No. 611,147. Patented Sept. 20, 1898.

S. A. RANDALL.

BACK PEDALING BRAKE.

(Application filed Dec. 3, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

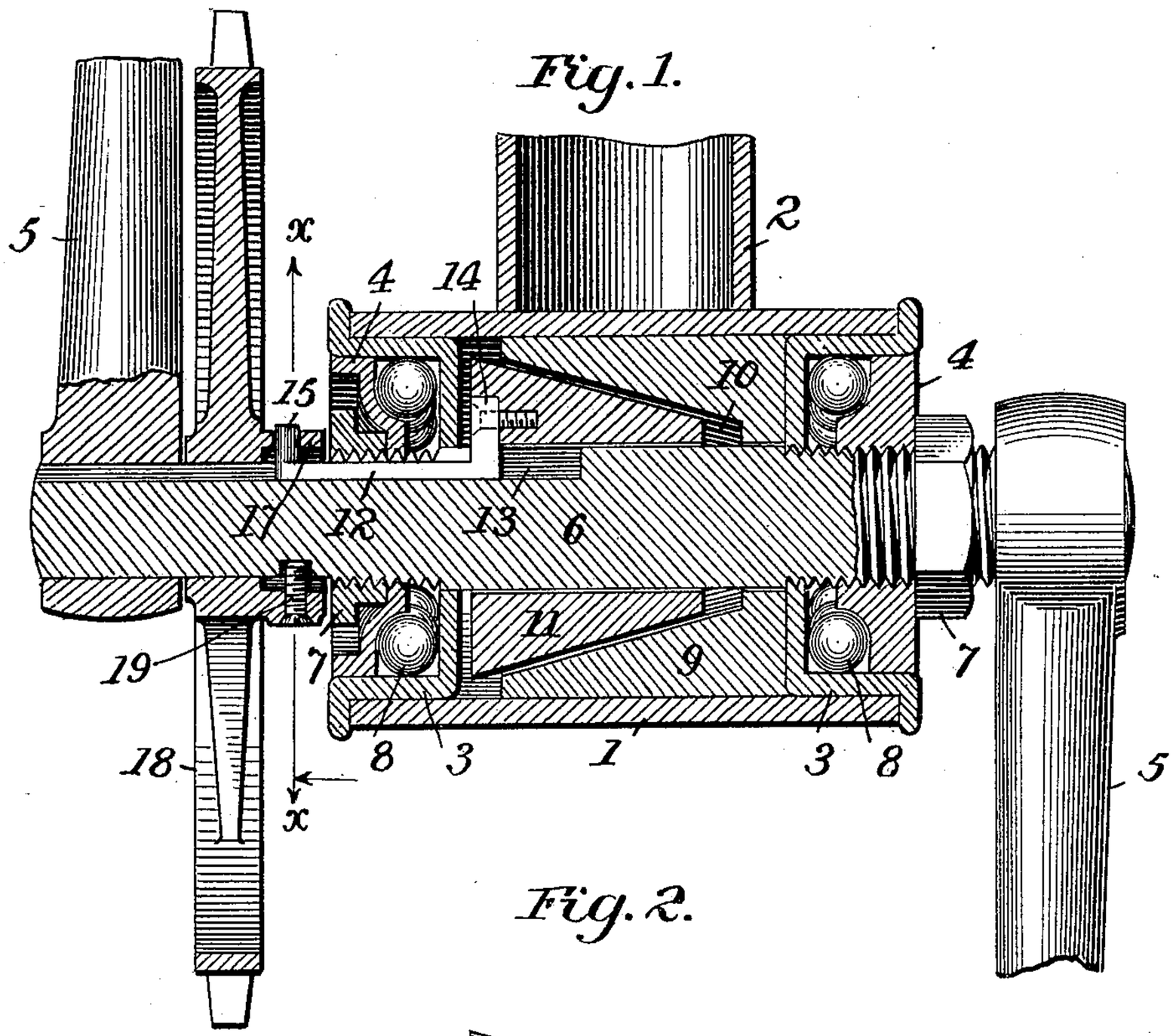

Fig. 2.

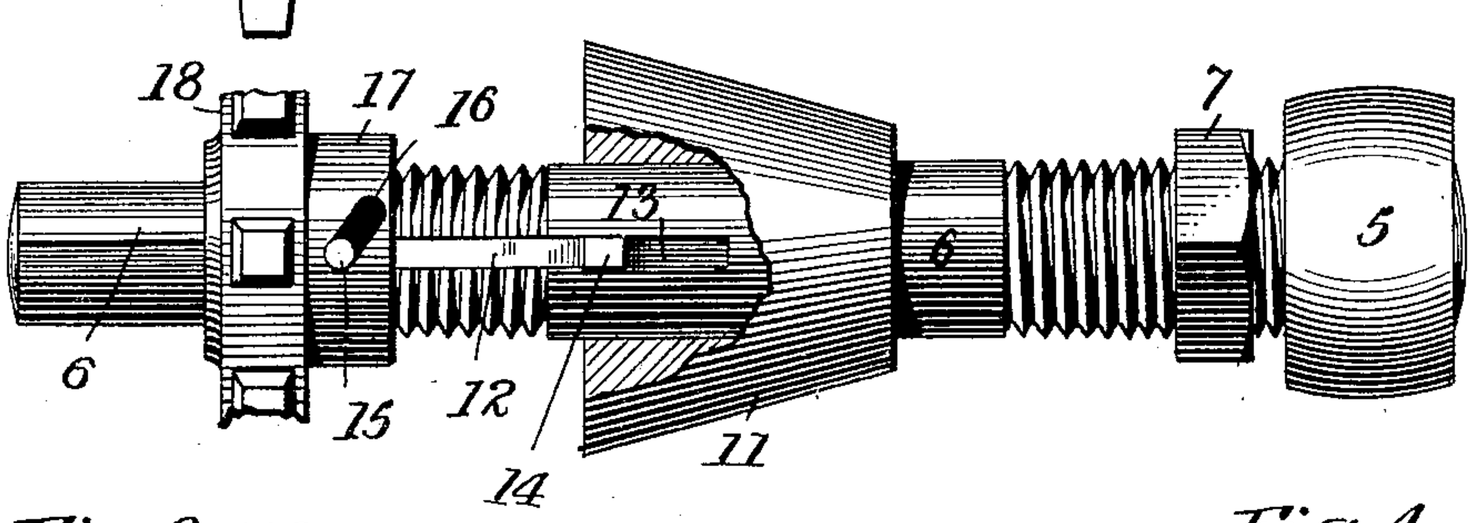

Fig. 3.

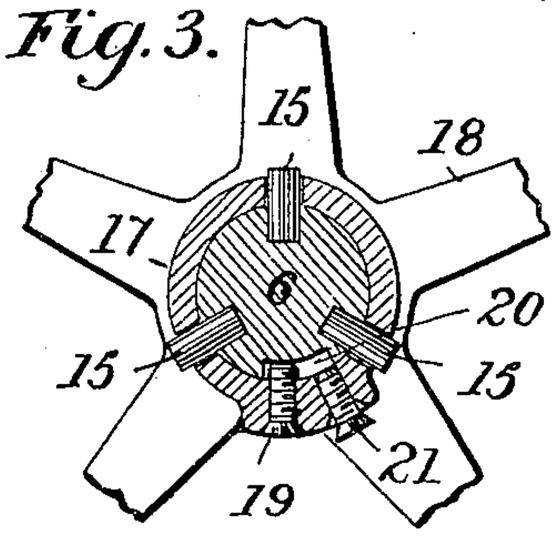

Fig. 4.

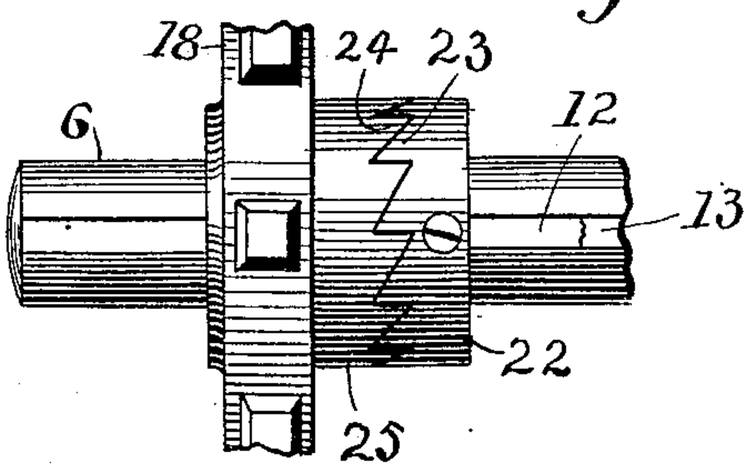

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Fig. 5.

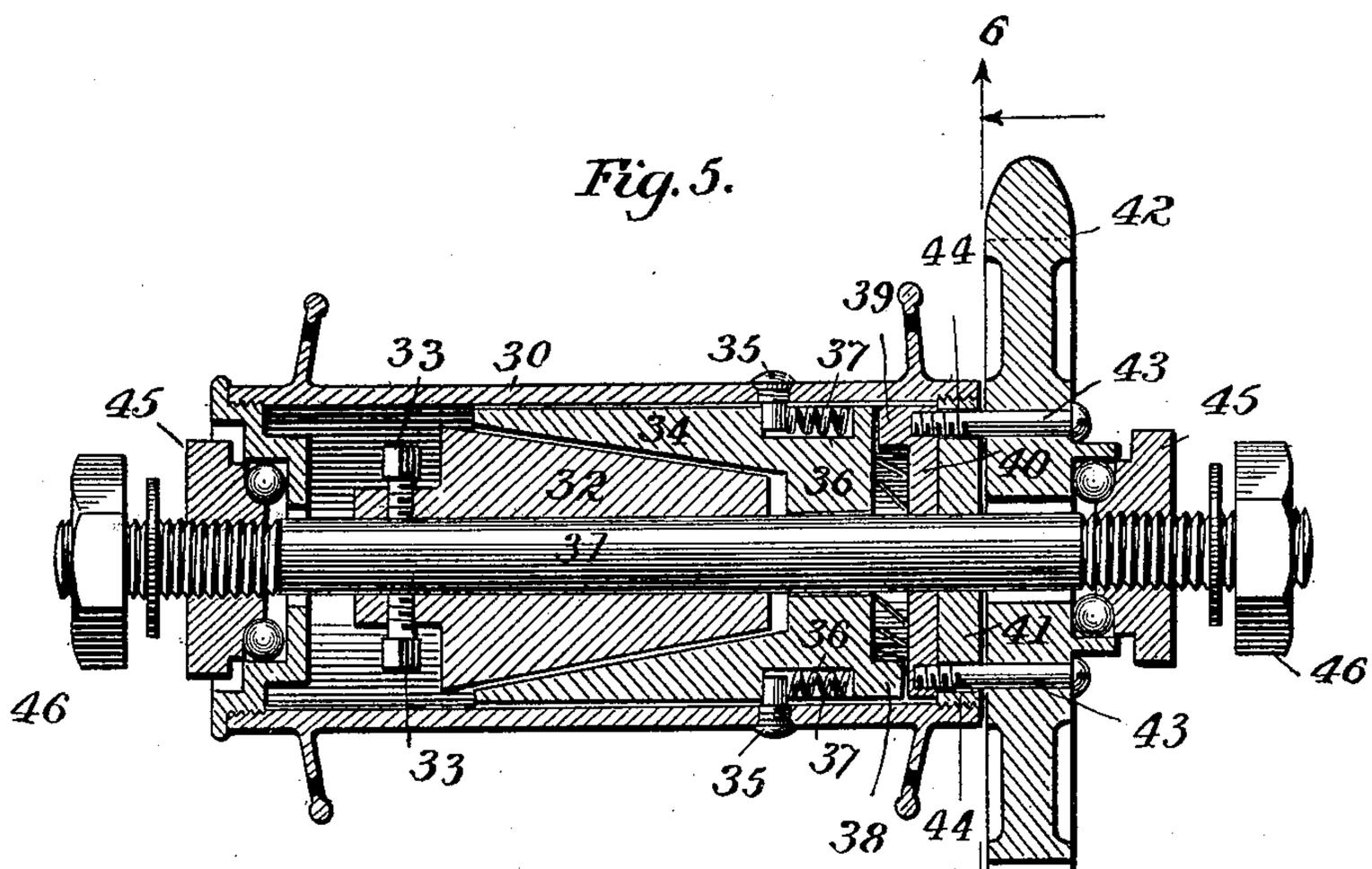
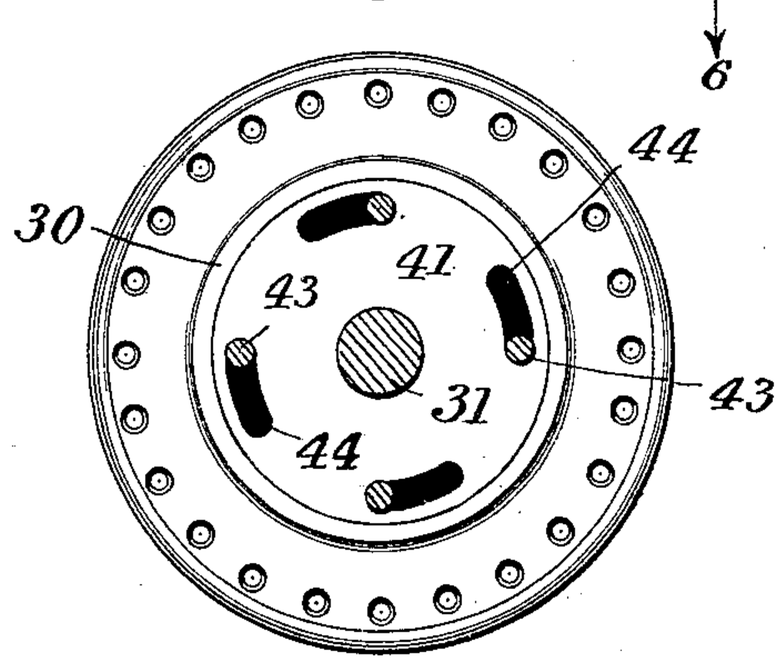


Fig. 6.



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UNITED STATES PATENT OFFICE.

SHERMAN A. RANDALL, OF HONEOYE FALLS, NEW YORK.

BACK-PEDALING BRAKE.

SPECIFICATION forming part of Letters Patent No. 611,147, dated September 20, 1898.

Application filed December 3, 1896. Serial No. 614,340. (No model.)

To all whom it may concern:

Be it known that I, SHERMAN A. RANDALL, a citizen of the United States, residing at Honeoye Falls, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Automatic Bicycle-Brakes, of which the following is a specification.

This invention relates to automatic brakes for bicycles.

The object of the invention is to produce a brake which is simple and strong in construction, powerful in operation, which does not mar the appearance of the machine, and which can be applied automatically by backward pressure upon the pedals.

To these ends the invention consists in male and female cones surrounding the crank-axle or the axle of the rear wheel, one of said cones being fixed and the other rotating with the axle, and means for positively forcing the conical surfaces together automatically when the pedals are moved backward and for drawing them apart when the pedals are moved forward.

The invention will be more fully described in connection with the accompanying drawings, in which—

Figure 1 is a sectional view through the crank-axle of a bicycle provided with my improvements. Fig. 2 is a plan view of the axle and the male friction-cone, parts of the cone and the sprocket-wheel being broken away. Fig. 3 is a section on the line *x x* of Figs. 1 and 2. Fig. 4 is a view similar to part of Fig. 2, illustrating a modification. Fig. 5 is a sectional view illustrating the application of the invention to the hub of the rear wheel of a bicycle, and Fig. 6 is a section on the line 6 6 of Fig. 5.

Referring to the drawings, 1 indicates the crank-hanger, which is attached in the usual manner to the tubular frame 2. The inner fixed bearings 3 are connected to the hanger, and the outer bearings 4 and cranks 5 are connected to the crank-axle 6 in the usual manner. Locking-nuts 7 are applied to the outer bearings, and balls 8 are interposed between the bearings, as usual.

Within the hanger 1 and rigidly attached to it is a block 9, having a conical cavity 10, which block I shall call the "female cone." Within the cavity 10 is a male cone 11, which is preferably ground to fit the conical surface of the cavity exactly. The cone 11 slides lengthwise on the crank-axle and turns with it, being attached to splines 12, which slide in grooves 13 in the axle. There may be one or more of the splines and grooves, as desired. I prefer to use several, and in the drawings I have shown three arranged one hundred and twenty degrees apart about the crank-axle. The inner ends 14 of the splines are turned radially outward and attached to the cone 11, while the outer ends 15 of the splines are also turned radially outward and engage inclined slots 16 in the hub 17 of the sprocket-wheel 18. The sprocket-wheel is loose upon the crank-axle and is permitted to turn slightly forward or backward, the amount of movement being limited by a pin or screw 19, which passes through the hub 17 and enters a groove 20 in the axle. The groove 20 is narrow, and it prevents the sprocket-wheel from sliding endwise on the axle.

The operation of the invention is quite simple and will be readily understood. When the cranks are being pedaled forward, the pin 19 is at the rear end of the slot 20 and the male cone is separated from the female cone by the inclined or cam grooves 16. When the pressure on the pedals is applied to "back-pedal" the bicycle, the momentum of the machine will drive the sprocket-wheel forward upon the crank-axle until the pin 19 reaches the opposite end of the slot 20. This movement of the sprocket-wheel upon the crank-axle will cause the inclined slots 16 to drive the splines 12 inward, thus bringing the conical frictional surfaces together and applying the brake to the crank-axle with more or less force, depending upon the pressure exerted in back-pedaling. It will be seen that the working parts of my improved brake are nearly all controlled and protected within the crank-hanger and that the friction-surfaces are thoroughly protected from dust and dirt. The brake will therefore be always reliable.

When it is desired not to use the automatic brake, the sprocket-wheel is attached rigidly to the crank-axle by some suitable means. As shown, this is accomplished by an addi-

tional pin or screw 21, which engages one end of the slot 20 while the pin 19 engages the other end.

In Fig. 4 I have illustrated a modification in which the splines 12 are attached to a cam-ring 22, having a series of cam-teeth 23, which engage similar teeth 24 upon the hub 25 of the sprocket-wheel 18. The operation of this device is exactly the same as the operation of the form above described. When the machine is back-pedaled, the sprocket-wheel rotates forwardly upon the axle and the cam-ring 22 is forced inward, thus applying the brake.

In Figs. 5 and 6 I have shown a modified form of the invention applied to the rear or driving wheel of a bicycle. In these figures, 30 indicates the barrel or hub, and 31 the fixed axle. In this modification the non-rotating part of the brake is a male cone 32, rigidly attached to the axle 31 by suitable means, such as the set-screws 33. The rotating part, which is preferably the sliding part also, consists of a female cone 34, fitted to slide within the hub and arranged to turn with it by means of pins or screws 35, which pass through the hub and enter slots 36 in the cone 34. The friction-surfaces are normally disengaged by means of springs 37, which, as shown, are located in the slots 36. Upon the outer end of the cone-piece 34 are a series of cam-teeth 38, which engage similar cam-teeth 39 upon a disk 40. This disk is located within the end 41 of the hub and is connected with the sprocket-wheel 42 by means of pins or bolts 43, which pass through curved slots 44 in the end 41. The rear hub and sprocket-wheel, with their connected parts, are supported upon ball-bearings of any desirable construction. As shown, the hub is directly supported at one end upon the ball-bearing, and at the other end the bearing supports the sprocket-wheel. In each case the inner bearing is in the form of a nut or disk 45, which is adjustable upon the axle. The usual nuts 46 are provided on the ends of the axle for attaching the axle to the rear fork of the bicycle.

In the claims I shall use the term "cylindrical casing" as a generic term to include both the hollow hub and the hollow hanger. It will be manifest that so far as my invention is concerned the hollow hub and hanger are full equivalents.

It will be obvious that my invention may be variously modified without departing from the spirit and scope thereof. The principal feature of the invention consists in providing within the hollow hub or hanger non-rotating and rotating friction-surfaces which can be brought together automatically by backward pressure on the pedals, thereby applying a brake and checking the progress of the bicycle. Broadly considered, it is not essential that the friction-surfaces should be conical, although this is the preferred form. Furthermore, either the rotating or non-rotating part may be arranged to slide laterally.

Without therefore limiting myself to the precise construction and arrangement of parts illustrated, what I claim is—

1. In an automatic bicycle-brake, the combination with the crank-hanger, the bearings, and the crank-axle, of the male and female cones arranged within the hanger between the bearings, said female cone being fixed and said male cone being arranged to slide upon and turn with the axle, one or more splines connected to the male cone and extending out to the sprocket-wheel, and the sprocket-wheel having a limited movement of rotation upon said crank-axle and provided with cam-surfaces by means of which the splines are moved, substantially as described.

2. In an automatic bicycle-brake, the combination with the crank-hanger, the bearings and the crank-axle, of the fixed female cone within the crank-hanger between the bearings, the male cone adapted to slide upon and turn with the axle, the splines sliding in grooves in the axle and having their inner ends rigidly connected to the sliding cone, the sprocket-wheel arranged to have a limited movement of rotation upon said crank-axle, the hub upon said sprocket-wheel provided with inclined cam-slots and the outwardly-turned ends upon the splines engaging the cam-slots, substantially as described.

3. In a bicycle-brake, the combination with an axle and a cylindrical casing surrounding the axle, of male and female friction-cones within the casing and surrounding the axle, one of said cones being stationary and the other rotatable, a sprocket-wheel, and connections between said sprocket-wheel and one of said cones whereby the cone is moved longitudinally when the bicycle is back-pedaled, substantially as described.

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

SHERMAN A. RANDALL.

Witnesses:
IDA A. ZIMMER,
ERWIN E. SHEETS.