

No. 748,380.

PATENTED DEC. 29, 1903.

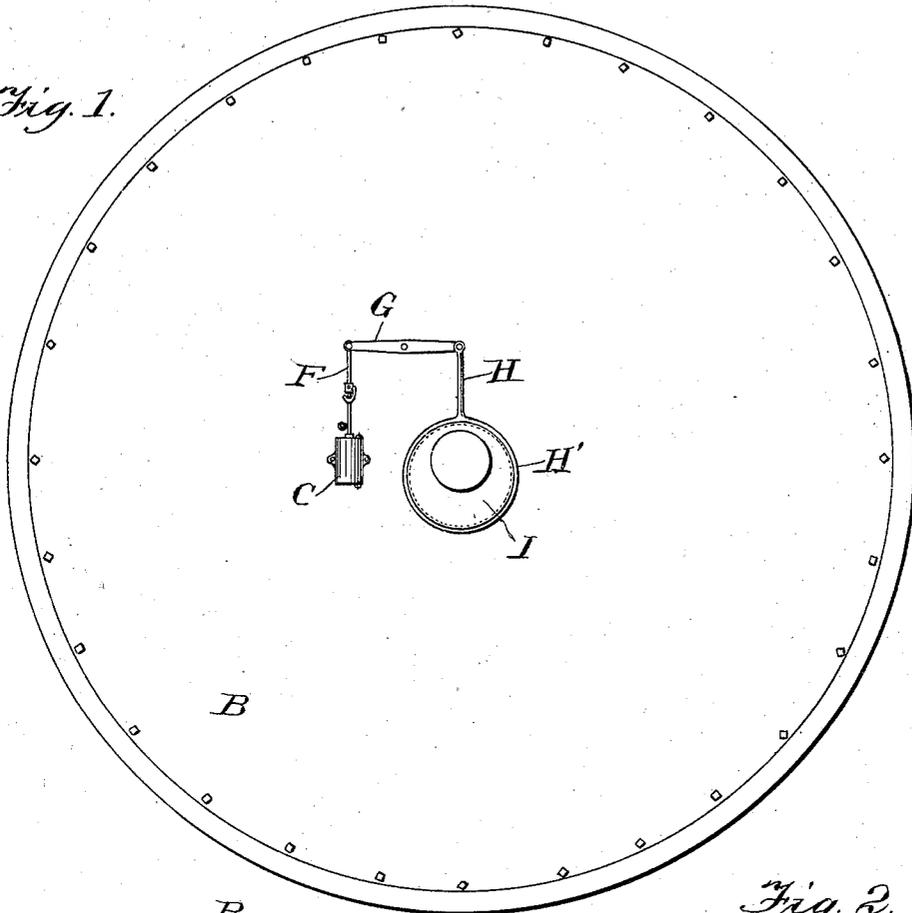
F. JAMES.  
FLY WHEEL.

APPLICATION FILED JUNE 30, 1903.

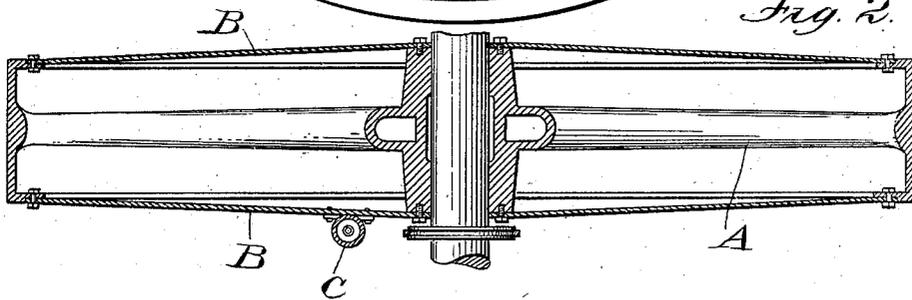
NO MODEL.

2 SHEETS—SHEET 1

*Fig. 1.*



*Fig. 2.*



Witnesses:

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*Frank James*  
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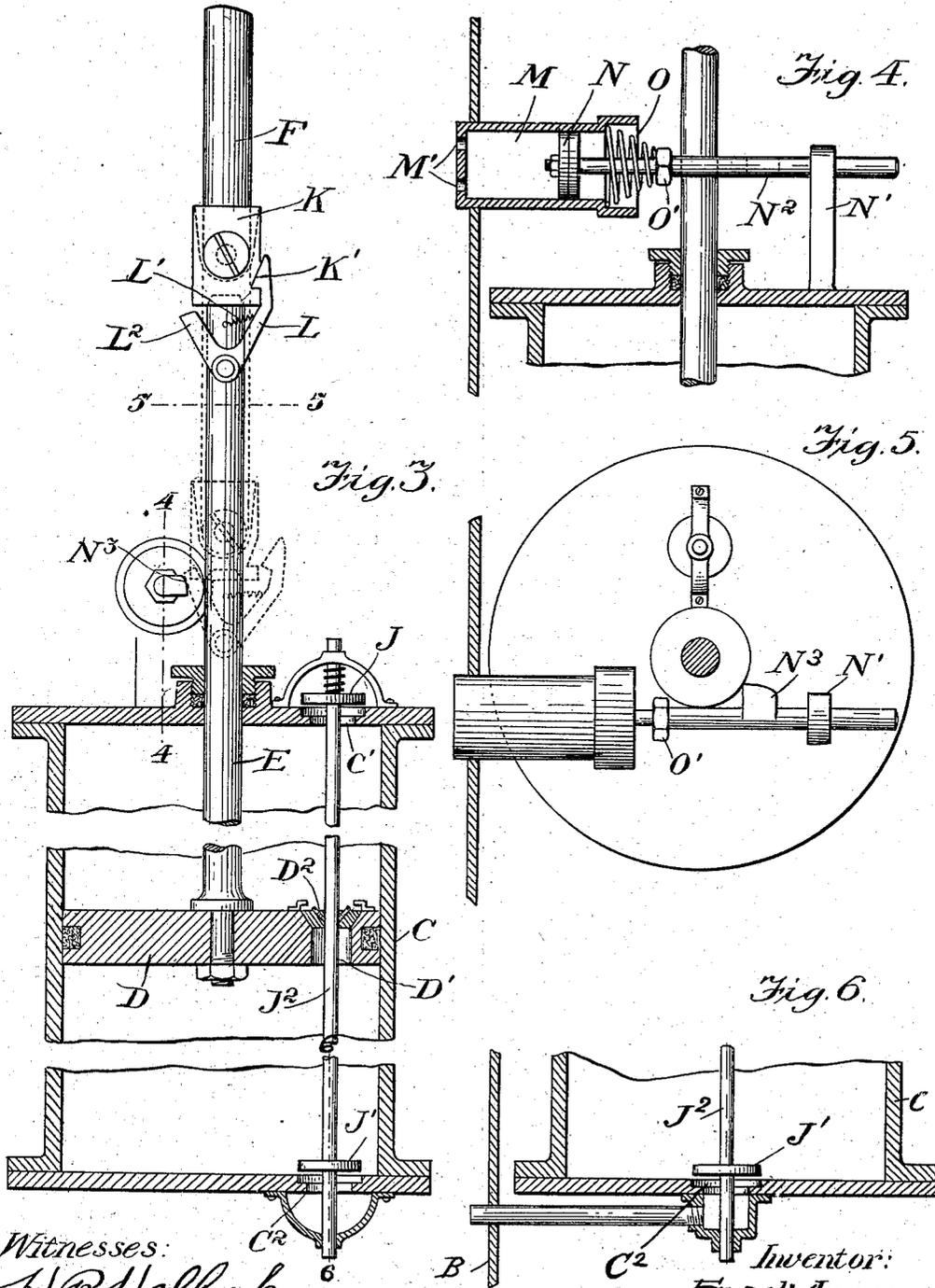
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

FRANK JAMES, OF PHILADELPHIA, PENNSYLVANIA.

## FLY-WHEEL.

SPECIFICATION forming part of Letters Patent No. 748,380, dated December 29, 1903.

Application filed June 30, 1903. Serial No. 163,822. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK JAMES, a citizen of the United States, residing at Roxboro, Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Fly-Wheels, of which the following is a specification.

My invention relates to a new and useful improvement in fly-wheels, and has for its object to so construct a fly-wheel that the fly-wheel will be inclosed and a partial vacuum will be maintained within the fly-wheel when the same is moving, so as to counteract the centrifugal force, which has a tendency to cause the fly-wheel to fly asunder.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of my improved fly-wheel; Fig. 2, a cross-section of the same; Fig. 3, a vertical section through the pump; Fig. 4, a section taken on the line 4 4 of Fig. 3; Fig. 5, a section on the line 5 5 of Fig. 3; Fig. 6, a section taken on the line 6 6 of Fig. 3.

A represents the fly-wheel, which has disks B bolted upon each side from the flange of the wheel to the hub, so as to hermetically seal the wheel and form an air-tight inclosure within the same. Secured to one side of the wheel is a pump-cylinder C, which is provided with a piston D, the piston-rod E of which extends upward through a suitable stuffing-box at the upper end of the cylinder and is removably connected at its upper end to a rod F, which rod is connected to one end of a walking-beam G, which walking-beam is pivoted to one of the disks B, the other end of the walking-beam being connected by a rod H with an eccentric-strap H', which passes around a stationary eccentric I. The cylinder C is provided with a port C' at its upper end and a port C<sup>2</sup> at its lower end. These ports are provided with seats,

and J and J' are valve-disks adapted to these seats and designed to open upward. Both of these valve-disks are secured to a valve-stem J<sup>2</sup>, which extends vertically through the cylinder and through a port D', formed through the piston. This port D' is provided with a seat at its upper end designed to be closed by a valve-disk D<sup>2</sup>, which slides loosely upon the valve-stem J<sup>2</sup>. The lower port C<sup>2</sup> is connected with the interior of the wheel, as shown in Fig. 6, and the upper port C' is open to the atmosphere outside of the wheel. Thus it will be seen that when the piston D is raised the valve D<sup>2</sup> in the piston-rod will be closed and the valve-disks J and J' raised, so that the air will be drawn from the interior of the wheel into the space below the piston and the air above the piston will be forced outward through the port C', and when the piston is forced downward the valves J and J' will be closed and the valve D<sup>2</sup> opened, so that the air from below the piston will pass into the space above the same.

For the purpose of connecting the piston-rod E and the rod F together I provide upon the lower end of the rod F a block K, which is provided with a notch K' in one side thereof. Pivoted to the upper end of the piston-rod is a latch L, which is normally held in engagement with the notch K' by the spring L', and this latch L is provided with a heel end L<sup>2</sup>, which is designed to throw the latch out of engagement by the following mechanism:

M is a lateral cylinder which extends into the interior of the wheel, and the end upon the interior of the wheel is open or perforated, as indicated at M'. This cylinder is provided with a piston N, the piston-rod of which extends through a suitable guide N', secured to this cylinder C.

O is a spring interposed between a shoulder upon the cylinder M and an adjusting-nut upon the piston-rod N<sup>2</sup>. The piston-rod N<sup>2</sup> is provided with a beveled projection N<sup>3</sup>, which is normally out of alinement with the heel end L<sup>2</sup> of the latch. It will thus be seen that the piston N will be drawn toward the wheel against the action of the spring as the vacuum increases in the interior of the wheel, and by means of the adjusting-nut O the tension of the spring can be set at any point

desired, so that when a predetermined vacuum has been created upon the interior of the wheel and it is desired to stop the pump the projection N<sup>3</sup> will be pulled into alinement with the heel end L<sup>2</sup>, so that when the piston-rod descends the heel end of the latch will strike the projection N<sup>3</sup> and throw the latch out of engagement with the notch K', and thus disconnect the piston-rod from the rod F, and thus stop the pump, but as soon as the vacuum has decreased so as to allow the spring O to act, so as to force the projection N<sup>3</sup> out of alinement with the heel end L<sup>2</sup>, the spring L' of the latch will then spring the latch into such a position that at the next downward motion of the rod F the latch will spring into engagement with the catch K' and the pump will commence to operate. Thus any degree of vacuum can be maintained automatically at all times within the interior of the wheel, and on account of this vacuum created within the fly-wheel the atmospheric pressure upon the exterior of the wheel will tend to counteract the centrifugal force and prevent the bursting of the wheel.

Of course it will be understood that this principle is applicable to any form of wheels, such as car-wheels and the like, and therefore I do not wish to be limited to the special application to a fly-wheel, and of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of the invention.

Having thus fully described my invention, what I claim as new and useful is—

1. In a device of the character described, a wheel closed upon each side so as to provide an air-tight inclosure within the same, an air-pump carried by the wheel provided with two ports, one communicating with the interior of the wheel and the other with the atmosphere, means for operating the pump by the revolution of the wheel, and means for automatically connecting and disconnecting the pump so as to maintain a uniform vacuum within the wheel, as and for the purpose specified.

2. In a device of the character described, a wheel provided with disks upon each side so as to form an air-tight inclosure within the wheel, a pump carried by one of the disks, said pump provided with two ports, one communicating with the interior of the wheel and the other with the atmosphere, a piston-rod, a walking-beam, to one end of which the piston-rod is detachably secured, said walking-beam being pivoted to the disk upon one side of the wheel, an eccentric, an eccentric-strap thereon, a rod connecting the eccentric-strap with the other end of the walking-beam, and means for detaching the piston-rod from the walking-beam when a predetermined vacuum has been reached in the wheel, and

means for connecting the piston-rod to the walking-beam when the vacuum is decreased to a predetermined point, as and for the purpose specified.

3. In a device of the character described, a wheel provided with disks upon each side so as to make an air-tight inclosure within the same, a pump carried by the wheel, a piston arranged within the cylinder of the pump, a port opening through the lower end of the cylinder and connected with the interior of the wheel, a port formed through the upper end of the cylinder and open to the atmosphere, valves adapted to these ports, said valves opening upward, a valve-stem connecting these two valves together and extending longitudinally through the cylinder, and through a port formed through the piston, a valve arranged to open upward in the port of the piston, said valve sliding loosely upon the valve-stem, means for operating the pump by the revolution of the wheel, and means for automatically stopping or starting the pump so as to maintain a uniform vacuum within the wheel, as and for the purpose specified.

4. In a device of the character described, a wheel closed upon each side so as to provide an air-tight inclosure within the same, a pump-cylinder carried by the wheel, a piston-rod extending upward from the cylinder, a walking-beam pivoted to the side of the wheel, a rod depending from one end of the walking-beam, a block secured upon the lower end of this rod, said block provided with a notch in one side, a spring-latch pivoted to the upper end of the piston-rod and normally in engagement with the notch in the block, there being a heel end provided upon the latch, a lateral cylinder extending from the interior of the wheel and opening into the same, a piston adapted to work in said cylinder, a piston-rod for said piston, an adjustable nut secured upon the piston-rod, a spring interposed between said nut and the cylinder, a lug extending outward from one side of the piston-rod and normally out of alinement with the heel end of the latch but adapted to be brought in alinement with the heel end of a latch when a predetermined vacuum has been reached in the interior of the wheel so as to disengage the latch from the block upon the downward movement of the piston-rod, an eccentric for operating the walking-beam, as and for the purpose specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

FRANK JAMES.

Witnesses:

H. B. HALLOCK,  
M. E. HAMER.