

(No Model.)

4 Sheets—Sheet 1.

DETALMO DI BRAZZA SAVORGNAN.
BICYCLE.

No. 549,397.

Patented Nov. 5, 1895.

Fig: 1.

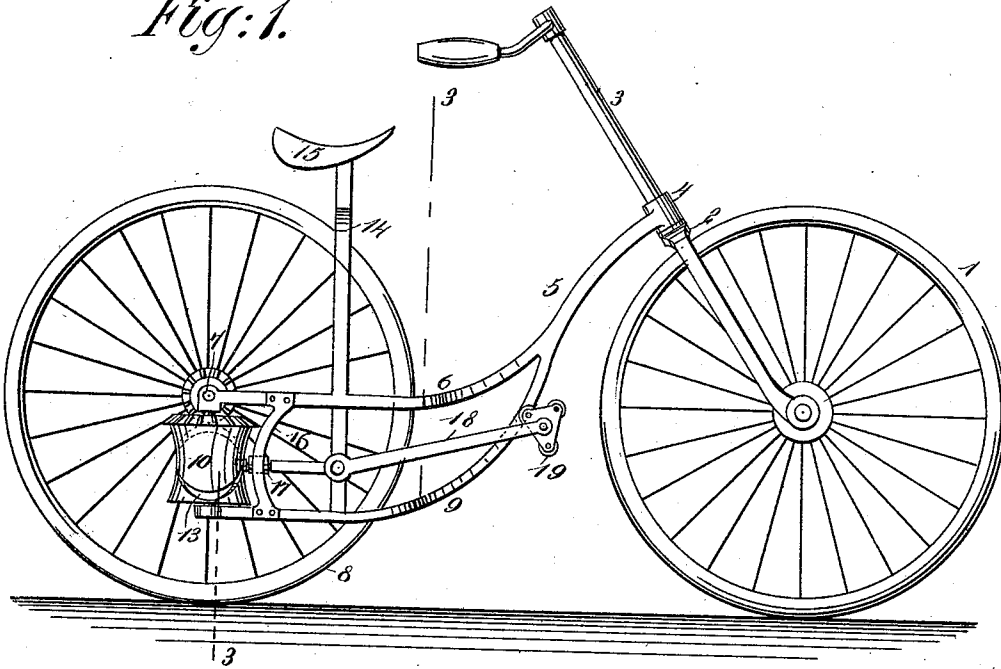


Fig: 2.

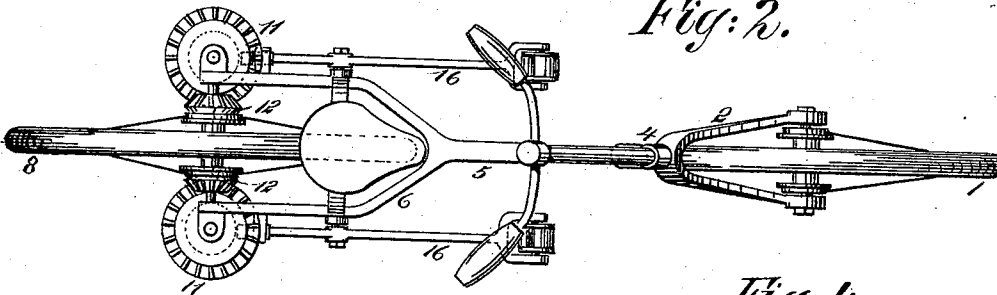
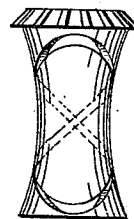
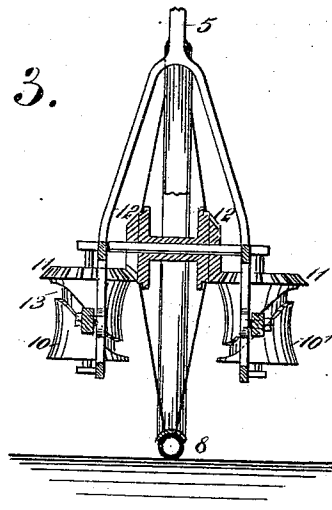


Fig: 4.

Fig: 3.



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Fig: 5.

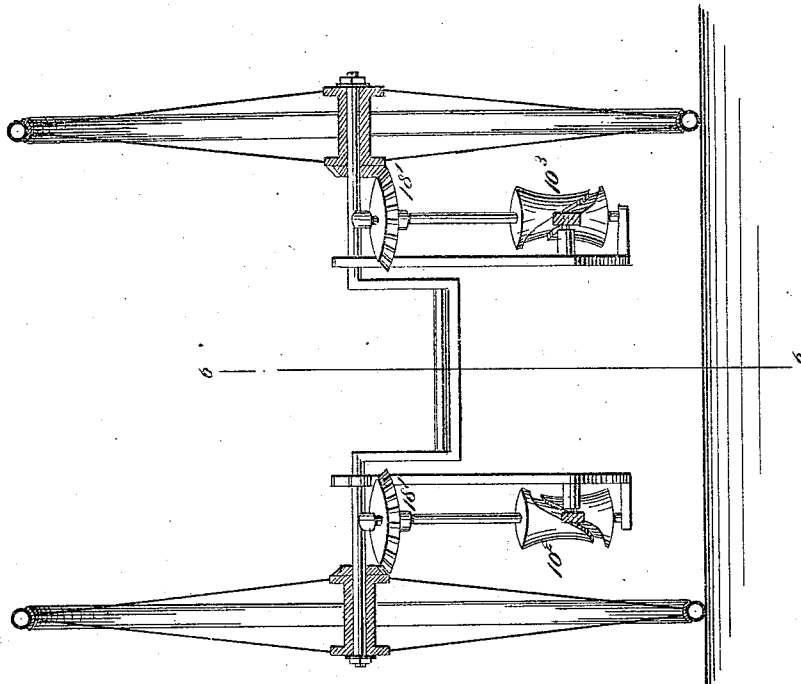
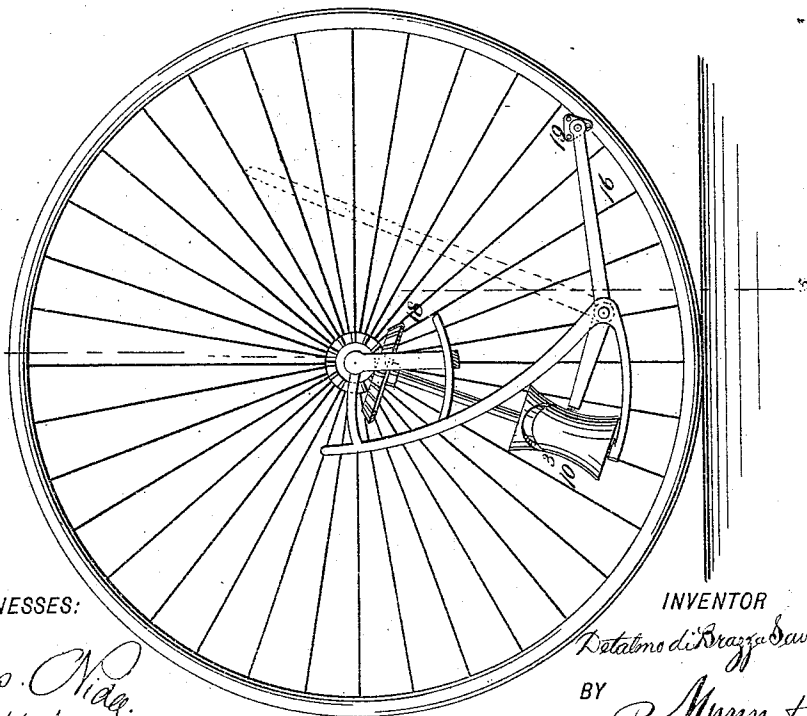


Fig: 6.



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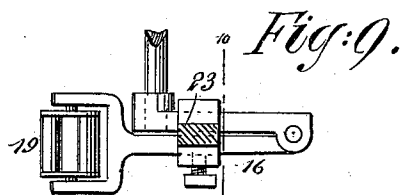
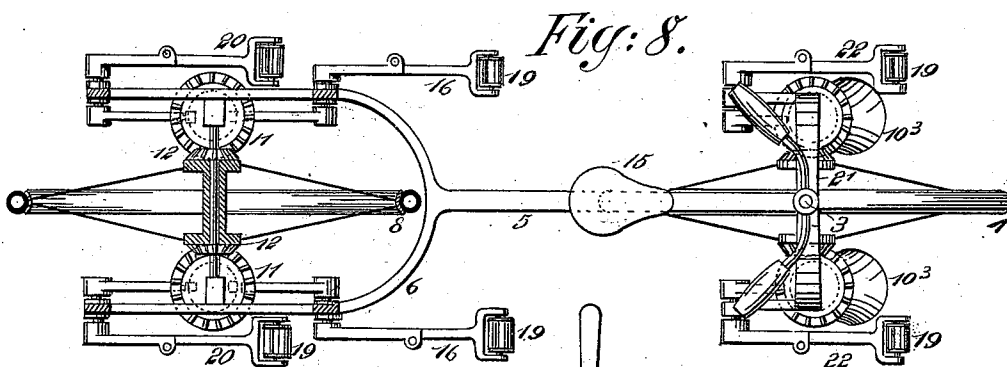
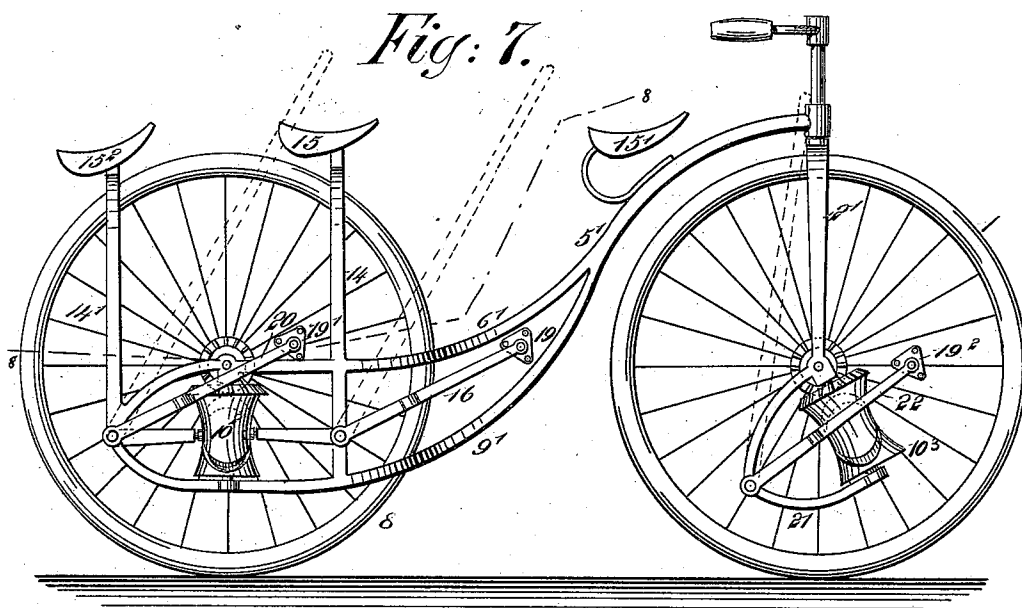
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BICYCLE.

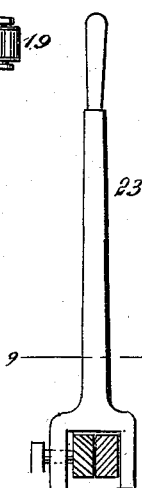
No. 549,397.

Patented Nov. 5, 1895.



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(No Model.)

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DETALMO DI BRAZZA SAVORGNAN.
BICYCLE.

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Fig: 11.

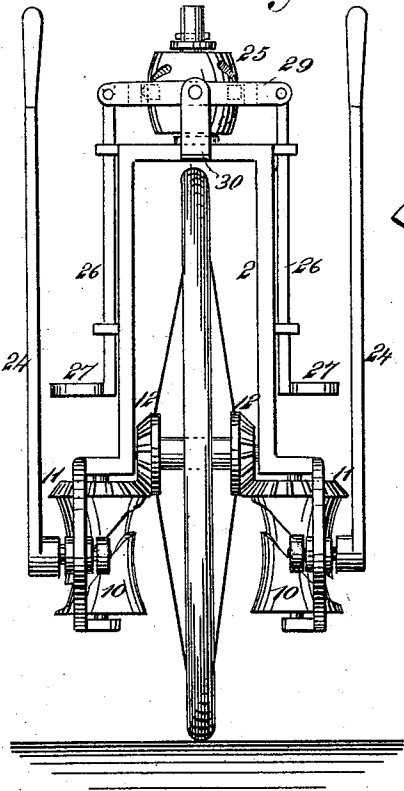


Fig: 12.

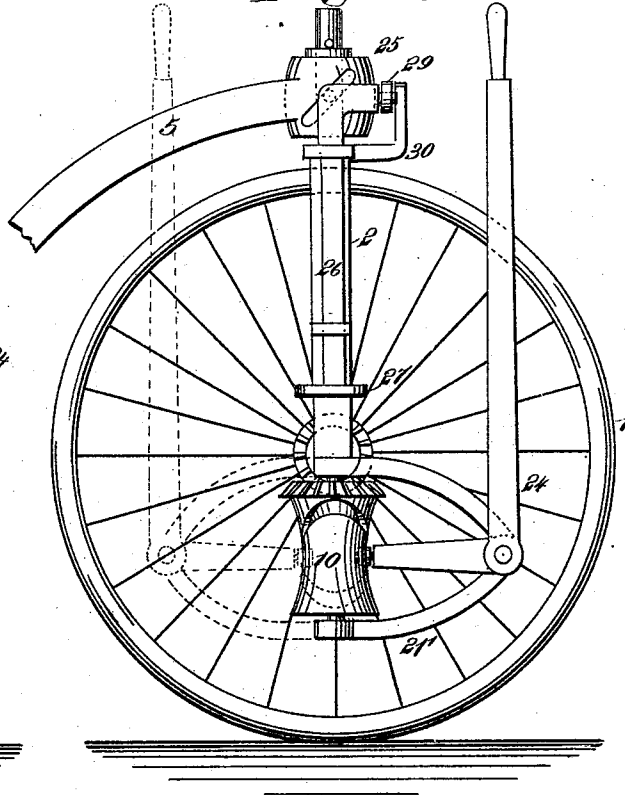


Fig: 13.

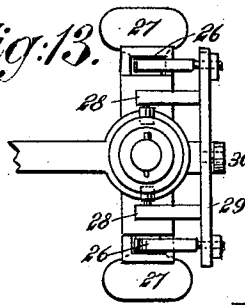


Fig: 14.

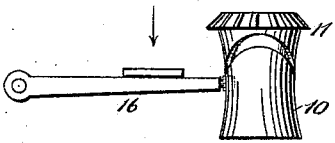


Fig: 15.

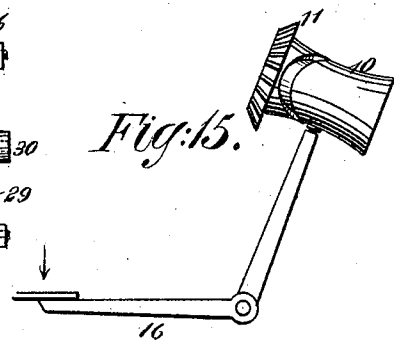
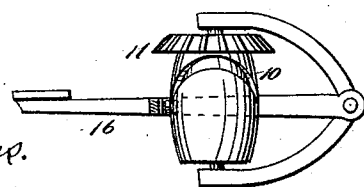


Fig: 16.



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UNITED STATES PATENT OFFICE.

DETALMO DI BRAZZA SAVORGNAN, OF ROME, ITALY, ASSIGNOR TO CORA ANN SLOCOMB DI BRAZZA SAVORGNAN, OF NEW YORK, N. Y., AND MORUZZO, ITALY.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 549,397, dated November 5, 1895.

Application filed January 2, 1895. Serial No. 533,605. (No model.)

To all whom it may concern:

Be it known that I, DETALMO DI BRAZZA SAVORGNAN, of Rome, Italy, have invented a new and Improved Bicycle, of which the following is a full, clear, and exact description.

The object of my invention is to construct a bicycle in which the pedals for propelling the drive-wheels are oscillated in a vertical plane, so as to give the feet a natural movement, which is practically the same as that of walking.

My object is also to construct a bicycle capable of carrying two or more persons, and which may be worked either by foot or hand.

The invention consists in a bicycle provided with the usual guiding and drive wheels and furnished with one or more slotted cams connected with the drive-wheel hub by gearing.

It also further consists in a device whereby the bicycle may be changed from a foot-propelled machine to a hand-propelled machine.

It also consists in novel steering mechanism and in other details of construction, all as will be hereinafter fully described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of my improved bicycle. Fig. 2 is a plan view. Fig. 3 is a vertical transverse section taken on line 3 3 in Fig. 1. Fig. 4 is a detail view of a double cam. Fig. 5 is a vertical transverse section, taken on line 5 5 of Fig. 6, in a bicycle in which the wheels are arranged parallel with each other on the same axial line. Fig. 6 is a vertical section taken on line 6 6 in Fig. 5. Fig. 7 is a side elevation of a form of bicycle adapted for three riders. Fig. 8 is a plan view, partly in section, of the same, the section being taken on line 8 8 in Fig. 7. Fig. 9 is a detail plan view of one of the foot-levers, showing the hand-lever in section, the section being taken on line 9 9 in Fig. 10. Fig. 10 is a vertical transverse section taken on line 10 10 in Fig. 9. Fig. 11 is a front elevation of a bicycle arranged to be driven by hand and steered by the feet. Fig. 12 is a partial

side elevation of the same. Fig. 13 is a plan view of the steering apparatus; and Figs. 14, 15, and 16 are modifications of the driving mechanism, showing different forms of pedal-levers.

The guiding-wheel 1 of the bicycle is journaled in the fork 2 in the usual way, and the shank 3 of the said fork 2 turns in the head 4 on the upper end of the curved backbone 5. The backbone in this case is forked, the arm 6 being itself forked and extending rearwardly and arranged to receive the pin 7, on which the drive-wheel 8 turns. The arm 9 of the backbone is also forked and extends rearwardly parallel with the arm 6, and in journal-bearings formed in the rear ends of these arms are journaled cams 10 10'. The upper ends of the cams are provided with bevel-wheels 11, which engage beveled pinions 12 on the hub of the drive-wheel 8. Each cam is provided with a groove 13, formed on right and left hand spiral lines.

To the forked arms 6 and 9 is secured a fork 14, which supports a seat 15, and to which, between the arms, is pivoted the pedal-lever 16. The said lever carries a roller at the rear extremity thereof, which fits the groove 13, and the face of the cam 10 is made concave to correspond to the radius of the rear end of the lever 16, and outside of the cam upon this end of the lever is placed a roller 17, which moves between curved guides 18, attached to the arms 6 9. The forward end of the pedal-lever 16 is provided with a pedal 19, pivoted in a fork formed on the end of the lever. The cams 10, on opposite sides of the wheel 8, are arranged relative to each other, so that when one of the pedal-levers is down the other is rising, so that the feet of the operator may work in alternation.

In the cams 10 10' (shown in Figs. 1 and 3) the groove makes but a single revolution around the cams, and as a consequence the required speed of the drive-wheel is secured by properly proportioning the bevel-gearing. In Fig. 4 I have shown a cam which revolves twice to one movement of the pedal, so that the difference between the two bevel-wheels need not be so great in order to secure the

same speed of the drive-wheel. It is obvious that to secure lightness the cams 10 10' may be constructed in the form of a skeleton.

In Figs. 5 and 6 I have shown gearing applied to bicycle-wheels which are arranged upon the same axial line and in which the seat is placed between the wheels, and the cams 10² 10³ are placed on shafts connected with the bevel-wheels 18' instead of being connected directly with the wheels. In other respects the propelling mechanism is the same as that already described.

In the modification shown in Fig. 7 the rear ends of the double arms 6' 9' extend rearward and are brought together to form a support for the seat-standard 14' and the fulcrum of the foot-lever 20. The cam-operating arm and the foot-pedal 19' of this lever are in front of the pivot of the lever. The pedal-lever 16 in this case is the same as that described in connection with Fig. 1 and operates upon the front side of the cam 10², while the shorter arm of the pedal-lever 20 operates upon the rear side of the cam. In this case the guide-wheel of the bicycle is provided with bevel-wheels attached to opposite ends of its hub, and from the end of the fork 2 extends a curved arm 21, forming a U-shaped support for the cam 10³ and for the pedal-lever 22, which is fulcrumed about midway between the ends of the U-shaped support. The pedal-lever is provided with a pedal 19². The cams 10² 10³ are the same as those described in connection with Fig. 1. The parts shown and described upon one side of the wheels are duplicated upon the other side, and to the backbone 5' is attached a seat 15' for the driver who operates the front pedals. The standards 14 and 14' carry seats 15 and 15² for receiving the riders who operate the rear pedal-levers. Hand-levers, as shown in dotted lines, may be applied in lieu of the pedal-levers, or both together may be used. The pedal-levers may also be jointed, as shown in Figs. 7 and 8, and they may be folded back as shown in Fig. 9, when it is desired to operate the machine by hand-levers. In this case the hand-levers 23, which are provided with forked ends and clamping-screws, as shown in Fig. 10, are applied to the pedal-levers while they are folded, as shown in Fig. 9.

In the modification shown in Figs. 11, 12, and 13 the cams 10, which are like those already described, are pivoted to a U-shaped support 21', formed on or attached to the fork 2. The cam-operating levers 24 in this case are angled, with their longer arms extending upward and provided at their upper ends with a handle, which is grasped by the rider of the bicycle. Motion is produced by oscillating the handle, by hand. In this case the rider uses his feet for guiding the bicycle. Upon the head of the backbone 5 is formed a

cam 25, having diagonal slots in opposite sides thereof, the slots being oppositely arranged with respect to each other, and in guides formed on the arms of the fork 2 are placed bars 26, having at their lower ends foot-pieces 27, and the upper ends of the bars 26 are angled and provided at their extremities with studs which enter holes in the opposite ends of the lever 29, which is pivoted to an arm 30, projecting from the upper part of the fork 2. Stud 28 extend from the lever 29 to points opposite the center of the cam 25 and are provided with rollers which work in the slots of the cam. By means of this device the bars 26 are connected so that they move simultaneously in opposite directions. The feet of the rider are placed upon the foot-pieces 27, and by pressing one or the other of the foot-pieces 27 the wheel is turned in one direction or the other by virtue of the engagement with the cam of the rollers carried by the lever 29.

In Figs. 14, 15, and 16 different forms of pedal-levers are shown. In the one shown in Fig. 14 the power is applied between the fulcrum and the cam. In the one shown in Fig. 15 the power is applied at one side of the fulcrum and is utilized at the other side, the lever being angled. In the form shown in Fig. 16 the power is applied and used on the same side of the fulcrum, the point of application of the power being outside of the point of utilization. In other words, the pedal-lever shown in Fig. 15 is a lever of the first kind; that shown in Fig. 16 is a lever of the second kind, and that shown in Fig. 14 is a lever of the third kind.

In any of the cases described the oscillation of the hand or foot levers by engagement with the cam causes the cam to rotate, which in turn revolves the drive-wheel, and thus propels the bicycle forward.

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

1. In a bicycle a grooved cam having its face curved in a longitudinal direction, and a cam lever constructed with one end adapted to work in the groove of the cam and having at the opposite end a foot pedal, substantially as specified.

2. The combination, with the driving wheel of a bicycle, of one or more slotted concave faced cams geared to the driving wheel, an operating lever provided with a foot pedal and constructed to engage the cam, and a curved guide for preventing the lateral movement of the operating lever, substantially as specified.

3. In steering mechanism for bicycles, the combination with the backbone, of a cam attached to the shank of the backbone, and steering levers carried by the guide wheel fork and adapted to be operated by the foot,

for engaging the cam carried by the back-bone, substantially as specified.

4. The combination with the front wheel
fork, of a cam attached to the spring head,
5 sliding bars carried by the fork and provided with foot pieces, and a lever pivotally connected with the sliding bars and carrying

rollers for engaging the cam, substantially as specified.

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Witnesses:

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