No. 611,966. Patented Oct. 4, 1898.

J. B. A. JUHEL.

BACK PEDALING BRAKE.

(Application filed Dec. 16, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

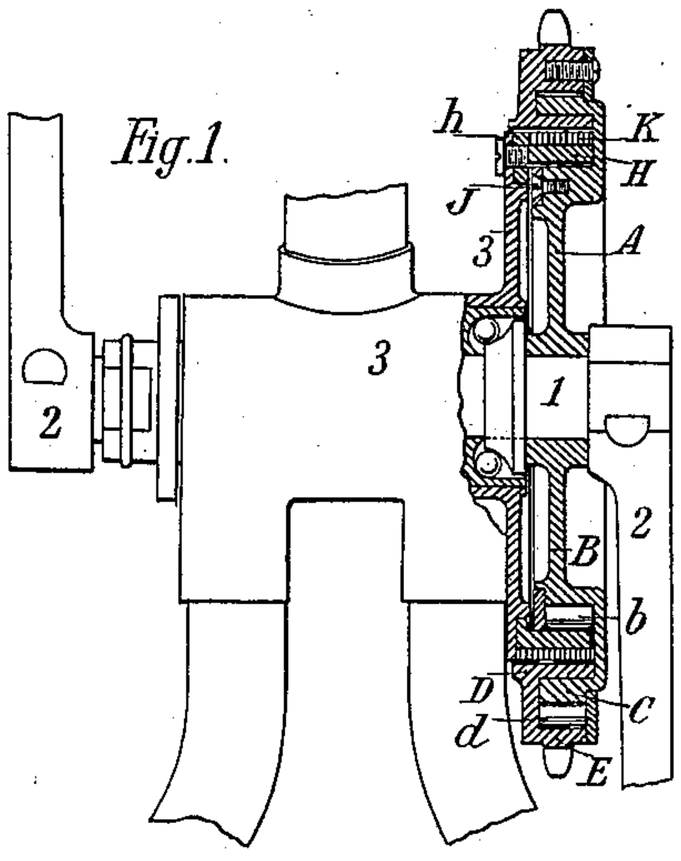


Fig. 2.

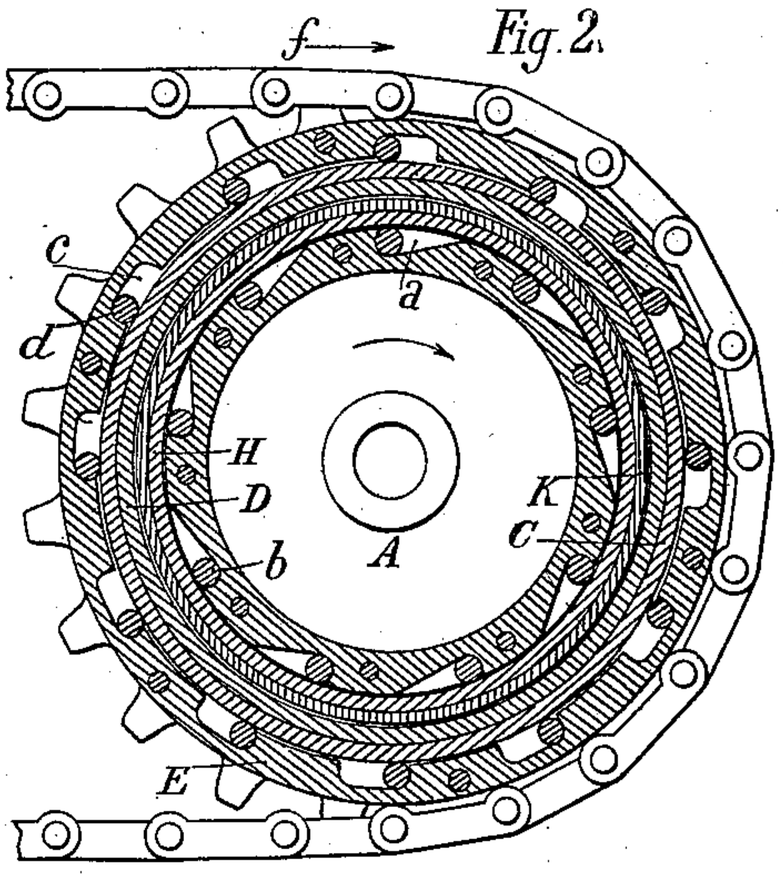


Fig. 3.

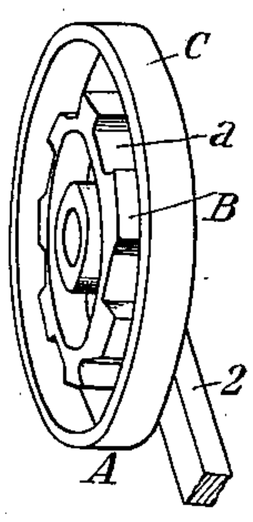


Fig. 4.

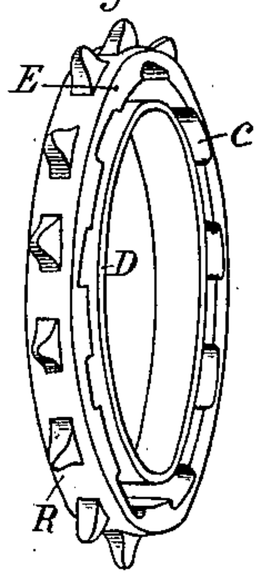


Fig. 5.

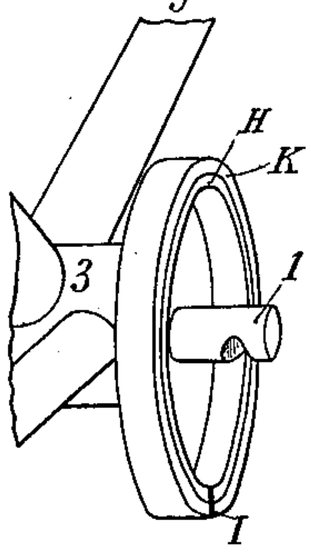
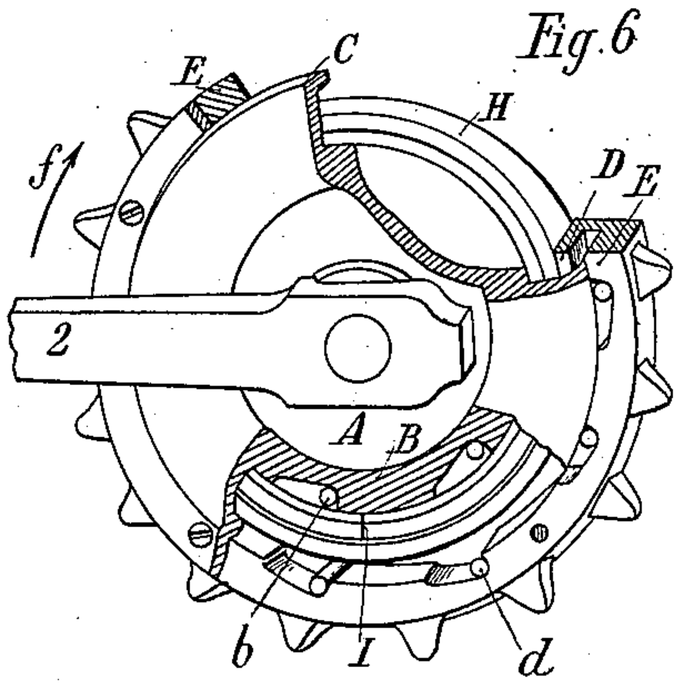


Fig. 6.



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No. 611,966. Patented Oct. 4, 1898.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 7.

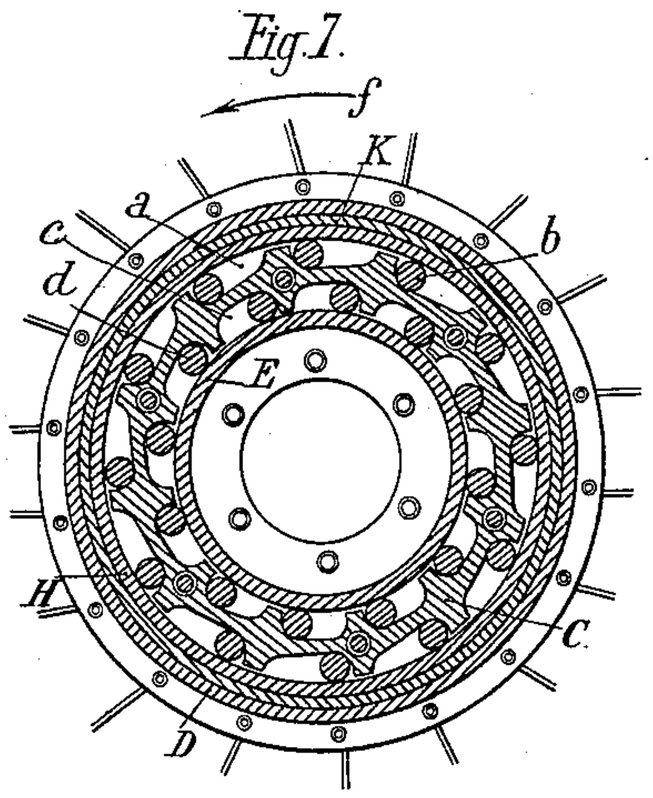


Fig. 8.

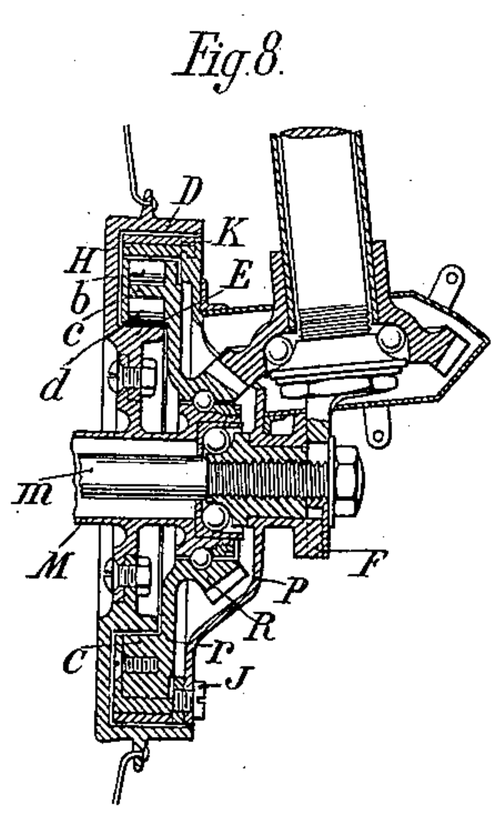


Fig. 9.

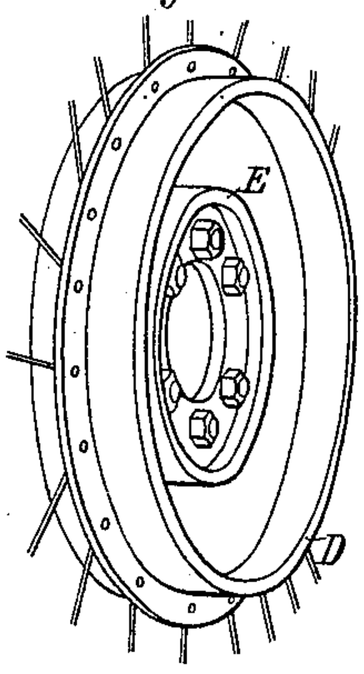


Fig. 10.

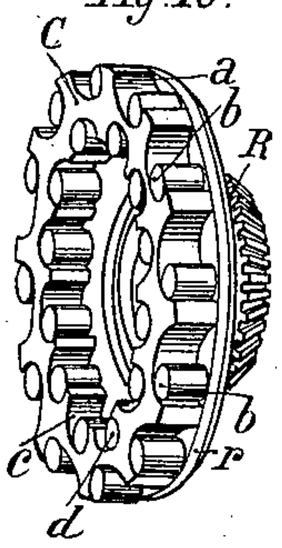
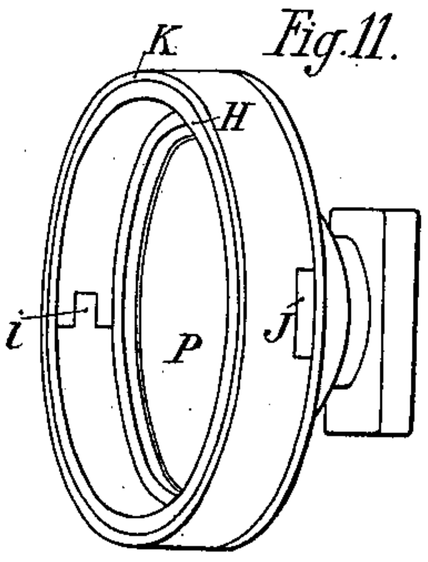


Fig. 11.



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Witness

Inventor:

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By Devereux & Dr

his Attorneys.

UNITED STATES PATENT OFFICE.

JEAN BAPTISTE AUGUSTE JUHEL, OF NEUILLY, FRANCE.

BACK-PEDALING BRAKE.

SPECIFICATION forming part of Letters Patent No. 611,966, dated October 4, 1898.

Application filed December 16, 1897. Serial No. 662,185. (No model.) Patented in France December 14, 1894, No. 243,636, and in England May 3, 1895, No. 8,833.

To all whom it may concern:

Be it known that I, JEAN BAPTISTE AUGUSTE JUHEL, a citizen of the Republic of France, residing at Neuilly, France, have invented certain new and useful Improvements in Braking Devices, (for which I have obtained Letters Patent in France, No. 243,636, dated December 14, 1894, and in Great Britain, No. 8,833, dated May 3, 1895,) of which the following is a specification.

The object of the present invention is to arrange on the driving-shaft of some mechanism having a determined gyration for the purpose of a positive performance of work an apparatus by which the following performances can be obtained at will, using this working or controlling organ therefor: first, impulse of the mechanism by the working device for the purpose of performing a possible work; second, disengaging or setting out of action the working mechanism for the purpose of utilizing the acquired speed of the mechanism, while the controlling mechanism remains motionless when it does not transmit force; third, the braking, gradual, or sudden stop of the mechanism by a movement of the controlling mechanism in opposite direction to the one in which it performs its function.

Such apparatus is very useful on a windlass or winch; but particularly good results are obtained when arranged on the pedal-axle or the axle of the driving-wheel of a cycle or other vehicle of the kind. In the case of a bicycle, for instance, motion is caused by the coöperation of the pedals and cranks. The apparatus would therefore allow the following actions: first, the impulse (driving) of the machine when the pedals and their cranks are in forward driving motion; second, the disengaging of the pedals when the pedaling ceases in order to utilize the acquired speed of the machine on the track, or, for instance, on a decline (coasting) the pedals remain motionless, while the machine continues its forward movement; third, the gradual or sudden braking by a light pedal movement in the opposite direction to the driving direction.

In the present styles of cycles the controlling (motion-imparting) mechanism (pedals and cranks) which are set on the pedal-axle transmit the movement of that axle to a cog-wheel fixed on the latter. This cog-wheel communicates the movement to the driving-wheel by a chain, gear, or other means. In order to obtain the three effects above mentioned, I make the cog-wheel independent of the axle on which the cranks are set and arrange at the inside of this wheel, between the wheel and the said axle, a double stop arrangement with rollers, blocks, wedges, or pawls, (click-and-dog arrangement,) which form a very characteristic intermediate mechanism. This movable mechanism produces friction gearing or wedging of the cog-wheel when the cranks are in forward driving action. It makes this wheel run loosely around the motor-axle when the pedals are not worked, and, finally, when the pedals are moved backward this organ acts by friction or wedging directly or by means of a locking-ring, pressing against the inner surface of the cog-wheel, and thus acting as a brake on the wheel, thereby arresting and completely stopping its movement.

After plainly indicating the principles and characteristics of my invention I describe in detail the various forms of practical execution of my arrangement, using a bicycle by way of illustration, as shown on the drawings herewith.

In the example represented in detail by Figures 1 to 6 the apparatus is arranged on the axle 1 of the cranks 2. It consists, essentially, of, first, a drum or disk, Fig. 3, set on the axle 1, and which consequently follows directly all the movements of the cranks 2. This disk carries in projection two rims or rings B and C, which are arranged, in a manner described farther on, so as to act upon the intermediary double-stop arrangement, (click and pawl.) Second, the annular gear R, Fig. 4, on the motor transmission of the driving-wheel of the machine. This pinion sits loosely on the axle 1 and is arranged for the purpose of receiving the transferred action of the interposed propelling and braking organ by means of its two rings or rims D and E. To that end the disk A settles into said gear, so that the rims D and E lie on opposite sides of rim C, and that inversely the rim D is comprised between B and C. Third, the in-

terposed mechanism is composed of two series of rolls *b* and *d*. The rolls *b* rest in the grooves *a* in the shape of inclined planes on rim B, and slanted in the opposite direction to the movement. In the rim E inclined planes *c* are arranged inversely—*i. e.*, inclined in the direction of the movement in which the rolls *d* rest. Between B and D a ring H carries a boss *h*, Fig. 1, by which it is attached with a screw J on the crank-hanger 3. This ring is split transversely, as at I, Fig. 5, so that it can be opened easily. On its outside the ring H has a leather mounting K. The rolls *b*, in accordance with the position which they occupy in the grooves *a*, simply roll on the inner surface of the ring H or press upon this surface to force the ring open. On the other hand, the rolls *d*, in accordance with the position which they occupy in their beds *c*, simply roll between E and C or are wedged between these two rims, which they so render solidly connected. Figs. 3, 4, and 5 show very plainly, before they are mounted, the above-described parts in perspective. Fig. 6 shows these parts set up together. When the cranks 2 are turned in forward motion—*i. e.*, in the arrow direction *f*—the ring C, which follows the movements of the axle, impels by contact the rolls *d*, which when brought into the narrow part of their bed, impel on their own behalf the crown E of the gear, procuring thereby the forward progression of the machine. The rolls *b* remain out of action at the deepest part of their inclined plane. When the cyclist stops pedaling and holds the pedals motionless, the rim B C (with its rolls *b*) remains also motionless, the rolls *d* are held at the deepest part of their inclined plane, and the rim E D turns loosely in the forward direction. This will be the result on a decline when the cyclist lets his machine run in coasting. Finally, if the cyclist uses a light retrograde pedal movement, the rolls *b* reascend on the inclined plane *a a* and are wedged against the ring H, which they compel to expand, and which must thereby press its leather rim K against the inner surface of the rim D. The movement of the latter, and consequently of the machine, will be then slackened in a measure with the stronger or lesser pressure exercised.

In the case of Figs. 7 to 11, Figs. 7 and 8 represent, respectively, in cross-section and longitudinal section my propelling and braking apparatus applied at the hub of the hind wheel of a bicycle. Figs. 9, 10, and 11 represent the apparatus in perspective and taken asunder. Like in the preceding example, based on the stated principle, the organ to which the stroke and the movement are transmitted—*i. e.*, the motor-axle of the machine, which is in this instance the hub M of the hind wheel—is independent of the controlling organ, which in this case consists of the pedal-cranks, the whole chain transmission or tooth-gearing, and the gear R. This gear R (which is in the figures an angle-gear, because the transmission is effected by tooth-gearing, but which could just as well be a smooth gear running by a chain) is loose on the hub M, around which it can turn by rolls. It carries a plate *r*, on which the rim C sets, ready to work the intermediary organ. This intermediary organ consists of the rolls *b* and *d*, which are relatively placed in the grooves *a* and *c*. The hub M is arranged so as to receive the transmission of the action of the intermediary organ. For this purpose it is provided with a box D E, which is of one piece with it, and at the outside of this box the spokes of the hind wheel are mounted. This box, into which the rim C couples, receives at its inner rim the action of the propulsion-rolls or guide-rolls when the gearing R turns in the arrow direction *f*, Fig. 7, and by means of the metallic ring H it receives the braking action of the guide-rolls *b* when the movement of R or of the pedals occurs in inverse direction. The ring H is split at I, Fig. 11. It has an outside leather rim K and is attached to a fixed disk P by a stop-piece J. The disk is mounted on the axle *m* of the hub and fitted into the regulating-piece F of the pinions. The working action of the apparatus is absolutely analogous to the one described in the preceding case. In the forward movement the hub-pinion is propelled, and it transmits the rotatory movement to the driving-wheel by means of the guide-rolls *d*, which wedge in between the hub and the inclined plane of their grooves in rim C. During this time the guide-rolls *b* remain motionless at the bottom of their grooves. When pedal action ceases, the rolls *d* resume their places at the bottom of their grooves. They have become liberated, and the rolls *b* maintain the same position. All pieces of the mechanism become motionless with the exception of the wheel, which, being disengaged, continues to revolve freely in the forward direction, arrow *f*. We have here before us the action as it occurs in a descent on a declivity, and it will be readily understood that in this case the feet can rest on the pedals without being propelled by the movement of the machine. It will be seen also that all that is necessary to maintain the movement is to turn the pedals in the forward direction to obtain reëngagement between the pinion and the hub by means of the guide-rolls *d*. Then when pressing on the pedals in the opposite direction the guide-rolls are immediately displaced on the inclined grooves *a* and press against the inside of the split ring H, which opens, its leather rim rubs on the outside disk D of the hub of the wheel, slackens its movement, and finally stops it if the pressure applied is sufficient and applied in time to obtain this result. As in the preceding example, as the essential element of the brake—*i. e.*, the split ring H—has a fixed supporting-point, the pedaling action has not to overcome directly the inertia created by the system in rotation. This stress is only employed to bring about

the opening of the ring and to transform by means of a very energetic operation a tangential action into a radiating force. The intensity of the latter depends practically only on the grade of the inclined planes *d*.

I claim—

1. In a back-pedaling brake the combination with the cycle-frame of a stationary split ring having a braking-surface, a driving element and a driven element, a clutch interposed between said elements and a second clutch interposed between one of said elements and the split ring and arranged in opposite relation to the first clutch so that in forward-pedaling the first clutch will bind and in back-pedaling the second clutch so as to apply the brake, substantially as described.

2. In a back-pedaling brake, the combination with the cycle-frame, of a stationary split ring, having a braking-surface, a driving and driven element having laterally-extending flanges arranged concentric with said split ring, a clutch interposed between the flanges of the driving and driven elements and a second clutch located between the split ring and a flange of the driving element and arranged in opposite relation to the former one so that in forward-pedaling the first clutch will bind and in back-pedaling the latter so as to apply the brake, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JEAN BAPTISTE AUGUSTE JUHEL.

Witnesses:

EMILY ZERT,

ANDRÉ MORTIERBE.