No. 667,791. Patented Feb. 12, 1901.

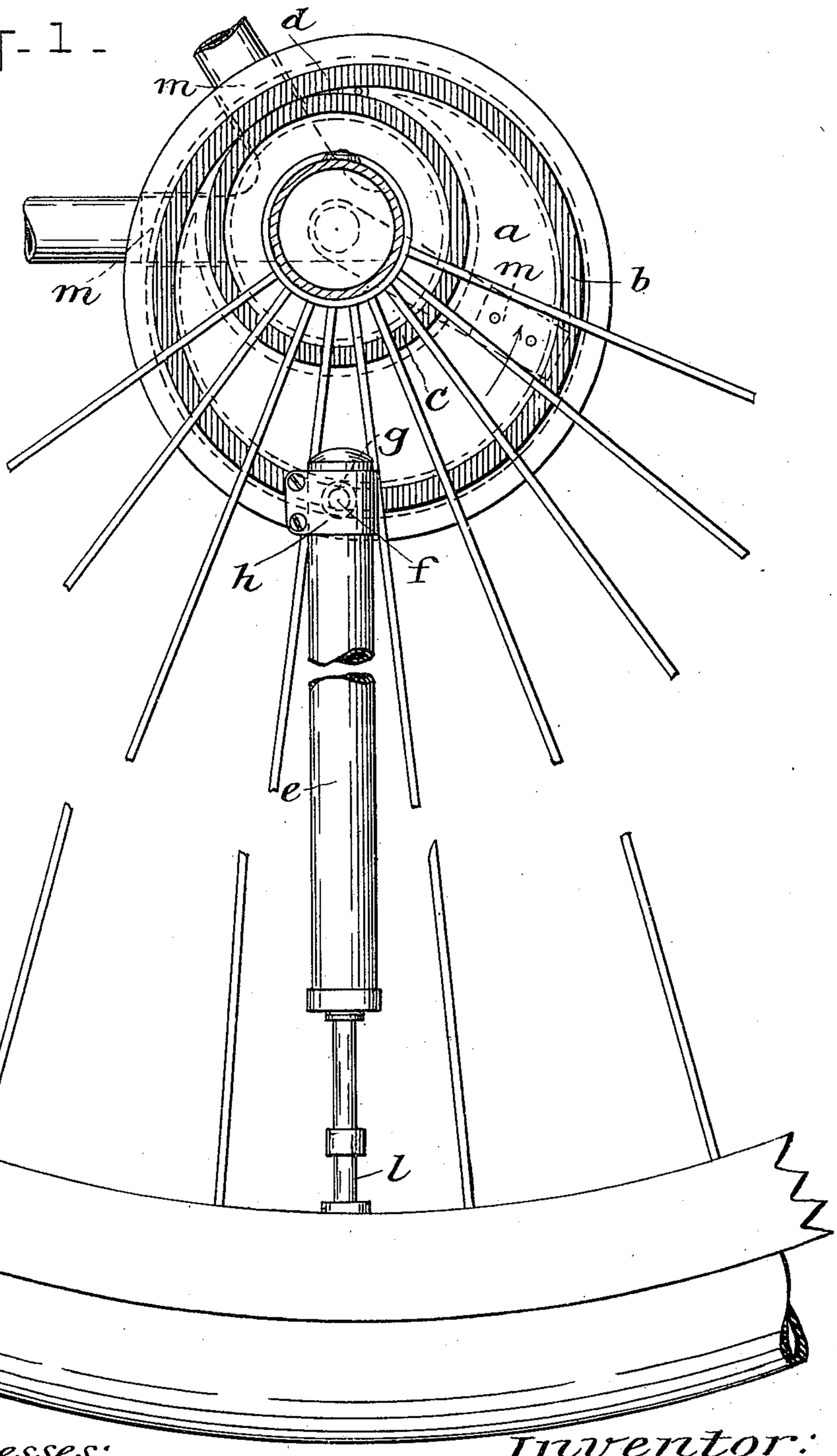
A. G. T. ÖFVERSTRÖM.

DEVICE FOR AUTOMATICALLY INFLATING PNEUMATIC TIRES.

(Application filed July 6, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
C. B. Bolton
Otis Curtis

Inventor:
Anders Gustaf Theodor Öfverström
By Richards & R
his Attorneys.

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Fig. 2.

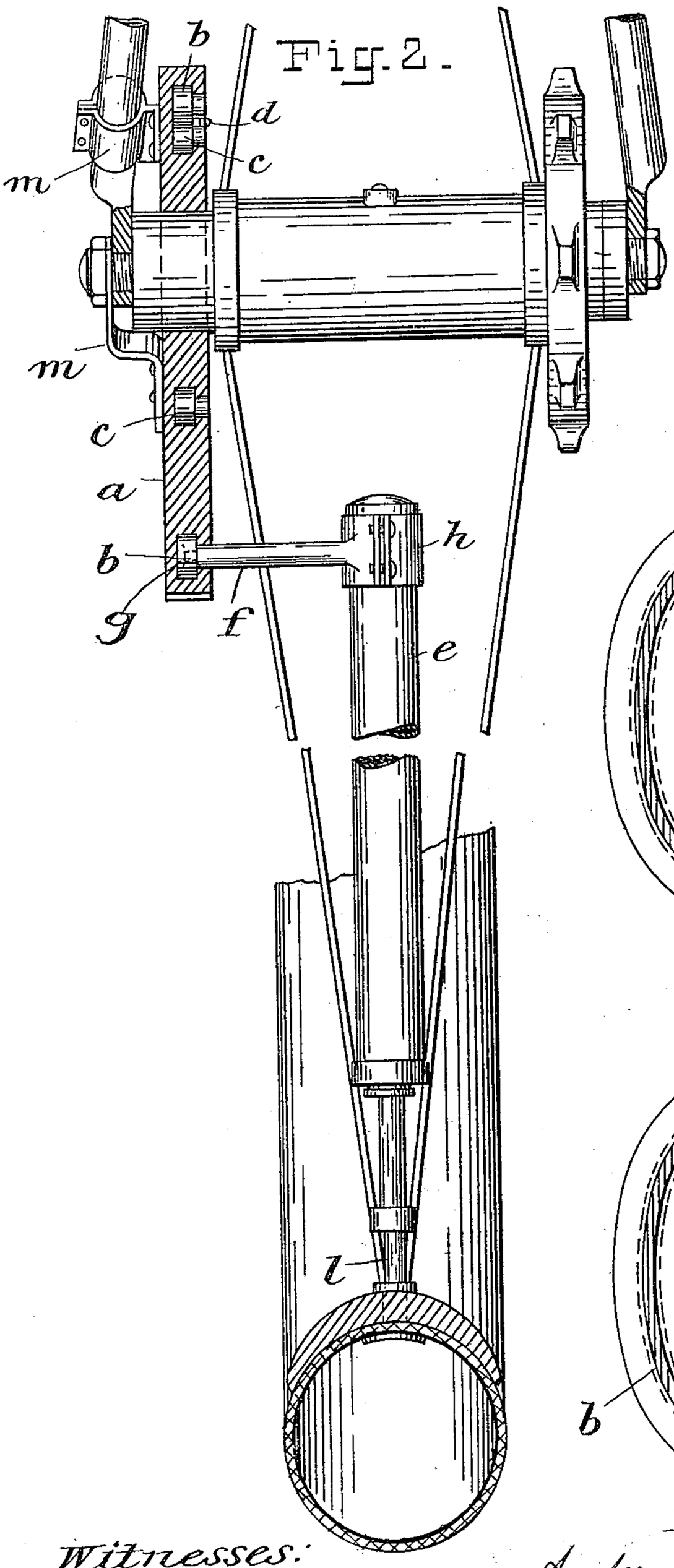


Fig. 3.

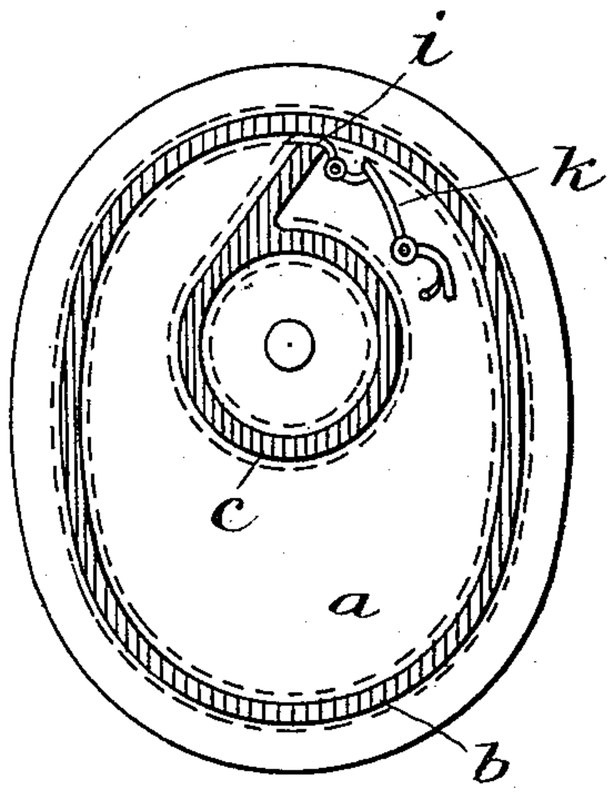
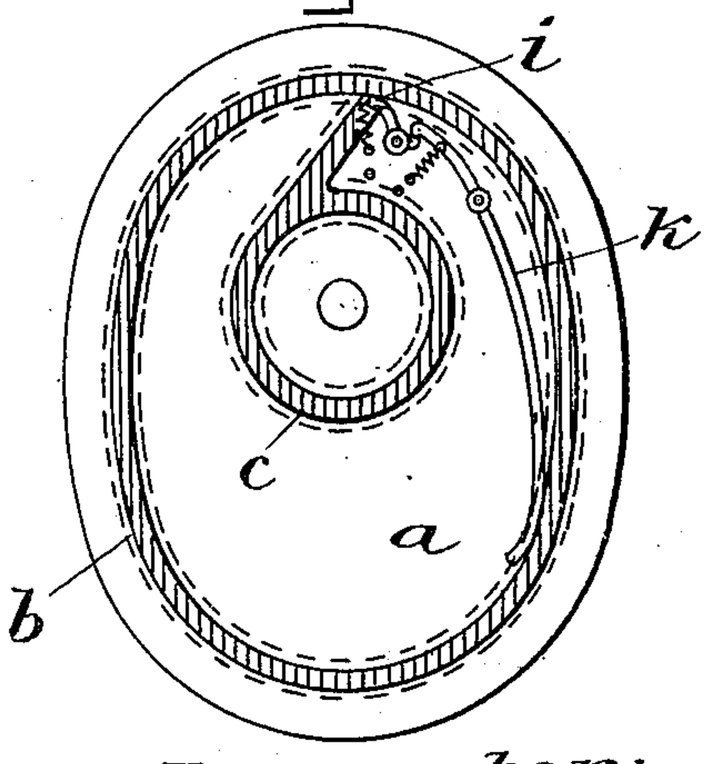


Fig. 4.



Witnesses:
E. B. Bolton
Otto Munck

Inventor:
Anders Gustaf Theodor Öfverström
By Richards & R
his Attorneys.

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Fig. 5.

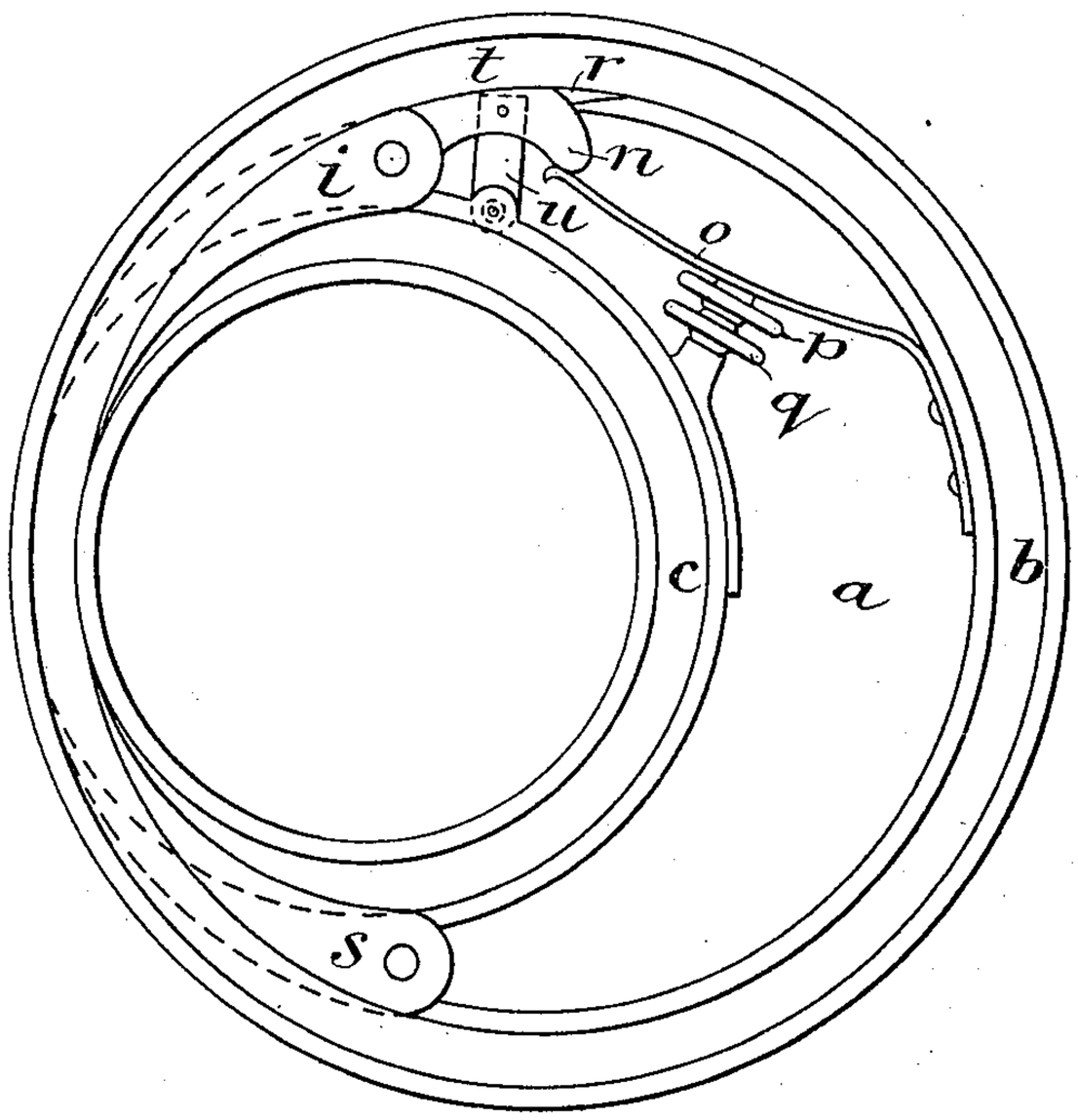

Fig. 6.

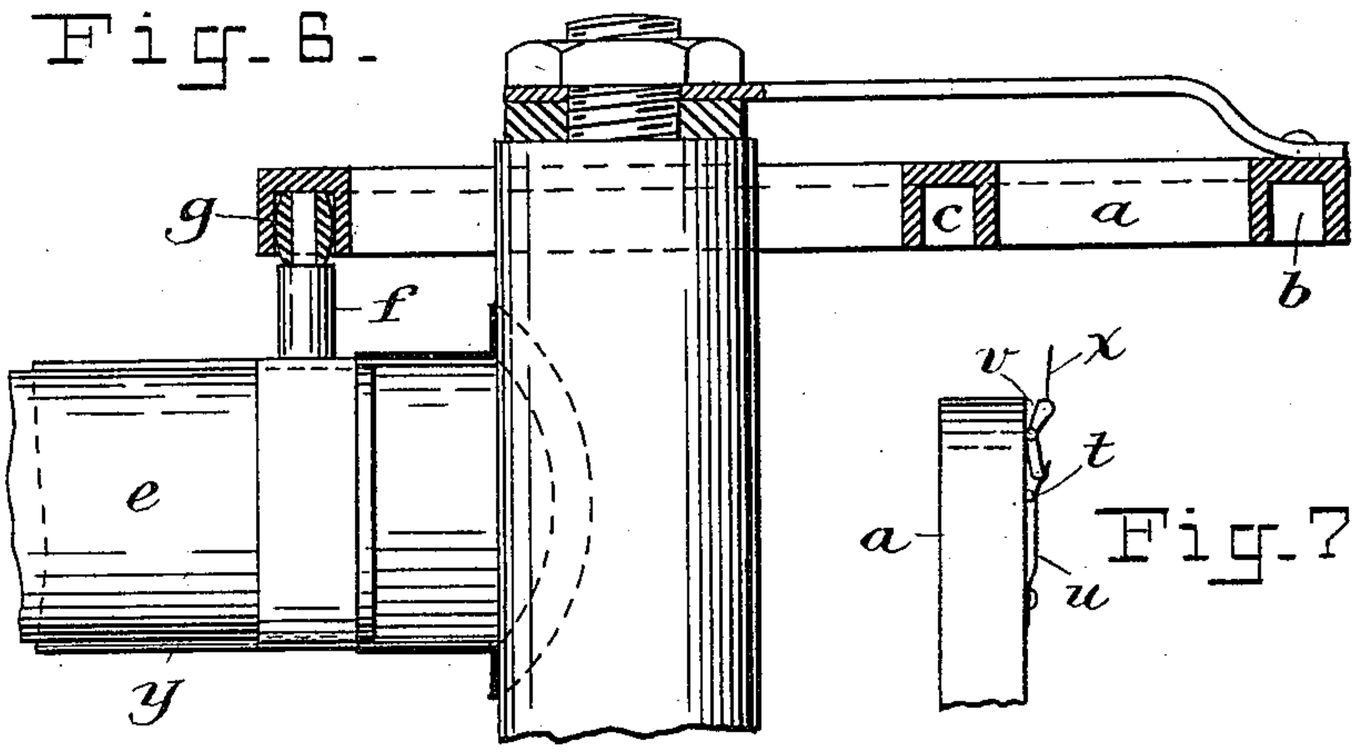

Fig. 7.

Witnesses:
E. B. Bolton
Attorney

Inventor:
Anders Gustaf Theodor Öfverström
By Richards & R
his Attorneys.

UNITED STATES PATENT OFFICE.

ANDERS GUSTAF THEODOR ÖFVERSTRÖM, OF SUNDSVALL, SWEDEN.

DEVICE FOR AUTOMATICALLY INFLATING PNEUMATIC TIRES.

SPECIFICATION forming part of Letters Patent No. 667,791, dated February 12, 1901.

Application filed July 6, 1900. Serial No. 22,733. (No model.)

To all whom it may concern:

Be it known that I, ANDERS GUSTAF THEODOR ÖFVERSTRÖM, dealer, a subject of the King of Sweden and Norway, and a resident of Sundsvall, in the Kingdom of Sweden, have invented certain new and useful Improvements in Devices for Automatic Pumping into Pneumatic Tires of Bicycle-Wheels and Similar Wheels, (for which I filed applications for patents in Sweden the 7th day of December, 1899, under No. 2,079/99; in Germany the 3d day of March, 1900, under No. O, 3,357^{II}/63^{d}, and in France the 7th day of March, 1900, under No. 286,157,) of which the following is a specification, reference being had therein to the accompanying drawings.

In order to obtain an automatic pumping into the pneumatic tires of bicycle-wheels and similar wheels while the wheel is rolling, it has been proposed to locate the air-pump on the wheel radially to its axis and communicate motion to the movable part of the pump by means of a pin or the like projecting from said part and running in a stationary grooved cam-plate, the groove of which is eccentric to the wheel-axle. The pin has hitherto been allowed to run continuously in the groove and drive the pump, and the pump has been provided with an extra valve, which as the tire has been pumped up discharges into the atmosphere any additional air coming from the pump.

This invention relates to an improvement of the said kind of automatic pumping devices with a view to dispensing with the extra valve and completely and automatically interrupting the pumping when the tire is pumped up. According to a modified arrangement of the invention the pumping device is, moreover, so contrived that the rider can at any time again couple on the pump while riding should additional air be needed in the tire.

Figure 1 is an elevation of a portion of a bicycle-wheel provided with a pumping device. Fig. 2 is a vertical cross-section of the same wheel. Figs. 3 and 4 show modified arrangements of the invention. Figs. 5 and 6 show in an elevation and a section, respectively, a further modification of the invention. Fig. 7 shows a detail.

a, Figs. 1 and 2, is the grooved cam-plate mentioned above. It is secured to the frame by means of clamps *m*. On the inside the cam-plate is provided with the above-mentioned groove eccentric to the wheel-axle, and besides with a circular groove *c*, concentric to the axle of the wheel. According to Figs. 1 and 2 the two grooves are tangent to each other, and at the point of tangency is a yielding spring *d*, forming a portion of the inner bounding-wall of groove *b* and outer bounding-wall of groove *c*.

l is the valve of the tire, and *e* the air-pump. The stationary part of the latter is connected to the valve *l*, and its movable part obtains during the rotation of the wheel a reciprocating motion from the pin *f*, entering in the eccentric groove *b*, and provided with a roller *g*, said pin being secured to the pump by means of a clamp *h*, so that air is automatically forced into the tire. When the air in the tire has reached a certain pressure, the spring *d* no longer has power to resist the inward pressure of pin *f* as the roller is passing, but yields, so as to cause the roller to snap into the groove *c*, and as a result the pumping action is discontinued, inasmuch as the movable part of the pump, owing to the groove *c* being circular and concentric to the wheel-axle, derives no reciprocating motion through the rotation of the wheel. To obtain rigidity, the pump may be secured to the bicycle-wheel in various manners. Thus, for instance, a bushing in which the movable part of the pump runs may be secured to the spokes by means of clamps or the like. Alternately there may be arranged on the movable part of the pump longitudinal guides, in which enter projections from the spokes for guiding the pump in the reciprocating motion.

In Fig. 3 is shown a modified arrangement of the plate *a*. The groove *b* is here of oval form, and in place of the spring *d*, Figs. 1 and 2, two two-armed levers *i k*, actuated by springs, are employed. The lever *i* by means of one of its arms, which is forced inward by a spring, shuts off the groove *c* from groove *b*, while the other arm of said lever is actuated inward by one arm of lever *k*, the other arm of which is actuated outward by a spring. At a certain air-pressure in the tire the pin *f* forces one arm of lever *i* inward, causing the roller to enter the groove *c*.

In Fig. 4 a modification of the latter arrangement is shown, by means of which the

communication between grooves *b* and *c* is opened already before the pin *f* has arrived at the point of transition or juncture between the two grooves. The lever *k* extends with its free arm to the groove *b*, so that a portion of it protrudes slightly in the groove. When the pin is passing the portion of lever *k* projecting in the groove *b*, it exerts a certain pressure on said lever, and when this pressure is sufficiently great to move said protruding part inward from the groove *b* the lever *k* is moved away from lever *i*, the latter being thereby so swung by its spring that communication between grooves *b* and *c* is opened, and as a result the pin in passing the point of juncture enters the groove *c*. The tension of the spiral springs actuating the levers is regulated by attaching them to different studs on plate *a*, Fig. 4.

In Figs. 5, 6, and 7 is shown the most convenient manner of arranging plate *a*. According to these figures the plate is so constructed that the pin *f* will not only be automatically switched into the groove *c* when the tire has been pumped up sufficiently, but the rider is enabled while riding to make the pin leave the groove *c* and enter groove *b* if the tire needs pumping up. The lever *i*, located at the point of tangency of grooves *b c*, has the shape of a switch-tongue, which can form part of the boundary both of the outer groove *b* and the inner groove *c*. From the tongue projects on the opposite side of its fulcrum an arm or projection *n*, actuated by a leaf-spring *o*, secured on plate *a*, and adapted to hold the switch-tongue in the position shown by full-drawn lines, and the tension of which can suitably be regulated by means of a screw *p*, tapped into the plate and provided with a lock-nut *q*. The direction of motion of the pin *f* is indicated by the arrow in Fig. 5. In the inner bounding-wall of groove *b* is a recess *r* near the projection *n*, so that when the pressure in the tire has reached a certain limit the pin *f*, actuating the projection *n*, can enter the recess *r* and place the switch-tongue in the position shown by dotted lines in Fig. 5. When the pin again arrives at the switch-tongue *i*, it will consequently be guided into the groove *c* and the pumping action be discontinued. The recess *r* is preferably filled up with india-rubber or the like for preventing shocks between the pin *f* and the inner bounding-wall of groove *b*. At the point of tangency of grooves *b c* a tongue *s* forms the inner bounding-wall of groove *b*. The tongue is reversed by means of the pin *f* and is retained in the position occupied by the friction at the pin and of the tongue on the plate *a*. The limit to which the pressure in the tire may be allowed to rise before the pin *f* is switched into the groove *c* is regulated by adjusting the tension of the spring *o* by means of the screw *p*. On the plate *a* is fixed a leaf-spring *u*, provided with a projection or pin *t*, which when the tongue *i* is moved into the position shown by dotted lines snaps over or is brought in engagement with the projection *n*, thus retaining the tongue in the latter position. On the plate *a* is journaled a bell-crank lever *v*, which can actuate the spring *u* by one of its arms and from the other arm of which leads a cord *x* or the like to the handle-bar of the bicycle or to the seat of the vehicle. When the rider desires to switch the pin *f* into the groove *b*, he pulls in the said cord, thereby causing the bell-crank *v* to move the spring *u* out of engagement with the projection *n*, so that the spring *o*, actuating the said projection, will return the switch-tongue to the position shown by full-drawn lines. In the arrangement shown in Figs. 5 and 6 the movable part of the pump is guided by a tube *y*, secured to the hub of the wheel, and in the wall of which is a slot for the pin *f*.

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

1. In combination in an apparatus for automatically inflating pneumatic tires of bicycles and similar wheels a pump connected to the valve of the tire, a disk revolving with the wheel arranged axially thereof, a guideway in the disk eccentric to the periphery of the wheel, a connection from the movable part of the pump to said way, a way concentric to the periphery of said wheel communicating with the eccentric way, and means for closing said communication adapted to be automatically removed, substantially as described.

2. In combination in an apparatus for automatically inflating pneumatic tires, a pump connected to the valve of the tire, means for reciprocating the movable member of the pump comprising a disk rotating with the wheel having a groove concentric with the wheel and a groove eccentric with the wheel therein, a pin extending from the movable part of the pump adapted to travel in said ways, said ways communicating with each other, a device normally closing said communication, to hold said pin in the eccentric way, said device yielding under pressure of said pin when the pressure in the tire has reached a predetermined point, to permit the pin to enter the concentric groove, substantially as described.

3. In combination in an apparatus for automatically inflating pneumatic tires, a pump connected to the valve of the tire, means for reciprocating the movable member of the pump comprising a disk rotating with the wheel having a groove concentric with the wheel and a groove eccentric with the wheel therein, a pin extending from the movable part of the pump adapted to travel in said grooves, said grooves communicating with each other, a switch-tongue normally closing said communication, to hold said pin in the eccentric groove, said tongue yielding under pressure of said pin, when the pressure in

the tire has reached a predetermined point, to permit the pin to enter the concentric groove, and a locking device for retaining the switch-tongue in the reversed position said locking device being disengaged by hand, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ANDERS GUSTAF THEODOR ÖFVERSTRÖM.

Witnesses:
P. B. KARTSOHN,
A. SMEDBERG.