No. 626,194. Patented May 30, 1899.

W. H. ALLDERDICE.

BACK PEDALING BRAKE.

(Application filed Dec. 7, 1896.)

(No Model.)

FIG. 1.

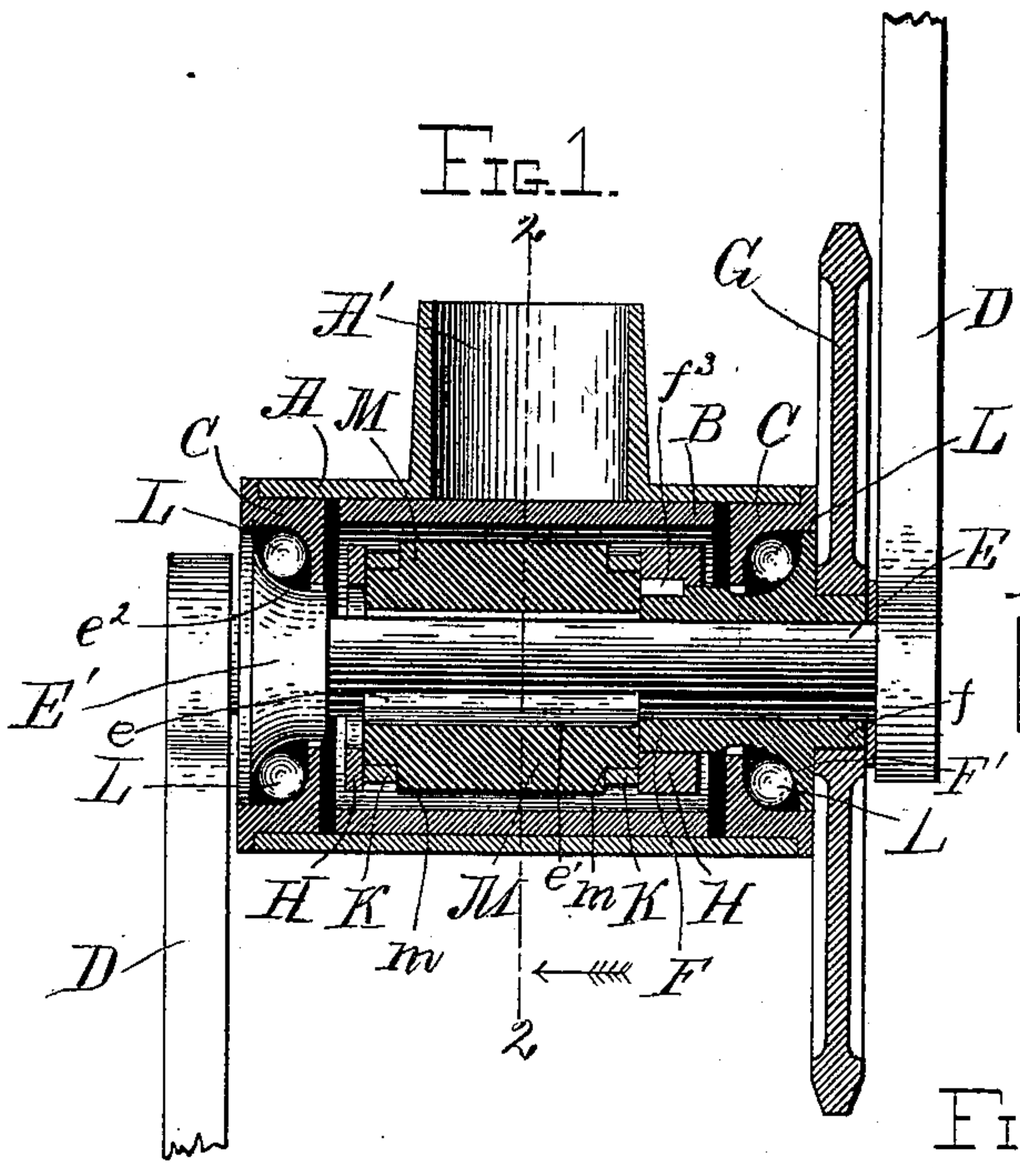


FIG. 2.

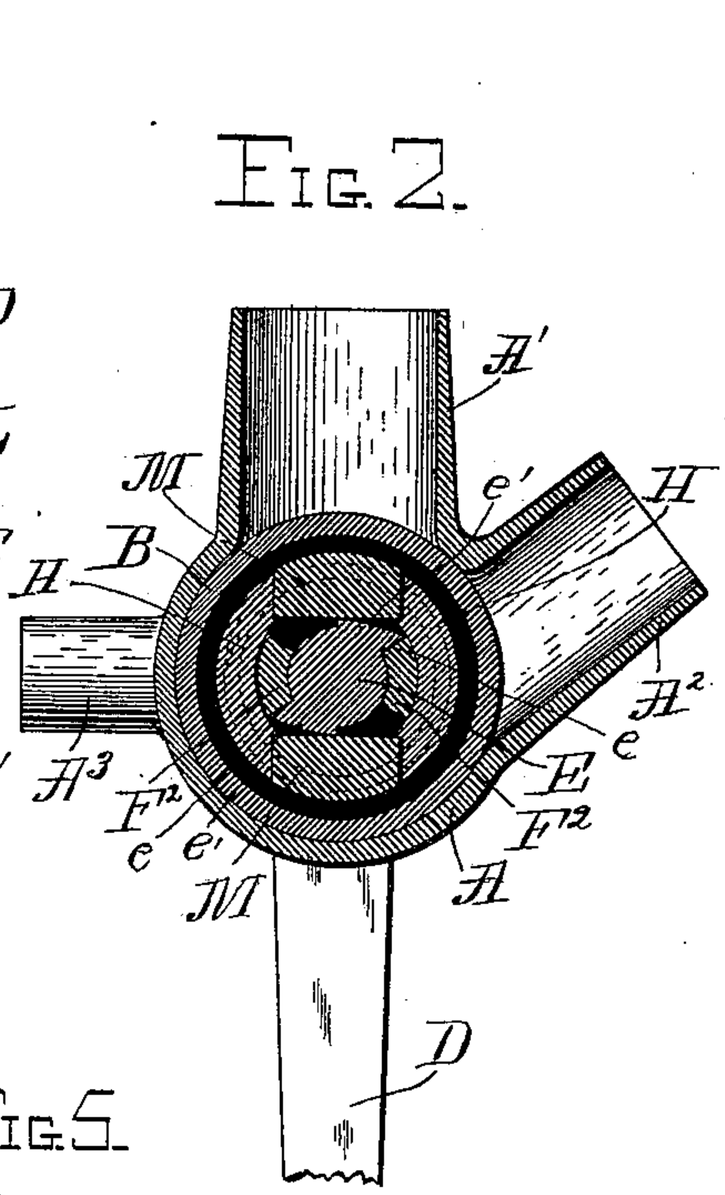


FIG. 5.

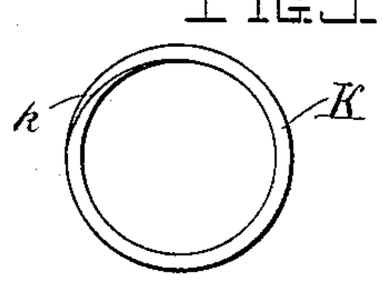


FIG. 3.

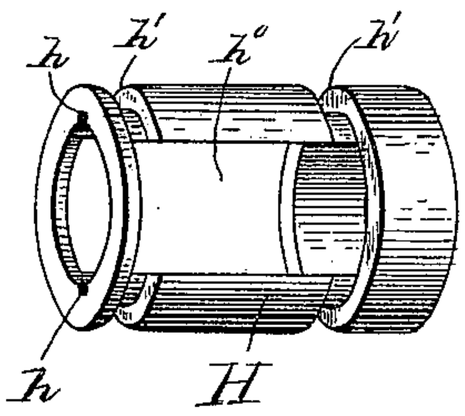
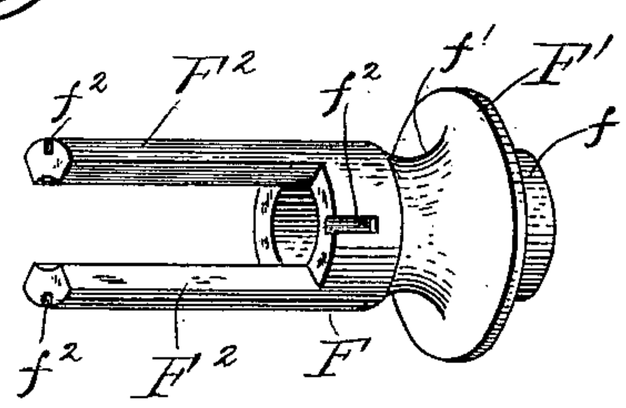


FIG. 4.



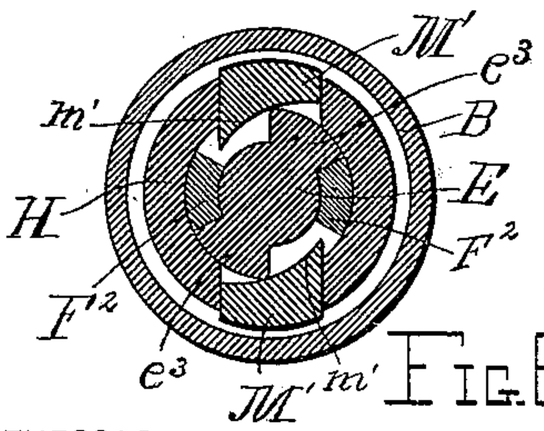


FIG. 6.

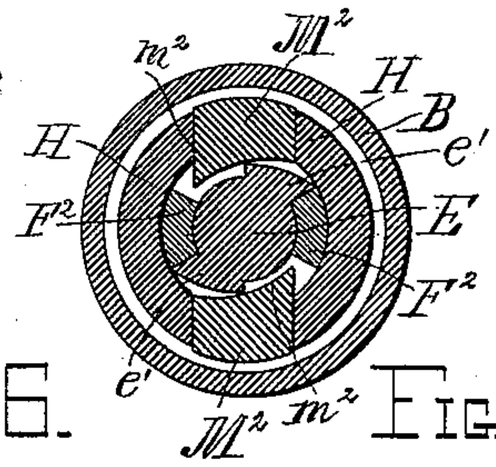


FIG. 7.

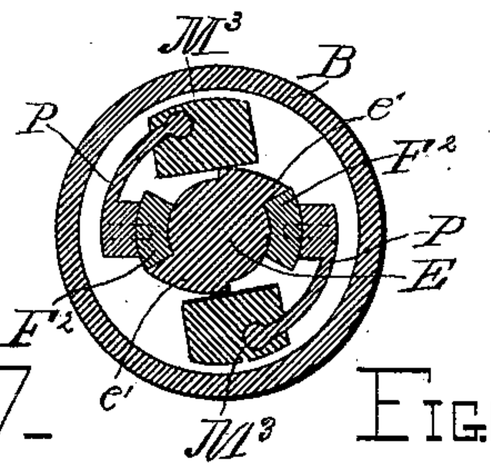


FIG. 8.

WITNESSES

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WILLIAM H. ALLDERDICE, OF THE UNITED STATES NAVY.

BACK-PEDALING BRAKE.

SPECIFICATION forming part of Letters Patent No. 626,194, dated May 30, 1899.

Application filed December 7, 1896. Serial No. 614,816. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. ALLDERDICE, passed assistant engineer, United States Navy, a citizen of the United States, stationed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Bicycle-Brakes; 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.

My invention relates to improvements in bicycle-brakes, and especially in that class of brakes in which the brake is automatically applied in the operation of back pedaling.

The invention will be understood by reference to the accompanying drawings, in which like parts are indicated by similar letters throughout the several views.

Figure 1 represents a central transverse section through the parts of the frame in which the crank-axle is mounted. Fig. 2 represents a section through the device shown in Fig. 1, made by the plane 2 2 of the said figure and looking to the left. Fig. 3 is a perspective view of the detachable sleeve in which the brake-shoes are guided and held. Fig. 4 is a perspective view of an inner sleeve adapted to slip over the crank-shaft and provided with a ball-race for the balls and with engaging arms to engage the shoulders at the ends of the cam-faces on the crank-axle. Fig. 5 represents one of the retracting-springs used for holding the brake-shoes in toward the crank-axle. Fig. 6 represents a vertical section of the friction-sleeve, together with interior portion of the brake mechanism, showing cams and brake-shoes differing in shape from those shown in the preceding figures. Fig. 7 represents a similar view showing another form of brake-shoe and cam. Fig. 8 represents a similar view of an arrangement by which each brake-shoe is secured to a corresponding spring and held thereby against the cams.

A represents a crank-hanger which is secured to the center stay A′, the lower main tube A^2, and the back fork A^3 in any convenient way, and this forms a transverse holder for the ball-bearings and other parts contained therein.

B represents a friction-sleeve which is rigidly contained in the crank-hanger A and is preferably made of hardened steel or other like material which will stand heavy wear.

The usual ball-races C may be used, if desired, or any desired form of antifriction-bearing may be used in connection with the brake mechanism that will hereinafter be described.

The cranks D are secured to the crank-shaft E in the ordinary way, and the said crank-shaft is provided with cams e', having shoulders e at the end thereof to engage the arms F^2 of the sleeve F. These cams e' may be made integral with the crank-shaft or may be secured thereto in any convenient way, but are preferably made integral therewith.

A cone E′, having the ball-race e^2, is secured to or integral with one end of the crank-shaft and serves as a bearing for the balls L, while the other bearing on the shaft is formed by the cone f' of the enlarged head F′ of the sleeve F, which sleeve fits loosely on the crank-shaft E and has rigidly attached thereto, as at f, the sprocket-wheel G. The sleeve F is provided with prongs or arms F^2, extending longitudinally along the crank-shaft, and the said sleeve F, with its arms F^2, is secured to the outer sleeve H in any convenient way, as by means of keys fitting in keyways f^2 and h. It will thus be seen that the sleeve H turns with the sleeve F and that the motion of the two relative to the crank-shaft is limited by the shoulders e of the cams e', which shoulders catch the extending edges of the prongs F^2, and thus permit a limited rotary motion of the crank-shaft relative to the sleeves F and H.

The sleeve H is slotted, as at h^0, and is provided with annular grooves h' to receive the retracting-springs K, which are preferably split, as at k. These springs K fit over shoulders at the ends of the brake-shoes M, which brake-shoes fit in the slot h^0 and are held against flying outward (due to gravity and centrifugal force) when the brake is not in operation by means of the said springs K. The cams e' are so arranged that in the ordinary operation of going ahead on a bicycle the said cams are in the position indicated in Fig. 2, whereby the brake-shoes are allowed to be drawn in by the retractile springs K out

of engagement with the sleeve B; but as soon as the rider begins to back-pedal or press upon the cranks in the opposite direction to that required for going ahead these cams e' will force the said shoes outward, causing them to bear against the interior of the friction-sleeve B, and it will be obvious that the greater the effort required in back-pedaling the harder will these brake-shoes bear against the friction-sleeve B.

Thus it will be obvious that by the herein-described mechanism an adjustable brake is obtained which operates automatically in the process of back pedaling and which is released the moment the rider reverses the direction of the pressure upon the cranks, as for going ahead. It will be seen that the parts are all inclosed and out of the way of dust or dirt and that greater compactness, lightness, strength, and durability are obtained without impairing the efficiency of the brake.

It will be obvious that the herein-described invention may be used with tricycles or other like vehicles, as well as bicycles, and, in fact, in any position wherever it is desired to check the momentum of a moving mass whose motion is imparted by a driving-shaft by retarding the motion of the said shaft.

While I have shown one particular form of ball-bearing, the invention may be used with a great variety of forms of such or other bearings. Moreover, it will be obvious that although Fig. 1 shows a sprocket-wheel G as used for the transmission of motion from the crank-shaft to the driving-wheel the brake herein described would be equally operative in case a cog-wheel were substituted for said sprocket-wheel G.

It may be seen that the principle of my invention would remain the same if a single brake-shoe were used instead of two, the use of two brake-shoes being, however, preferable in order to equalize the pressure on opposite sides of the shaft E.

It will also be obvious that the principle would remain the same if the radially-inclined surfaces were transferred from the cams e' to the backs of the brake-shoes M, against which the cams e' bear, the cams themselves being given cylindrical faces, as shown in Fig. 6, in which M′ represents the brake-shoe and e^3 the cam, or if radially-inclined surfaces were given to both the cams and the brake-shoes, as shown at M^2 and e', Fig. 7.

It may further be seen, referring to Figs. 1 and 2, that the function of the sleeve H is primarily to serve as a guide for the brake-shoes M and to carry the springs K, which serve to retract or hold back the brake-shoes M when the brake is not in operation, but that other means may be employed to guide or restrict the motion of the brake-shoes and to carry the retracting-springs without departing from the principle of my invention—as, for example, in the form shown in Fig. 8, in which the sleeve H of the preceding figures is omitted, and a separate spring P is used for each brake-shoe, one end of each spring being rigidly secured to or integral with the corresponding brake-shoe M^3 and the other end being rigidly secured in any convenient way to the part F^2 of the sleeve F. (Shown in Fig. 4.) In this form of my invention the brake-shoes M will be given an approximately but not exactly radial motion when the brake is put in operation.

It may also be seen that in my invention the tension of the springs K will serve to prevent the operation of the brake when it is not desired to put it on, as in coasting, a considerable pressure being required to put on the brake against the tension of the springs.

Further advantages possessed by the brake herein described lie in the fact that the parts are inclosed and free from dust, that the external appearance of the bicycle remains unchanged, and that all parts are readily accessible for examination.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A brake mechanism consisting of two rotating movable parts concentric with each other and normally rotating together but capable of a limited rotary motion relative to each other, a fixed part concentric with said rotating movable parts, a brake-shoe carried by that one of the said rotating parts nearest to said fixed part and rotating therewith and normally out of contact with said fixed part, a spring carried by said rotating part nearest to said fixed part, a cam secured to or integral with that one of the said rotating parts farthest from said fixed part and rotating therewith, a forked sleeve transmitting motion from the rotary part farthest from said fixed part to the rotary parts nearest to said fixed part, suitably-arranged surfaces on said cam and on that side of said brake-shoe farthest from said fixed part whereby when a limited rotary motion relative to each other is given to said rotating parts said surfaces will act upon each other in such manner that said brake-shoe will be pressed against said fixed part in opposition to the tension of said spring, substantially as described.

2. In a bicycle-brake, the combination with a fixed friction-sleeve, a shaft operated by the pedals and rotating in said sleeve, cams on said shaft with engaging shoulders thereon, a sleeve loose on said shaft and having forks adapted to engage the shoulders of said cams, and brake-shoes mounted between said forks and operated by said cams when the pressure on said pedals is reversed, substantially as described.

3. In a bicycle-brake, the combination with a fixed friction-sleeve, a shaft operated by the pedals and rotating in said sleeve, cams on said shaft with engaging shoulders thereon, a sleeve loose on said shaft and having forks adapted to engage the shoulders of said cams, a slotted guide-sleeve secured to said

forked sleeve, over said forks, and brake-shoes mounted in said slots and between said forks, substantially as described.

4. In a bicycle-brake, the combination with a fixed friction-sleeve, a shaft operated by the pedals and rotating in said sleeve, cams on said shaft with engaging shoulders thereon, a sleeve loose on said shaft and having forks adapted to engage the shoulders of said cams, and brake-shoes mounted between said forks and operated by said cams when the pressure on said pedals is reversed, and springs normally tending to draw said brake-shoes toward the axis of said shaft, substantially as described.

5. In a bicycle-brake, the combination with a fixed friction-sleeve, a shaft operated by the pedals and rotating in said sleeve, cams on said shaft with engaging shoulders thereon, a sleeve loose on said shaft and having forks adapted to engage the shoulders of said cams, a slotted guide-sleeve secured to said forked sleeve, over said forks, brake-shoes mounted in said slots and between said forks, and springs normally tending to draw said brake-shoes toward the axis of said shaft, substantially as described.

6. In a bicycle-brake, the combination with a driven wheel, a crank-shaft operated by pedals, a cam on said shaft, a sleeve loose on said shaft, engaging shoulders on said shaft and said sleeve whereby when said pedals are operated for going ahead said sleeve will be caused to revolve with said shaft as if rigidly connected thereto, a sprocket-wheel or other gear rigidly attached to said sleeve, intermediate gearing connecting said sprocket with said driven wheel, a fixed friction-sleeve fast to the framework of the machine, a brake-shoe mounted on the sleeve loose on the crank-shaft hereinabove referred to and normally out of contact with said fixed friction-sleeve when said pedals are operated for going ahead, but operated by said cams when the pressure on said pedals is reversed in such manner as to be pressed against said fixed friction-sleeve, and springs normally tending to draw said brake-shoe toward the axis of said crank-shaft, substantially as described.

7. A brake for bicycles, comprising a driving-shaft, a cam fast thereon, a fixed sleeve fast to the framework of the machine, a brake-shoe rotating with said driving-shaft and in the same direction with the driven wheel of the bicycle and capable of a limited rotary motion relative to said driving-shaft, a sleeve mounted loosely on said driving-shaft and extending on each side of said cam, the said cam forcing said brake-shoe against said fixed sleeve only when force is applied to said driving-shaft in the direction reverse from the normal, substantially as described.

8. A brake for bicycles, comprising a driving-shaft, a cam fast thereon, a fixed sleeve fast to the framework of the machine, a brake-shoe rotating with said driving-shaft, a forked sleeve mounted loosely on said driving-shaft and adapted to impart forward movement to said brake-shoe, the said cam forcing said brake-shoe against said sleeve only when force is applied to said driving-shaft in the direction reverse from the normal, and a retracting-spring adapted to withdraw said brake-shoe when it is not forced outward by said cam, substantially as described.

9. A brake mechanism, comprising a driven wheel, a rotary driving part, a cam fast thereon, a rotating sleeve, concentric with said driving part and capable of a limited rotary motion relative thereto, a slotted guide-sleeve secured to said rotating sleeve, a fixed sleeve fast to the framework of the machine, a brake-shoe rotating with said slotted sleeve and in the same direction with the driven wheel and also movable radially relative to said rotary driving part, and a retracting-spring normally tending to withdraw said brake-shoe, substantially as described.

10. A brake mechanism comprising a driven wheel, a driving-shaft, a cam fast thereon, a fixed sleeve fast to the framework of the machine, a rotating sleeve concentric with said driving-shaft and capable of a limited rotary motion relative to said shaft, a slotted guide secured to said rotating sleeve, a brake-shoe rotating with said rotating sleeve and in the same direction with the driven wheel, the brake-shoe being forced against said fixed sleeve when force is applied to said driving-shaft in the direction reverse from the normal, substantially as described.

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

WILLIAM H. ALLDERDICE.

Witnesses:
RAY W. JONES,
LINCOLN L. EYRE.