No. 675,288. Patented May 28, 1901.

N. E. NASH.

BACK PEDALING BRAKE.

(Application filed Dec. 8, 1899.)

(No Model.) 2 Sheets—Sheet 1.

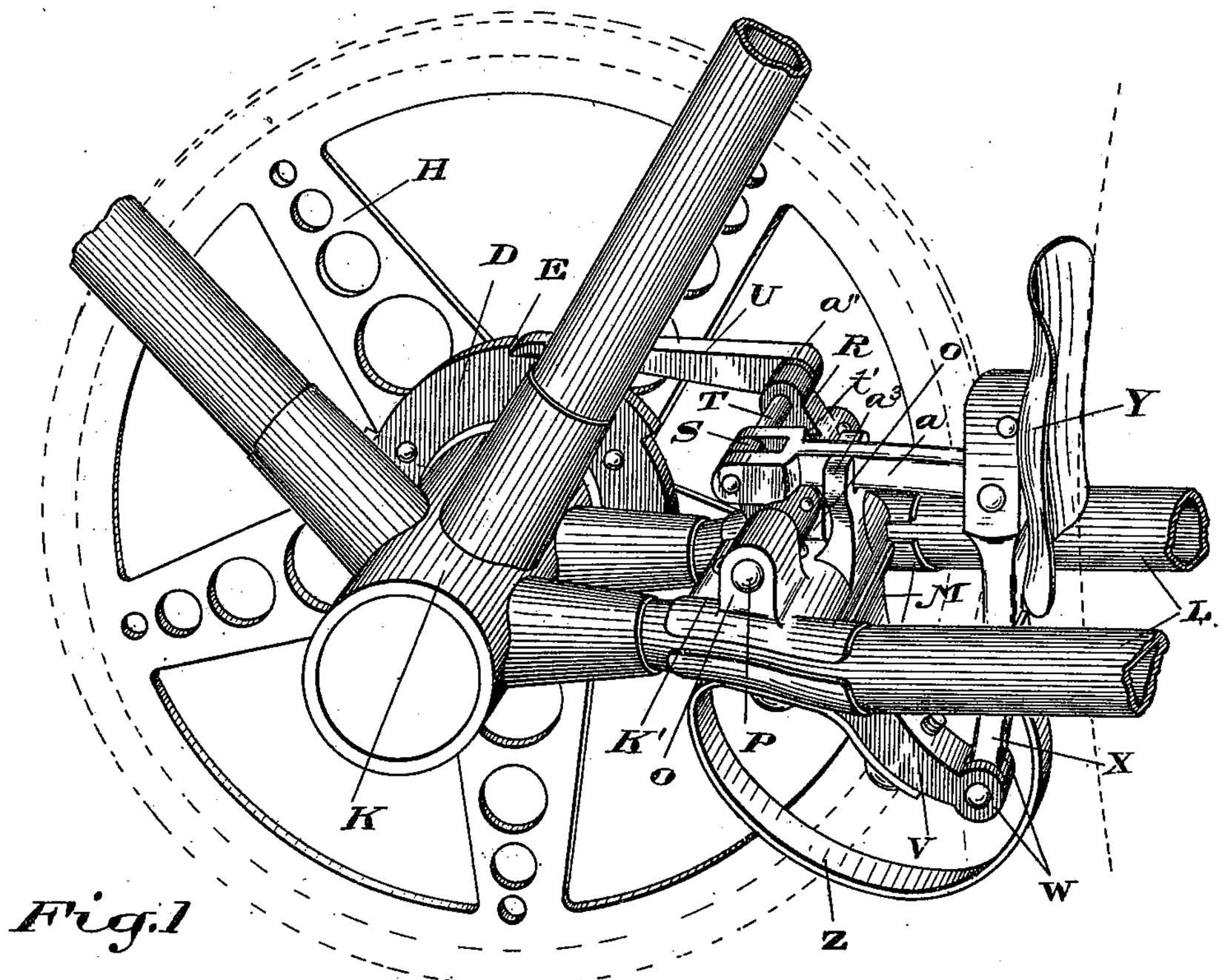

Fig. 1

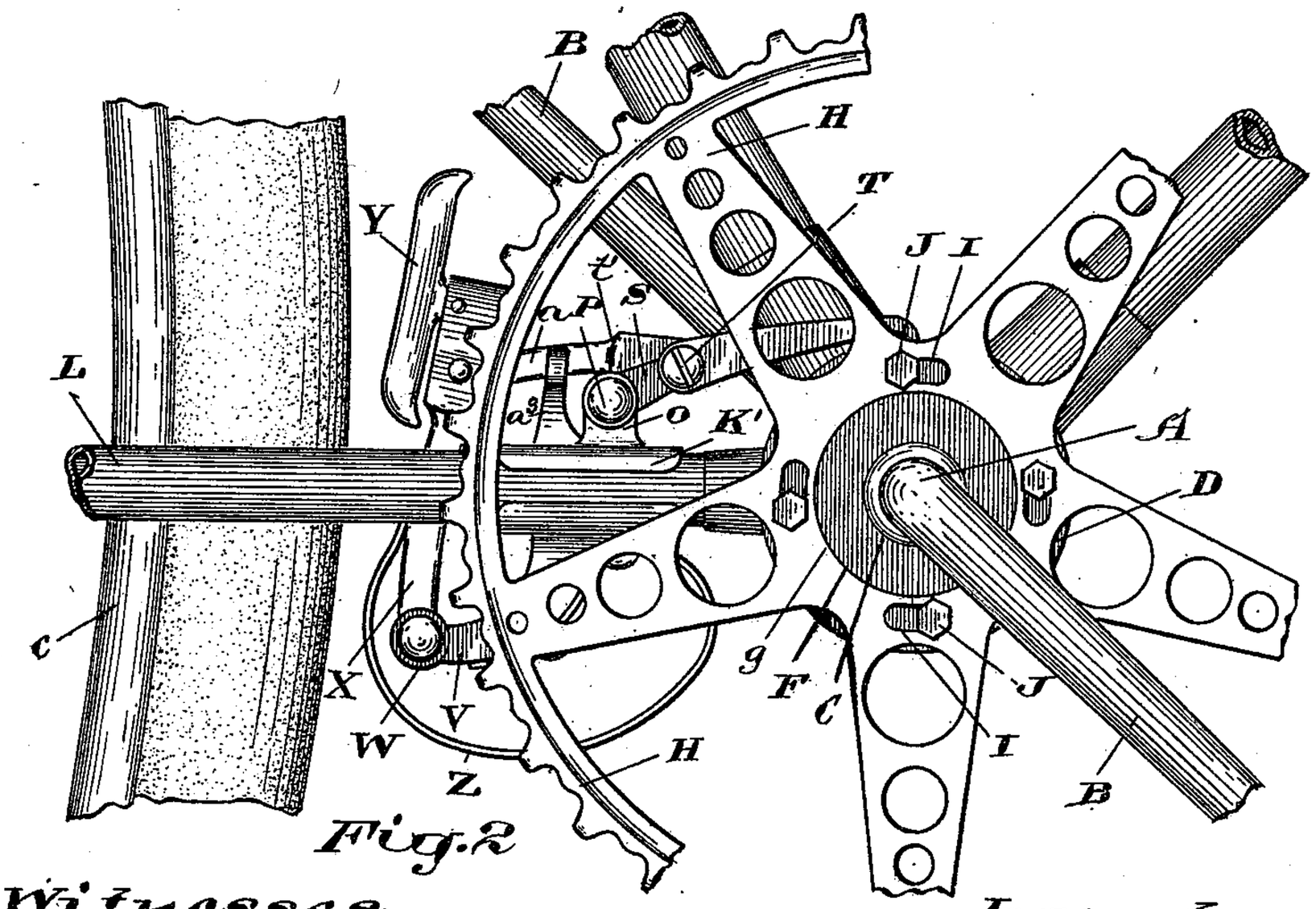

Fig. 2

Witnesses
J. E. Bamum
G. Snyder

Inventor
Nathan E. Nash
by C. N. Riches
his attorney.

No. 675,288. Patented May 28, 1901.

N. E. NASH.

BACK PEDALING BRAKE.

(Application filed Dec. 8, 1899.)

(No Model.) 2 Sheets—Sheet 2.

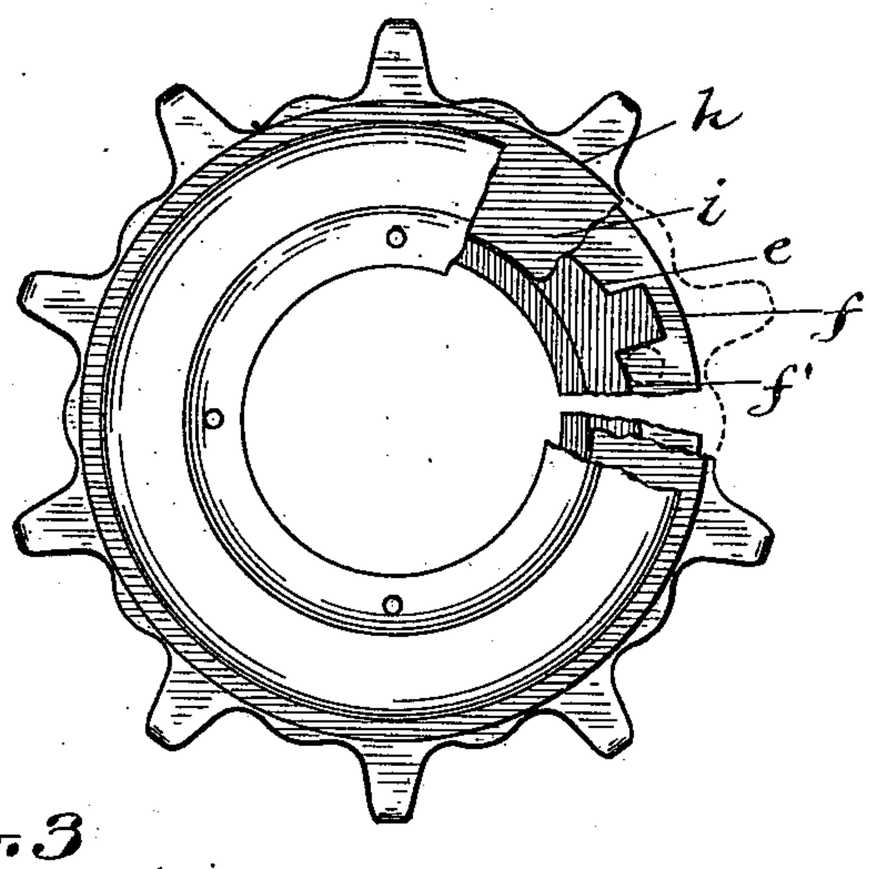

Fig. 3

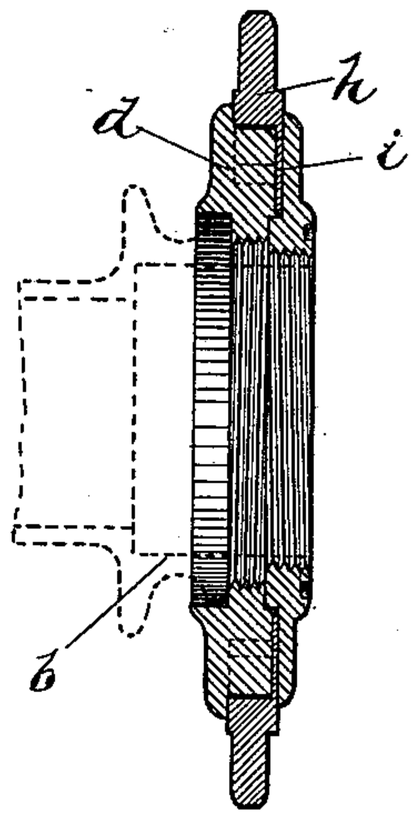

Fig. 4

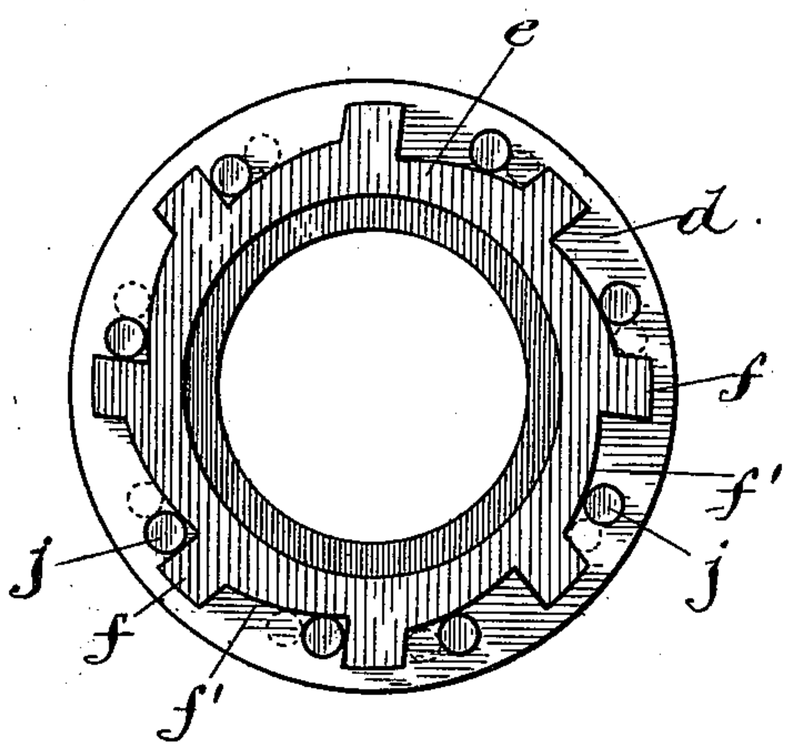

Fig. 5

Witnesses
J. E. Lamson
G. Snyder

Inventor
Nathan E. Nash.
by C. N. Ricks
his attorney

UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF TORONTO, CANADA.

BACK-PEDALING BRAKE.

SPECIFICATION forming part of Letters Patent No. 675,288, dated May 28, 1901.

Application filed December 8, 1899. Serial No. 739,730. (No model.)

To all whom it may concern:

Be it known that I, NATHAN E. NASH, residing at 125 Oxford street, in the city of Toronto, county of York, and Province of Ontario, Canada, have invented certain new and useful Improvements in Bicycles; and I hereby declare that the following is a full, clear, and exact description of the same.

The object of this invention is to provide a bicycle with a brake the shoe of which is capable of being instantaneously set with any desired pressure against the tire of the driving-wheel by the application of back pressure to the pedals and to provide the hub of the driving-wheel with an independent sprocket-wheel fitted with a friction-clutch, arranged to rotate the hub of the driving-wheel during the forward rotation of the pedals, and the friction-clutch being so arranged that it will disengage itself from the hub of the driving-wheel while coasting or back-pedaling; and the invention consists, essentially, of the device hereinafter more fully set forth, and more particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a portion of a bicycle, showing the construction of the brake. Fig. 2 is a side view of the same. Fig. 3 is a side elevation of the sprocket-wheel of the driving-wheel with the casing partially broken away to show the relative positions of the parts. Fig. 4 is a transverse section through the sprocket-wheel and a portion of the hub of the driving-wheel. Fig. 5 is a side elevation of the friction-clutch for rotating the hub of the driving-wheel during the forward rotation of the sprocket-wheel.

Like letters of reference refer to like parts throughout the specification and drawings.

A represents a crank-axle, journaled in the crank-axle bracket K, which is provided with the usual cranks B. Rigidly mounted upon the crank-axle A, contiguous to one of the cranks B, is a disk D, having a series of rearwardly-projecting ratchet-teeth E. Projecting outwardly from the side face of the disk D, between the bore C and ratchet-teeth E, is a circular shoulder F, upon which is loosely mounted the hub *g* of the sprocket-wheel H. The hub *g* of the sprocket-wheel H is provided with a series of elongated slots I, concentric with the center of the crank-axle A, and projecting through the slots I from the side face of the disk D is a corresponding number of bolts J, by means of which the sprocket-wheel H is caused to revolve during the revolution of the disk D. Connected to the lower end of the standard of the frame and projecting rearwardly from the crank-axle bracket K are the rear forks L, braced by a suitable stay-rod M, contiguous to the bracket K. Projecting upwardly from a bracket K′ are two lugs O, in which is journaled the operating shaft P of the brake. Projecting upwardly from that end of the shaft contiguous to the sprocket-wheel H is a crank R, and projecting upwardly from the middle of the shaft P is a crank S. Journaled in the cranks R and S is a shaft T, and loosely journaled on the shaft T on the outer side of the crank R is the hub *a″* of the dog U, the opposite end of the dog U normally resting on the periphery of the disk D to engage the teeth E of the disk D when back-pedaling is applied to the cranks B. Projecting rearwardly from the under side of the stay-rod M is a curved lug V, the rear end of which is bifurcated, and pivoted between the forks W of the bifurcated end of the lug V is the lower end of the arm X of the brake-shoe Y. The rear face of the brake-shoe Y conforms to the shape of the tire of the wheel in order that when the brake is applied the whole face of the brake-shoe will engage the tire to realize the full braking value of the brake-shoe. As shown in the drawings, the face of the brake-shoe opposed to the tire is of a concaved shape; but this shape can be varied to correspond to the shape of the tire. Bolted to the under side of the stay-rod M is one end of a curved spring Z, while the opposite end of the spring Z engages the rear face of the arm X to hold the brake-shoe normally out of engagement with the tire of the wheel. Loosely mounted on the shaft T, contiguous to the crank S, is one end of a lever *a*, while the opposite end of the lever *a* is pivotally connected to the arm X at the front of the brake-shoe Y.

The operation of this portion of the invention is as follows: By applying back pressure to the cranks B the disk D is partially rotated rearwardly, causing one of the ratchet-teeth E to engage the point of the detent-dog U and force the dog rearwardly during the

continued application of the back pressure to the cranks B. The backward movement of the detent-dog U turns rearwardly the cranks R and S and shaft P. The rearward rotation of the cranks R and S carries with them the shaft T, upon which is journaled one end of the lever *a*. The rearward movement of the shaft T causes a corresponding movement of the lever *a*, which movement of the lever *a* moves the brake-shoe rearwardly and sets it against the tire of the driving-wheel with a pressure corresponding to the back-pedaling pressure applied to the cranks B. The back-pedaling pressure causes the movement of the bolts J to the rear ends of the slots I. When the brake is to be released from the tire, the disk moves forwardly to bring the bolt to the front end of the slots before causing the rotation of the sprocket-wheel, which movement on the part of the disk is sufficient to release the detent-dog U to allow the spring Z to move the brake-shoe from the tire, after which the forward rotation of the sprocket-wheel is commenced. The hub *b* of the driving-wheel *c* is provided with a removable disk *d*, the inner side face of which is fitted with a clutch member of an annular flange *e*, projecting outwardly from the side face of the disk, and a series of radial lugs or stops *f*, radiating from the periphery of the annular flange. The periphery of the annular flange *e* between each adjacent pair of lugs or stops *f* is inclined rearwardly to provide rearwardly-sloping recesses *f'*, the front of each of which is higher than the back. Loosely mounted on the hub *b*, contiguous to the disk *d*, is a sprocket-wheel *h*, provided with an annular flange *i* to overlap the annular flange *e*. Contained in the spaces between the lugs or stops *f* are a series of friction rollers or balls *j*, the diameter of each of which is slightly greater than the lesser depth of the recess *f'* in order that during the forward rotation of the sprocket-wheel *h* the friction rollers or balls *j* will roll to the forward end of the recess *f'* and by binding between the periphery of the recesses *f'* and inner face of the flange *i* cause the united revolution of the disk *d*, hub *b*, and driving-wheel *c* with the sprocket-wheel *h*. While coasting the sprocket-wheel *h* is stationary. This enables the friction rollers or balls *j* to roll to the rear of the recess *f'*, the depth of which is greater than the diameter of the balls or rollers to prevent the contact of the balls or rollers with the inner face of the annular flange *i* and to allow of the revolution of the driving-wheel independently of the sprocket-wheel. This releases the disk *d* and allows of the disk, hub, and driving-wheel continuing their revolution, while the sprocket-wheel is held stationary. Motion is imparted from the sprocket-wheel H to sprocket-wheel *h* by means of a sprocket-chain. During the forward rotation of the cranks the sprocket-wheel H is caused to revolve with the crank-axle, which revolution of the sprocket-wheel H imparts a rotary motion to the sprocket and through the sprocket-chain to the sprocket-wheel *h*. The forward rotation of the sprocket-wheel *h* causes the friction rollers or balls *j* to bind in the recess *f'* of the flange *e* to cause the united revolution of the disk, driving-wheel, and hub with the sprocket-wheel *h*.

If during the progress of the vehicle the cranks B are held stationary, the rotation of the sprocket-wheels and the sprocket-chain will be arrested, but the driving-wheel will continue its revolution and the vehicle its progress. It is possible by this means to coast without removing the feet from the pedals, which enables the rider to control his wheel with the assistance of the feet while indulging in that pastime. By the application of back pressure to the cranks the disk D is caused to engage the detent-dog and move the brake-shoe into engagement with the tire on the wheel. The brake can be set in this way either during the progress of the wheel or while coasting with any pressure or force which the rider may deem it advisable to exert. If it is necessary to stop the wheel suddenly during its progress, the rider can exert his entire strength upon the cranks when setting the brake-shoe to instantaneously arrest the revolution of the driving-wheel and cause it to skid upon the pavement and at the same time arrest the revolution of the sprocket-wheel and sprocket-chain. By applying the braking power to the wheel vertically below the rider or slightly to the rear the danger of throwing him over the handle-bars by a sudden stoppage of the wheel when traveling at a high rate of speed is obviated, and by disconnecting the sprocket-wheels from the driving-wheel the danger of breakage to any of these parts is avoided.

By loosely mounting the sprocket-wheel H on the circular shoulder of the disk D and providing the sprocket-wheel with the elongated slots through which pass the bolts coupling the sprocket-wheel to the disk the brake can be released from its pressure on the tire of the driving-wheel before the revolution of the sprocket-wheel is commenced.

Projecting upwardly from the top of the bracket K' is a bifurcated lug a^3, which embraces the sides of the shaft T, which shaft is provided with shoulders *t'* to engage the front face of the bifurcated stop when the lever has reached its most rearward position. This lug acts as a dismounting-stop for the rider—that is, it holds the lever in its most rearward position and prevents the jamming of the shoe against the tire of the driving-wheel while the rider is dismounting. The spring Z acts as a riding-spring—that is, it is of sufficent strength to hold the parts in their normal position during the forward transition of the bicycle and by the rotation of the pedals when coasting.

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

1. In a bicycle a brake embracing in its construction a crank-axle, a ratchet-disk mounted on the crank-axle and revoluble therewith, a brake-shoe, an arm for the brake-shoe pivoted to the frame of the bicycle contiguous to the wheel, a shaft journaled in bearings connected to the frame of the bicycle contiguous to the brake-shoe, cranks connected to the shaft, a shaft journaled in the cranks, a lever journaled on the shaft connected to the arm of the brake-shoe, a detent-dog journaled on the second shaft engaging the ratchet-disk, a hub projecting outwardly from the side face of the ratchet-disk, a sprocket-wheel loosely mounted upon the hub having slots concentric with the center of the same, bolts passing through the slots and entering the ratchet-disk, in combination with the driving-wheel a sprocket-wheel, loosely mounted on the hub of the driving-wheel, a friction-clutch adapted to rotate the driving-wheel during the forward rotation of the sprocket-wheel, the sprocket-chain passing around the sprocket-wheels of the driving-wheel and crank-axle, substantially as specified.

2. A bicycle embracing in its construction a crank-axle bracket, a crank-axle journaled in the bracket, cranks fitted to the crank-axle, a disk rigidly mounted on the crank-axle contiguous to one of the cranks and having a series of rearwardly-projecting ratchet-teeth, a circular shoulder projecting outwardly from the side face of the disk, a sprocket-wheel loosely mounted on the shoulder and revoluble therewith, a series of slots formed in the sprocket-wheel concentric with the crank-axle, bolts passing through the slots into the disk in combination with the frame connected to the crank-axle bracket, a brake-shaft journaled in the frame, an outwardly-directed crank for the brake-shaft, a movable shaft carried by the crank, a dog connected to the crank engaging the teeth of the disk, a rearwardly-directed arm connected to the frame, a brake-shoe pivoted to the arm, a spring one end of which is connected to the arm and the other bearing against the brake-shoe, and a lever one end of which is loosely mounted on the movable shaft and the other end pivotally connected to the brake-shoe, substantially as specified.

Toronto, December 1, 1899.

NATHAN E. NASH.

In presence of—

C. H. RICHES,

J. E. CAMERON.