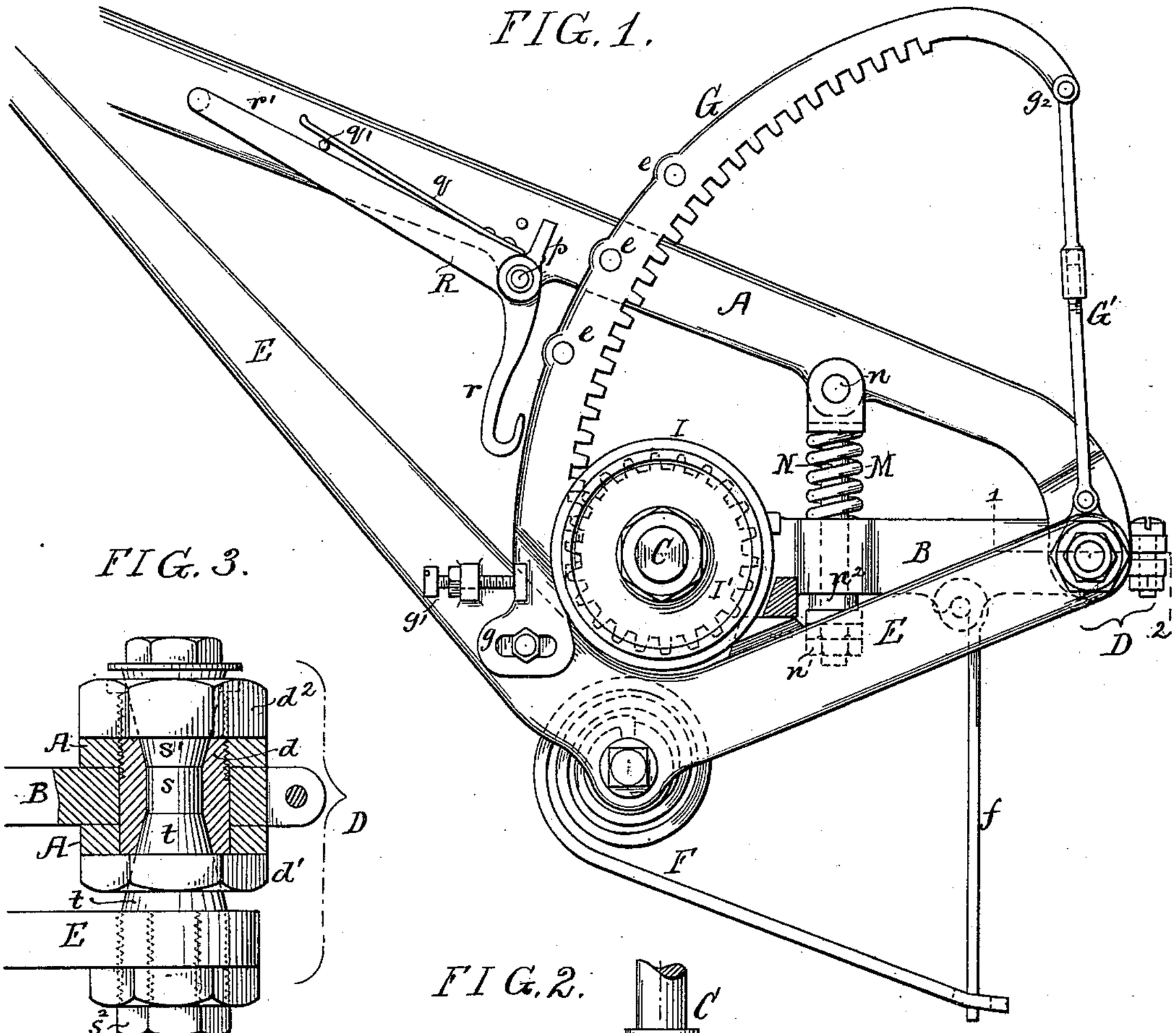


FIG. 3.

FIG. 2.

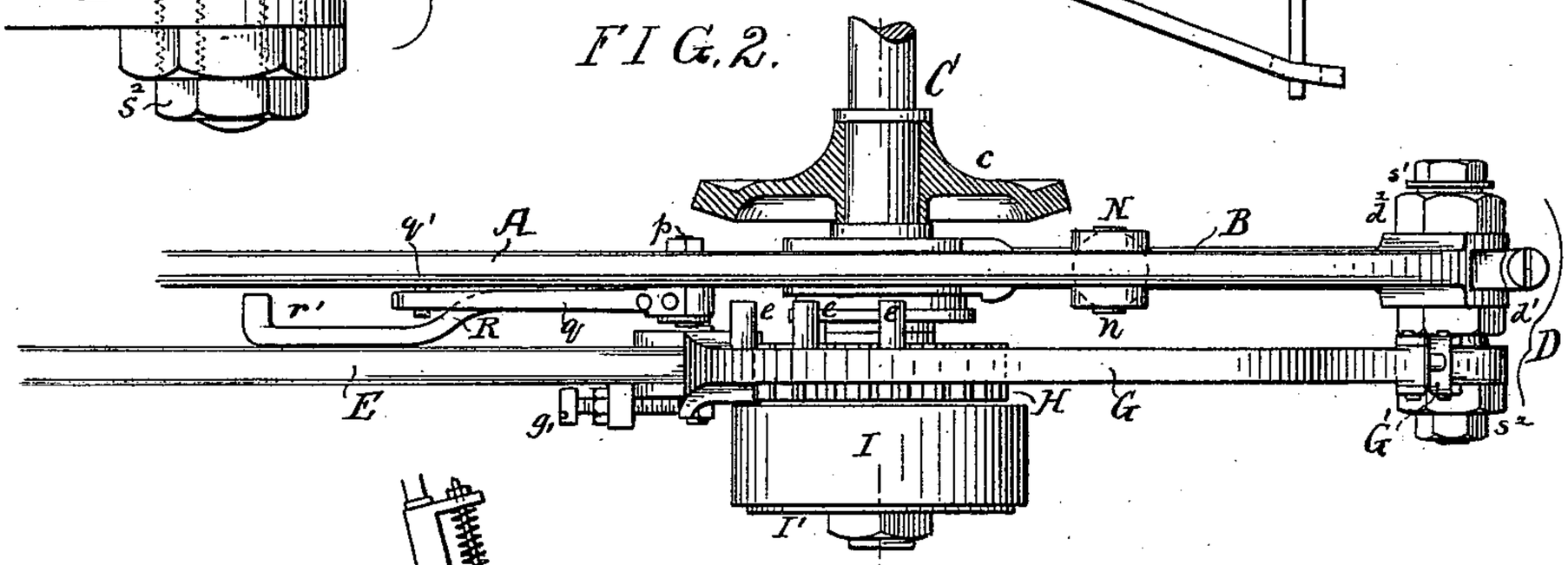
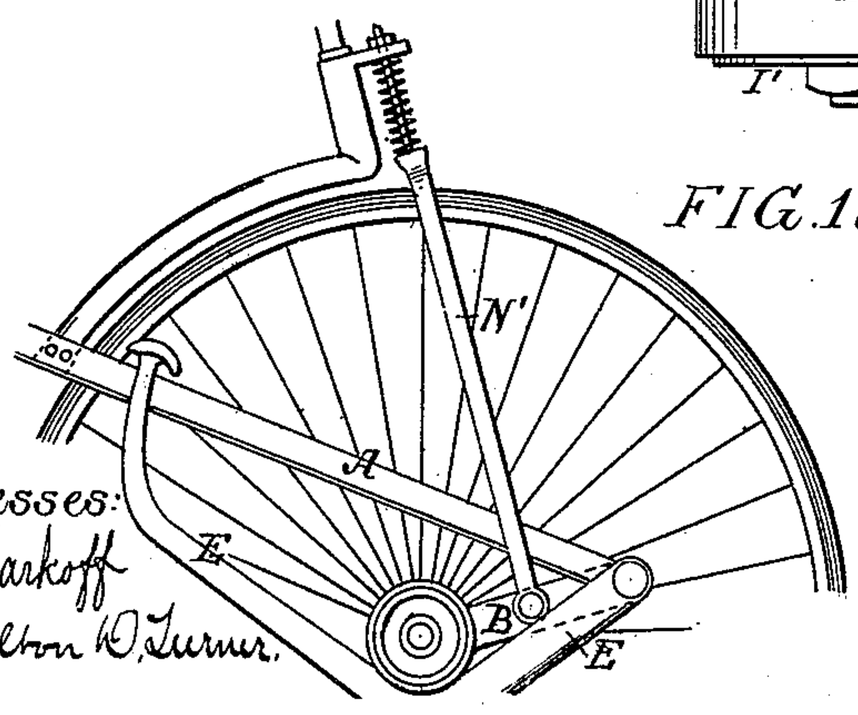


FIG. 12.



Witnesses:
Alex. Barkoff
Hamilton W. Turner.

Inventor:
Frederick Schrader
by his Attorneys
Howson & Howson

(No Model.) 2 Sheets—Sheet 2.

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FIG. 6.

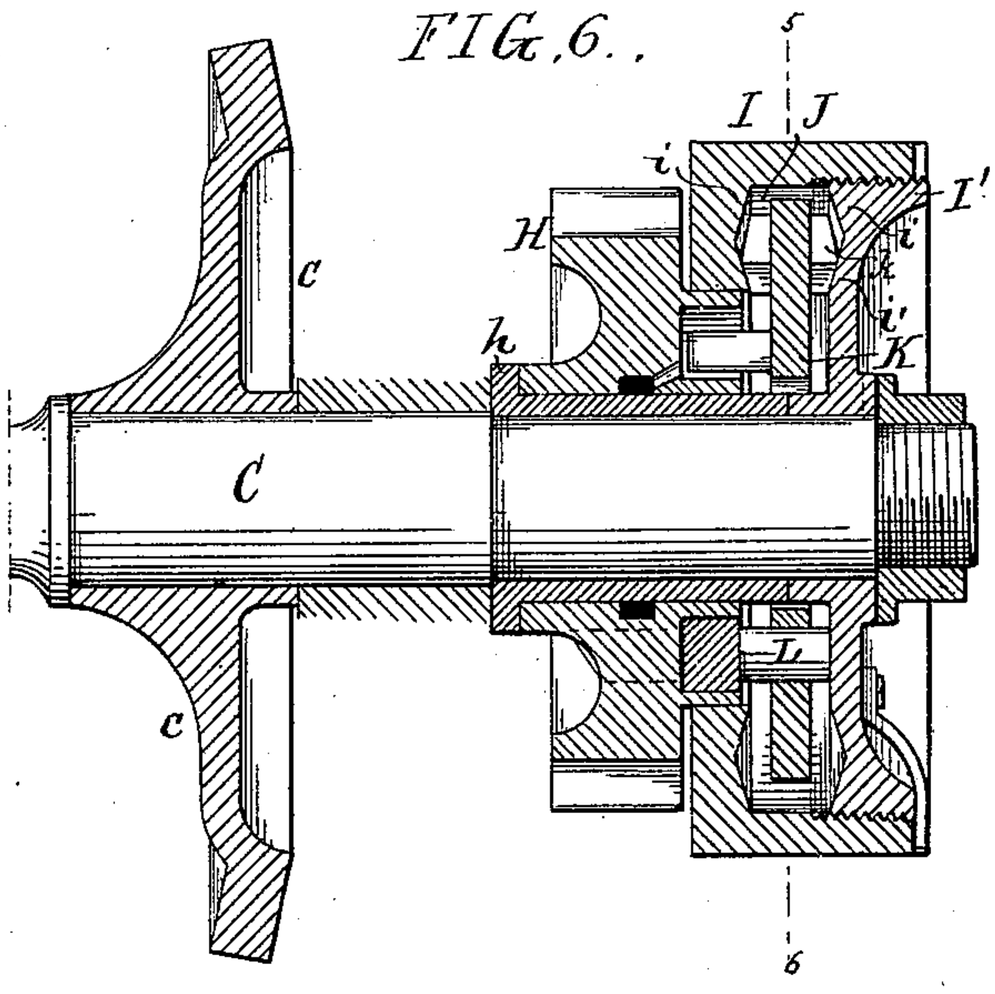


FIG. 7.

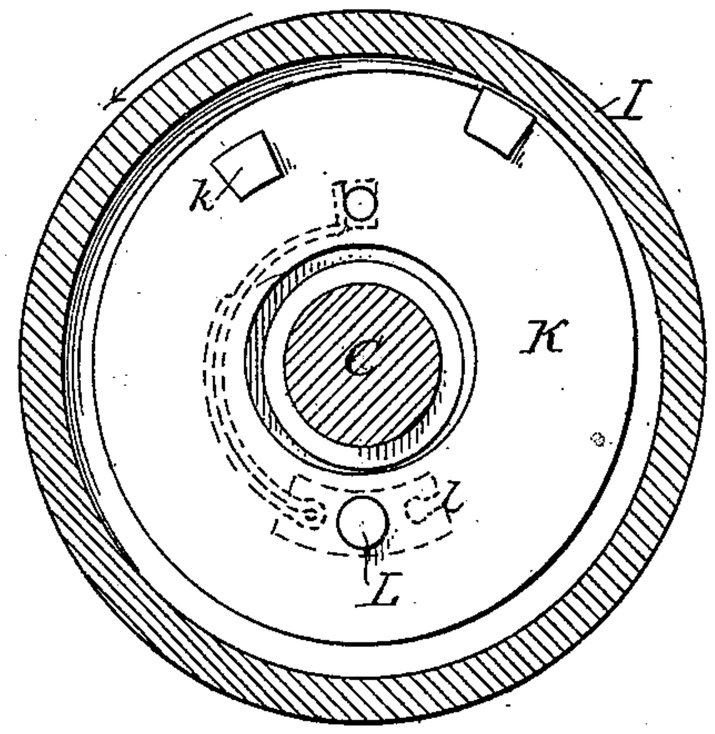


FIG. 4

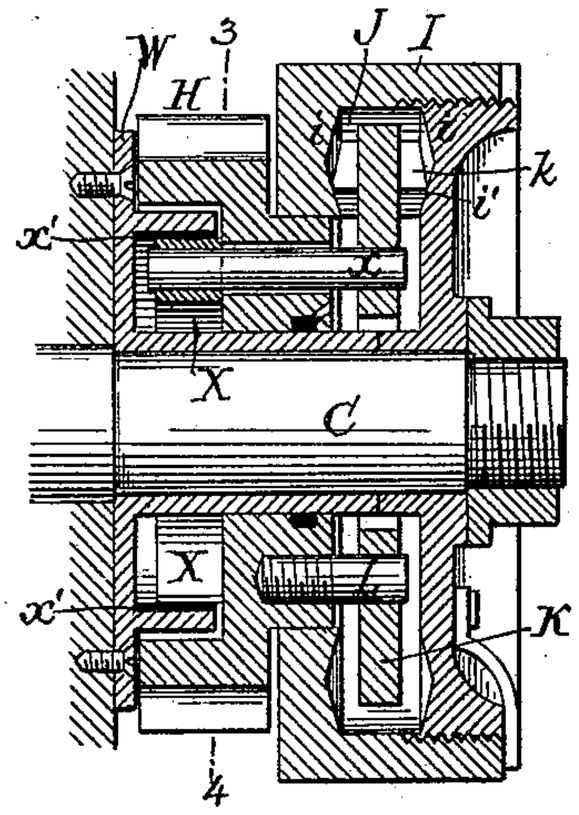


FIG. 8.

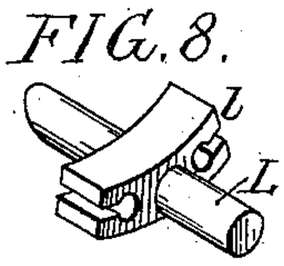


FIG. 9.

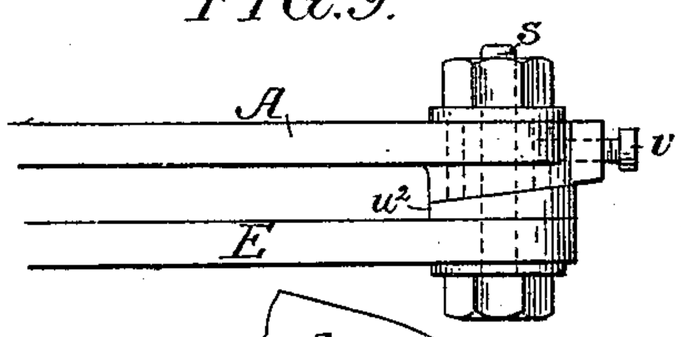


FIG. 10.

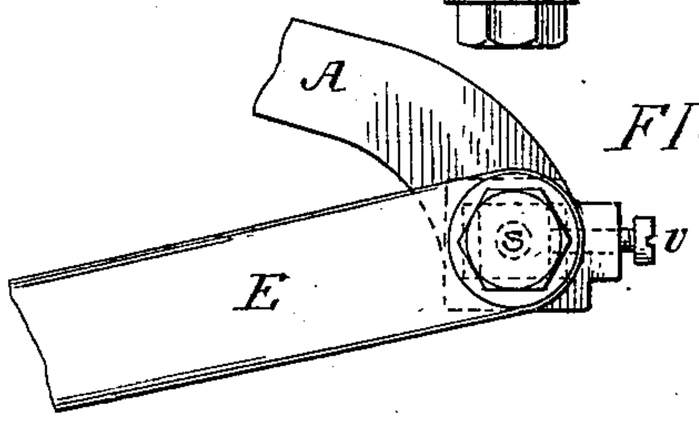


FIG. 11

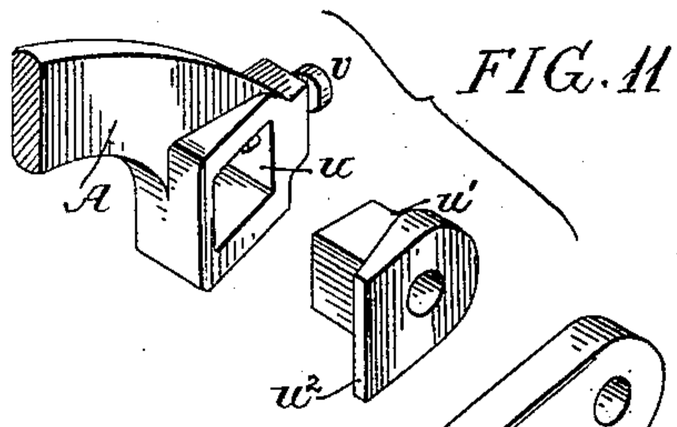
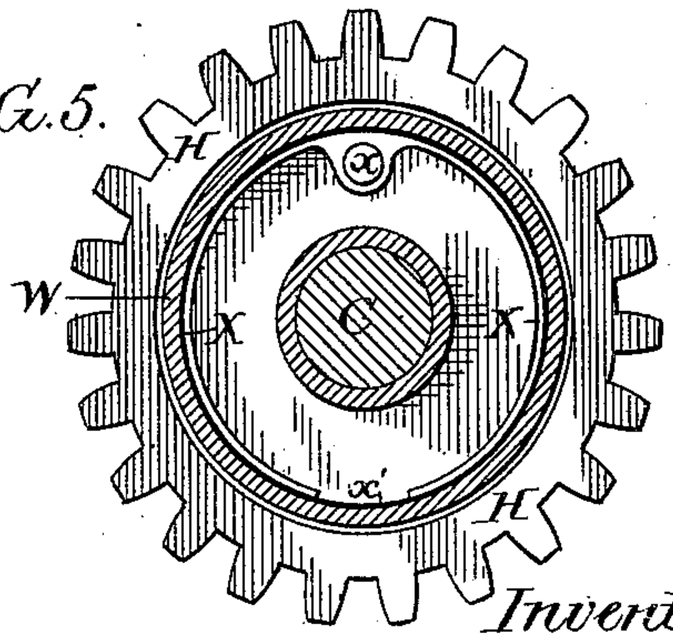


FIG. 5.



Witnesses:
Alex. Barkoff
Hamilton D. Turner.

Inventor:
Frederick Schrader
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

FREDERICK SCHRADER, OF PHILADELPHIA, PENNSYLVANIA.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 420,922, dated February 4, 1890.

Application filed November 26, 1889. Serial No. 331,650. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK SCHRADER, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Bicycles, of which the following is a specification.

My invention consists of certain improvements in bicycles based on the improvements set forth in the application filed by me on June 14, 1889, Serial No. 314,267.

My improvements mainly relate to the construction of the driving mechanism, the object of my invention being to improve the clutching mechanism to adjust for lost motion, to mount the rear of the frame on springs, and to provide means by which the treadle can be attached to the frame when used as a rest, substantially as herein set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of sufficient of a bicycle to illustrate my invention. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a section on the line 1 2, Fig. 1. Fig. 4 is a longitndinal section of the clutch mechanism. Fig. 5 is a section on the line 3 4, Fig. 4. Fig. 6 is a section of a modified form of clutch mechanism. Fig. 7 is a section on the line 5 6, Fig. 6. Fig. 8 is a detached perspective view of the clutch-pivot pin. Figs. 9, 10, and 11 are views of a different form of adjusting mechanism, and Fig. 12 is a modification of the spring arrangement.

In the drawings I have omitted the front portion of the bicycle, merely showing the mechanism directly connected with my invention, and will refer to the application above mentioned for details not shown in the drawings, although it will be understood that my invention can be applied to tricycles as well as bicycles and to velocipedes in general.

A is the yoke-frame of the machine, to the rear ends of which are pivoted the bars B, carrying the bearings for the shaft C, on which are mounted the hubs *c* of the rear wheel, which in the present instance is the driving-wheel. Each pivot D also carries the foot-treadle lever E, having at its outer end a foot-rest for the operator's foot. This lever is kept in a raised position by the tension-spring F, which is hung on the lever and is connected to the bar B by the link *f*. On the lever is a segment G, adjustably connected to the lever at its lower end, it being slotted at *g*. Through this slot passes a bolt. The segment can be moved toward or from the pivot D, and may be adjusted by a set-screw *g'* on the lever E, which bears against a projection on the segment. The upper end of the segment is connected at g^2 to an extension-rod G', which in turn is connected to the rear end of the lever E. This segment is provided with a series of rack-teeth, which mesh with a pinion H, loose on a sleeve *h* on the shaft C, and by the adjusting mechanism above described the segmental rack can be moved toward or from the pinion.

Mounted on a rim of the pinion H is a casing I of the clutch mechanism, and screwed into this casing is a disk I', forming a space J, in which rests the clutch-plate K, having bearing-lugs *k k'* on each side, and in the internal face of both the casing and the disk are gripping-surfaces *i i'*, forming an annular groove in each part I I'. The gripping-lugs *k* on the clutch-plate come in contact with the surfaces *i i*. The gripping-lugs *k'* come in contact with the surfaces *i' i'*, the gripping-lugs *k* being forced up into position and the gripping-lugs *k'* being forced down into position.

The clutch-plate is pivoted to a pin L, projecting from the pinion or driven part H, and a pin *x* passes through a slot in the pinion and into a bearing in a split ring X, adapted to an annular groove in a plate W, of which the sleeve *h* in the present instance is a part. This plate W is secured to a stationary part of the machine, as shown clearly in Figs. 4 and 5. The inner periphery of this plate is preferably lined with rawhide *x'*, so that when pressure is applied to the pinion the pin carried by the pinion will force the gripping-plate in the direction of the arrow; but the spring-ring *x* will tend to keep the gripping-plate back, owing to frictional contact with the rawhide, and thus force the gripping-lugs into engagement with the gripping-faces of the casing, so that the shaft carrying the wheel will be revolved; but on the return movement the pinion will be reversed and the plate will be drawn away from frictional contact with the bearing-faces, owing to the

friction between the spring-plate X and its bearing, so that there is no useless wear of the bearing-lugs against their bearing-faces when the pinion is reversed. At the same time the machine on which the clutch is mounted can be run backward or forward without the intervention of the clutch.

The clutch mechanism may be constructed as shown in Figs. 6, 7, and 8, the plate K being pivoted to a stud L, mounted in the pinion H and formed as shown in Fig. 8, the portion *l* having orifices adapted to carry a spring *l'*, which rests against a lug k^2, tending to press the clutch-plate in the direction of its arrow, Fig. 5, the portion *l* and the spring *l'* resting in the recess in the pinion. On the forward motion of the pinion the clutch-plate will grip the casing, and as this casing is secured to the shaft C it will turn the shaft forward; but on the reverse movement of the pinion the clutch-plate will not bite upon the casing, but will slide therein. The pin is made right and left, so that the spring can be inserted on either side of the pin, depending on which side of the bicycle the clutch is placed.

I prefer to secure the clutch-casing to the shaft in the manner described in the above application.

Situated between the frame A and the bar B on each side of the machine is a compression-spring M, mounted on a spindle N, pivoted at *n* to the frame A and passing through an enlarged orifice in the bar B, on which are mounted suitable retaining-nuts *n'* and an elastic washer n^2. By this arrangement there is a yielding connection between the shaft C and the frame A.

The spring need not necessarily be mounted in the position shown in Figs. 1 and 2—as, for instance, the spring may be on a yoke-frame N', attached at its lower end to a bar B on each side of the frame and adapted to slide in the frame at a point near the seat, as shown in Fig. 12, the spring being mounted between the collar on the yoke and a projection of the frame.

In order to rest the feet when coasting with this class of machine, I form a series of projections *e* on the segment G, and I mount at *p*, on the frame A, a lever R. One arm *r* of this lever is hooked, as shown, to engage with one or other of the pins *e* on the segment, and the other arm *r'* is within easy reach of the operator, it being held in its normal position by a spring *q*, mounted on the lever and resting upon a pin *q'* on the frame A, so that when the rider wishes to coast the rider presses upon the arm *r'* of the lever by his heel, forcing the hooked arm *r* of the lever in the path of the pins on the segment. The treadle-lever is then pressed down by the toe until one of the pins engage with the hook, after which the heel can be released from the lever R, and the foot can rest solidly upon the treadle-lever, said lever being suspended by the hooked lever.

By manipulating the hooked lever the treadle-lever can be suspended in different positions, as the rider wishes.

The pivot-section D is constructed in the following manner: The pivot *d* is adapted to the forked end of the frame A, and passes through an orifice in the bar B and between the forked portions of the frame rests the bar B. The pivot *d* has at one end a head *d'*, and is threaded at the opposite end, and on this threaded portion is mounted a nut d^2. Passing through the pivot *d* is the pivot-pin *s* of the treadle-lever E. This pivot-pin has at one end a tapered shoulder *s'*, and is threaded at the outer end, and to this threaded portion is adapted a nut s^2.

Secured to the treadle-lever E is a tapered sleeve *t*, mounted on the pin *s* and adapted to a tapered orifice in the pivot *d*, so that by tightening the nut s^2 on the pin *s* the wear can be taken up on the lever. By this adjustment, taken in connection with the adjustment of the segment, as shown in Fig. 1, accuracy of fit and easy running are assured.

Instead of making the pivot-section as in Fig. 3, it may be made as in Figs. 9, 10, and 11, the frame A having an elongated slot *u*, in which rests a block *u'*, having a head u^2, the block and the frame being tapered, as shown. By turning a set-screw *v* on the frame the block in the slot *u* can be adjusted. The block *u'* carries the pivot-pin *s* of the treadle-lever E, so that it will be seen that by this arrangement the independent adjustment of the segment on the lever may be dispensed with and the lever adjusted longitudinally in its bearings.

By inclining the adjoining faces of the frame A and block *n'* only one set-screw need be used, as the inclined surfaces prevent the movement of the block in one direction, while the set-screw limits the movement of the block in the opposite direction.

I claim as my invention—

1. The combination, in a bicycle, of the frame, the bar pivoted thereto, carrying the shaft on which is mounted the wheel, with a spring situated between the frame and the bar, substantially as specified.

2. The combination of the frame A, the bar B, pivoted thereto, said bar carrying the axle on which is mounted the wheel, the spindle carried by the frame and passing through the bar, with a spring mounted on said spindle, substantially as described.

3. The combination of the frame, the treadle-lever pivoted thereto, with a segmental rack mounted on said lever, said segmental rack being mounted at its lower end, with a bolt passing through the said slot, substantially as described.

4. The combination of the frame, shaft, pinion mounted thereon, with a treadle-lever pivoted to the frame, with an adjustable segmental rack carried thereby, with a set-screw *g'*, adapted to set the segmental rack on the lever, substantially as described.

5. The combination of the frame, treadle-lever pivoted thereto, with a lever R, pivoted to the frame, one arm r of said lever being hooked and adapted to engage the treadle-lever, and the other arm r' being in position to be operated by the foot of the rider, with a spring tending to keep said lever R in its normal position, substantially as and for the purposes set forth.

6. The combination of the frame, treadle-lever pivoted thereto, segmental rack mounted on said treadle-lever, having one or more pins, with a hooked lever mounted on the frame, adapted to suspend the treadle-lever through the medium of the pins and segment, substantially as described.

7. The combination, in a clutch, of the clutching-faces, the disk adapted to bear upon the same and pivoted to the driving mechanism, a spring-ring resting in a non-revolving plate, with a pin projecting from said disk into said ring, substantially as described.

8. The combination, in a clutch, of the grip-plate having gripping-lugs $k\,k'$, with a casing having inclined bearing-surfaces $i\,i'$, against which the lugs bear, with mechanism for driving said disk and keeping it in contact with the driven shell on its forward movement, substantially as described.

9. The combination of the shell having gripping-faces, plate adapted to bear against said gripping-faces, said plate being carried by a pin on the driven part, with frictional mechanism for forcing the grip-plate against the bearing-surfaces while running forward and releasing the plate from the gripping-surfaces when running backward, substantially as described.

10. The combination of the casing of the clutch, having tapered bearing-surfaces $i\,i'$, with a clutch-plate having bearing-lugs $k\,k'$, adapted to said faces of the clutch-casing, and means for operating said clutch-plate, substantially as described.

11. The combination of the frame A, slotted as described, with a block adapted to said slot, with a head on said block having a tapered shoulder adapted to rest upon the tapered shoulder of the frame, with a pivot-pin mounted in said block, carrying the treadle-lever, substantially as set forth.

12. The combination, in a bicycle, of the frame yoked with a bar mounted in said yoke, with a pivot-block retaining the frame and the bar in position, with a pivot-pin passing through said block and having at its outer end the operating-lever, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK SCHRADER.

Witnesses:
R. SCHLEICHER,
HARRY SMITH.