No. 674,722. Patented May 21, 1901.

A. C. & L. S. ANDERSEN.

AUTOMATIC PUMP FOR TIRES.

(Application filed Oct. 12, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

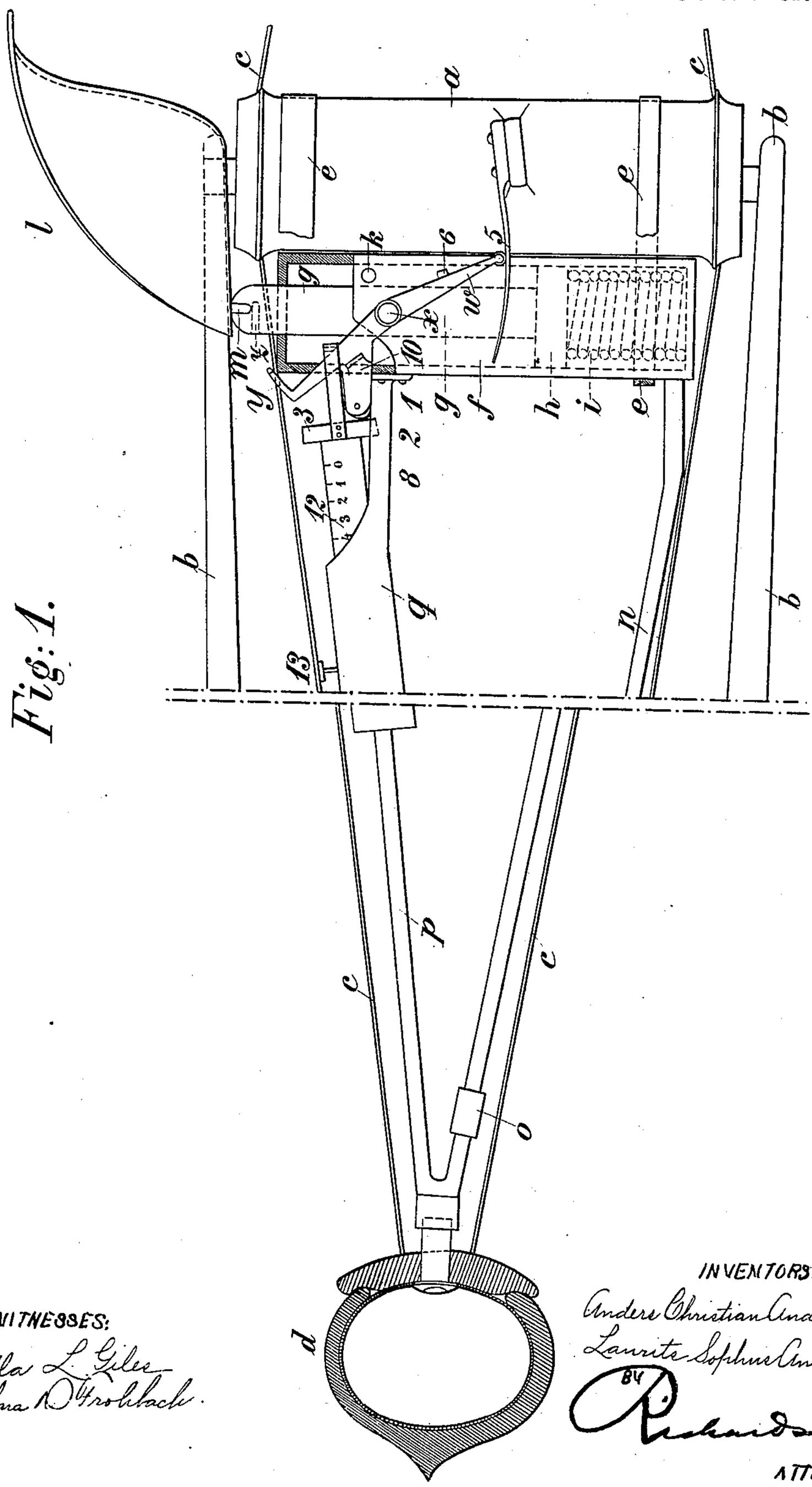

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Fig. 2.

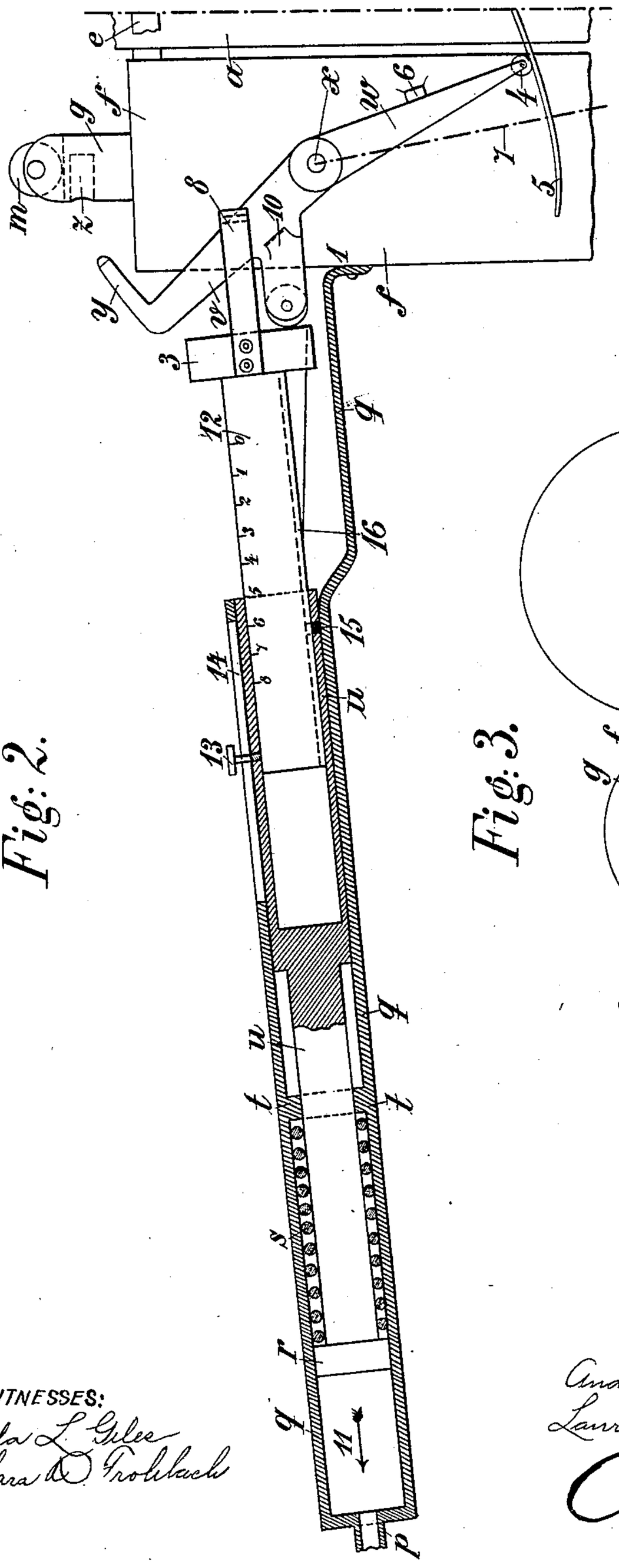

Fig. 3.

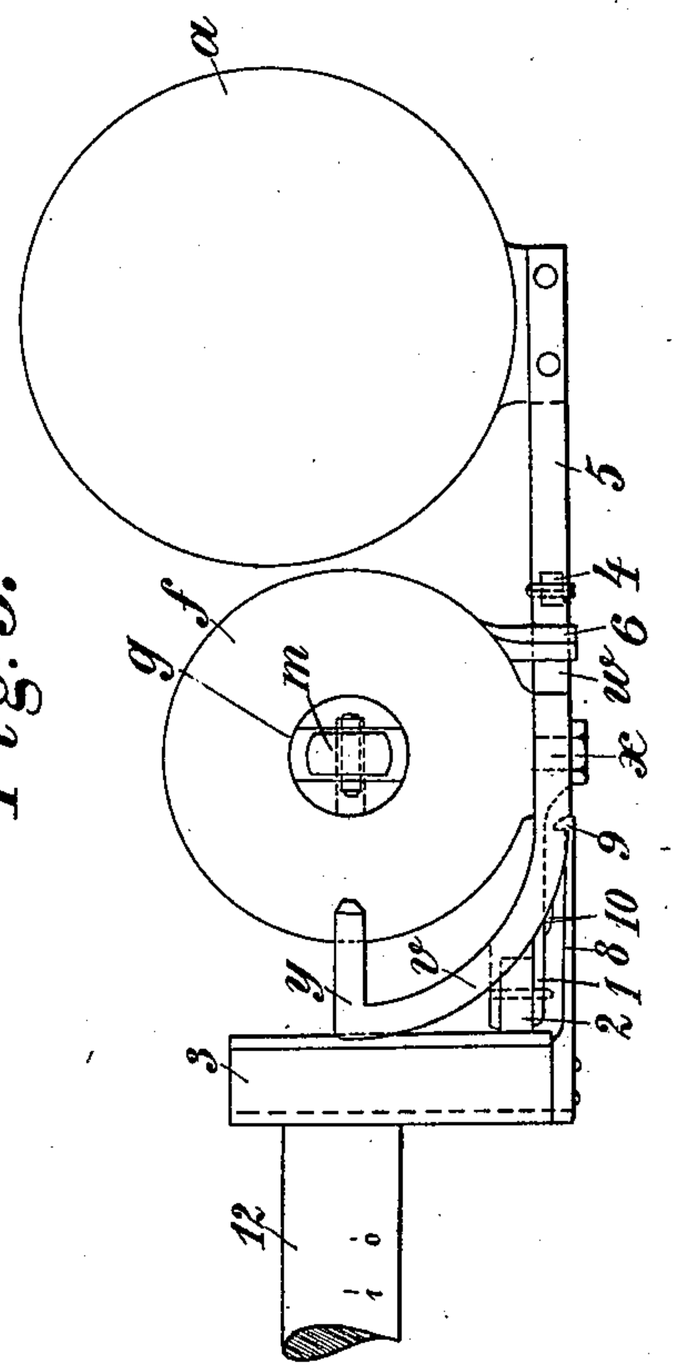

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Fig. 4.

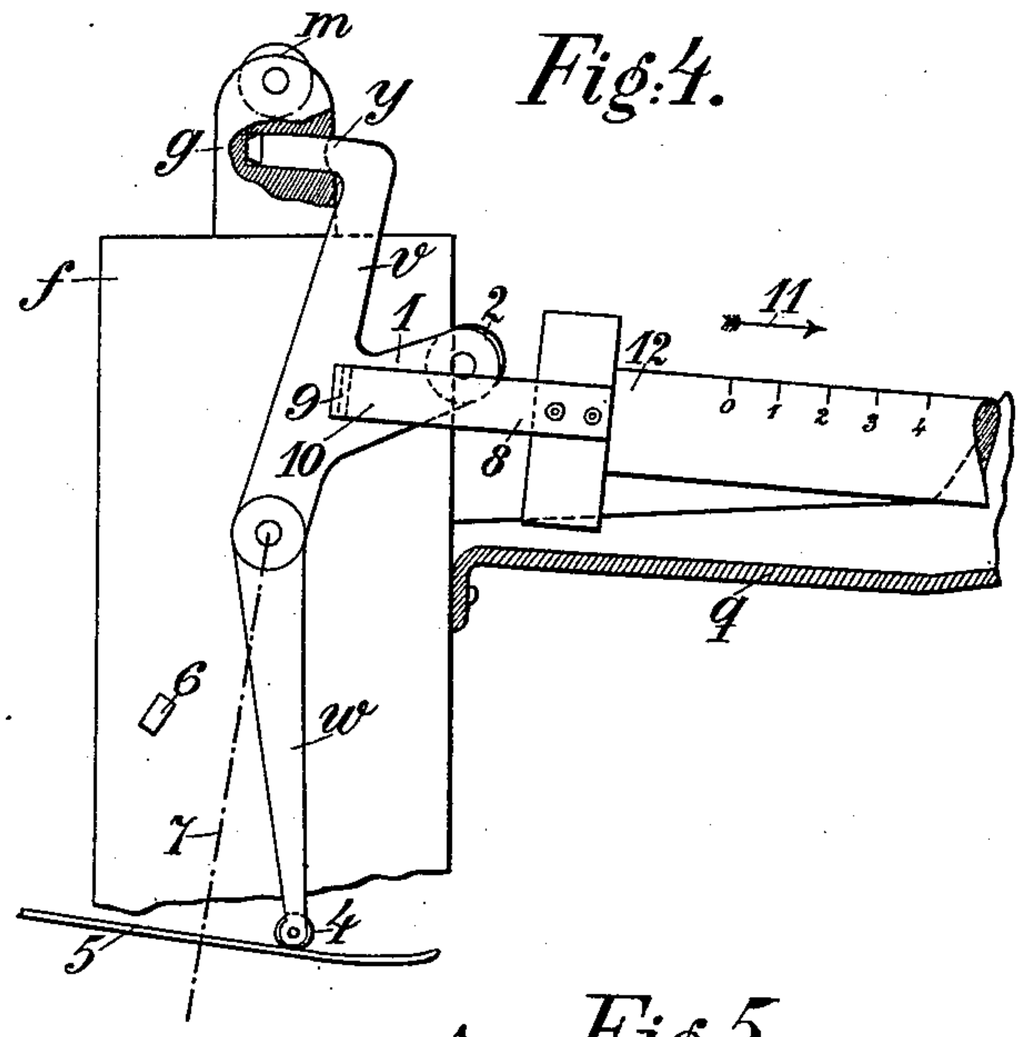


Fig. 5.

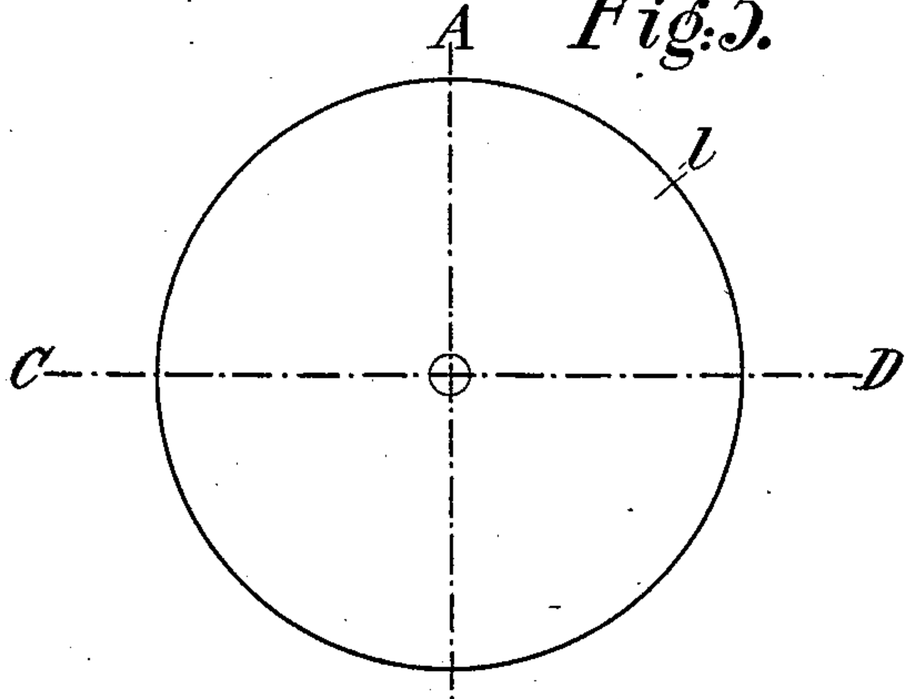


Fig. 6.

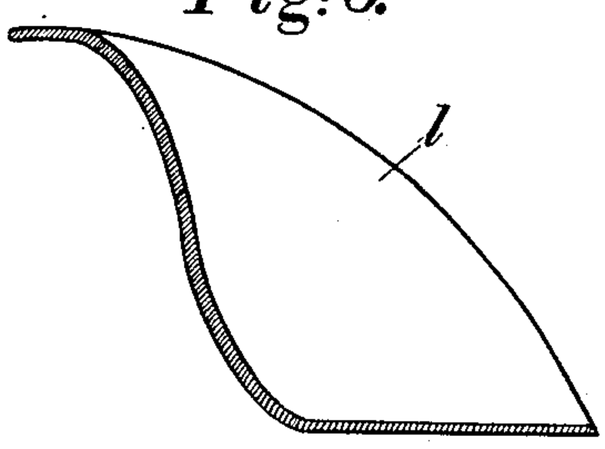
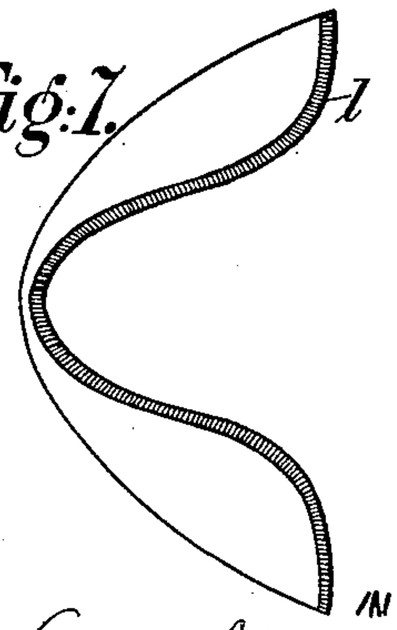


Fig. 7.



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UNITED STATES PATENT OFFICE.

ANDERS CHRISTIAN ANDERSEN AND LAURITS SOPHUS ANDERSEN, OF ODENSE, DENMARK.

AUTOMATIC PUMP FOR TIRES.

SPECIFICATION forming part of Letters Patent No. 674,722, dated May 21, 1901.

Application filed October 12, 1900. Serial No. 32,811. (No model.)

To all whom it may concern:

Be it known that we, ANDERS CHRISTIAN ANDERSEN and LAURITS SOPHUS ANDERSEN, saddlers, of 1 St. Jörgens Forstad, Odense, Island of Funen, in the Kingdom of Denmark, have invented certain new and useful Improvements in Automatic Pumps for Tires, of which the following is a specification.

The present invention refers to a method of automatically producing a constant air-pressure in pneumatic tires and an apparatus for carrying out this method. The said method consists in forcing, by means of an air-pump, which in well-known manner is worked from the bicycle-wheels, air into the tire until a suitable pressure is obtained, whereupon the pumping when this pressure has been reached automatically ceases again to commence when the pressure in the tire, owing to one reason or another, falls down below the desired pressure. The pumping is effected by means of an air-pump driven by the cycle-wheel, but which may be of any kind—for instance, of the known kind shown on he drawings.

The invention is shown in the accompanying drawings, in which—

Figure 1 shows part of a cycle-wheel supplied with the said arrangement. Fig. 2 shows part of the arrangement seen in side elevation and partly in section. Fig. 3 shows part of the arrangement seen from above. Fig. 4 shows the same part in side elevation, but in another position than the one shown in Fig. 2. Figs. 5, 6, and 7 are details. Figs. 2, 3, and 4 are shown on a larger scale than Fig. 1.

a is the hub; *b*, the fork-arms; *c*, the spokes, and *d* the rim, which in known manner is supplied with a pneumatic tire of any kind. A cylinder *f*, in which a piston *h*, with piston-rod *g*, may move forward and backward, is by means of bands *e* or in some other suitable manner fastened to the hub *a*. The piston is pressed outward by a spring *i*, placed inside the cylinder between the bottom of same and the piston. The cylinder-mantle is provided with a hole *k*, so placed that it is between the piston and the bottom of the cylinder when the piston is in its outermost position. The outer air may thus pass into the cylinder below the piston every time this assumes the said position. The extremity of the piston-rod *g* is resting against a plate *l*, fixed rigidly upon the cyle-frame and of the shape shown in Figs. 1, 5, 6, and 7. Fig. 5 shows the plate *l* seen from the inside, Fig. 6 a section on the line A B, and Figs. 5 and 7 a section on the line C D of Fig. 5. As will be seen from the figures, the plate *l* is undulated, and the distance from the summit of the undulation to the bottom is equal to the stroke of the piston *h*. The plate *l* is attached to the inner side of the fork *b*, and the piston-rod *g*, which protrudes between the spokes *c*, will consequently while the wheel is turning and actuated by the spring *i* follow the undulated surface of the plate *l*, and thus obtain a forward-and-backward movement.

In order to diminish the friction against the plate *l*, the piston-rod *g* may have a roller *m*, which runs upon the plate.

The bottom of the cylinder is provided with a tube *n*, leading to the pneumatic tire *d*, which tube is supplied with a counter-valve *o*, that prevents the air introduced into the pneumatic tire from returning through the tube *n* when the piston *h* moves outward. The air-pump is further provided with a device that automatically interrupts the pumping when the pressure in the tire *d* has reached a certain suitable height and which again automatically starts the pump when the pressure in the tire falls down below the normal state. A form of construction for such an arrangement is shown in the drawings. From the tube *n* branches off another tube *p*, leading to a cylinder *q*, Fig. 2, in which is a piston *r*, that by a spring *s*, inserted between a flange *t* and the piston *r*, is forced down toward the mouth of the tube *p*.

On the cylinder *f* is fixed a double-armed lever *v w*, that may turn around a pin *x* and whose one arm *v* is bent toward the axle of the cylinder *f* and is provided with a hook *y*, that may engage into a hole *z* in the piston-rod *g* and with a bracket 1, having a roller 2, that may be actuated by a plate 3, fixed upon the foremost end of the piston-rod of the piston *r* when this piston is moving toward the cylinder *f*. The lever *w* is provided with a roller 4, rolling upon a spring 5, fixed upon the hub

a. The turning of the lever *v w* is limited partly by a fixed lug 6 and partly by the hook *y*, reaching the bottom of the hole *z*. The spring 5 is thus so fixed that its plane is at right angles with the middle position of the arm *w*, (the line 7,) and when the arm *w* has passed this line in the one or the other direction the spring 5 will cause a further quicker turning of the lever *v w*, and thereby either bring the hook *y* to enter the hole *z* when this is just outside the hook or bring the arm *w* to bear against the lug 6, in which latter position the hook *y* is a certain distance away from the piston-rod *g*.

On the plate 3 is a spring-trigger 8, whose hook 9 is turned toward the arm *w* and which when the hook *y* is in the bottom of the hole *z* bears against a lug 10 upon the side of the arm *v*, Fig. 4.

The apparatus acts in the following manner: When the cycle-wheel is turning, the piston *h* of the cylinder *f* will, as above described, be moved forward and backward, whereby air is pumped into the tire *d*. Gradually as the pressure in the tire increases the piston *r* of the tube *q*, which by means of the tube *p* is in connection with the tire *d*, moves toward the flange *t*, the spring *s* being compressed, and the plate 3 on the piston-rod *u* will therefore be pressed up against the roller 2 and turn the arm *v*, so that the hook *y* is brought over against the piston-rod *g*, the spring 5 being simultaneously pressed downward, and consequently tightened by the arm *w*. When this arm passes the line 7, the plate 3 assumes the position shown in Fig. 4, and by a further movement of the plate 3 the spring 5 will make the hook *y* strike against the piston-rod *g*, it being pressed in against same by the action of the spring 5. When the hole *z* during the movement of the piston-rod *g* passes in front of the hook *y*, this hook will catch into the hole *z*. The piston-rod is now locked, and the pumping will cease. The hole *z* is placed thus so that it is just in front of the hook *y* when the piston *h* assumes its innermost position in the cylinder *f*, and the plate *l* will therefore when the piston-rod is locked by the hook *y* not be able to act upon the piston-rod. The spring *i* will in this case remain compressed. When the lever *v w* assumes the position shown in Figs. 1 and 2, the spring-trigger 8 will not touch the lug 10; but this one will as the hook *y* jumps into the hole *z* during the turning of the arm *v* be turned up behind the hook 9, and the length of the spring-trigger 8 is thus so adjusted that the lug 10 does not touch the hook 9 before the point of the hook *y* reaches the bottom of the hole *z*. If the pressure in the pneumatic tire owing to one reason or another falls below the pressure at which the pumping ceased, the spring *s* will expand and push the piston *r* back in the direction indicated by the arrow 11, Figs. 2 and 4, and the spring-trigger 8, which engages with the lug 10, will then drag the hook *y* out of the hole *z*, while the lug 10 during the turning of the arm *v* at the same time glides away from the hook of the spring-trigger. When the arm *w* has passed the line 7, the spring 5 will force it over toward the lug 6, and there being nothing to prevent the turning of the lever *v w* this one will turn quickly until the arm *w* strikes against the lug 6. As soon as the hook *y* is disengaged from the hole *z* the piston-rod *g* is released. The pumping will then again commence and be continued until the piston-rod, when the desired pressure in the tire has again been reached, is stopped by the hook *y*.

In order to be able to vary the pressure in the tire—for instance, to suit the weights of different riders—the piston-rod *u* is provided with an axial boring, in which a rod 12, fixed upon the plate 3, may slide and be held in different positions by means of a set-screw 13. The screw 13 may during the adjusting of the rod *u* slide in a groove 14 in the tube *q*. The rod 12 is prevented from turning in the boring of the rod *u* by means of a pin 15, that slides in a notch 16 in the rod 12. The rod 12 is provided with a scale corresponding to the weight of the riders. On the rod *u* there must be a suitable adjustment-mark—for instance, the extreme edge of the rod *u*—which mark may continually be observed either directly or through the slit 14. In Fig. 2 the apparatus is adjusted at the mark "5." It will be seen that the farther the rod 12 is pushed into the rod *u* the more the spring *s* will have to be compressed and the greater will consequently the pressure be in the tire before the piston has moved far enough forward for the plate 3 to actuate the arm *v*.

That part of the tube *q* which is nearest to the cylinder *f* and which in the figures is shown cut away may in order to prevent dirt and the like from entering the mechanism be covered by an easily-removable guard.

It must be remarked that in order to diminish the dead-space of the cylinder *f* the spring may be placed between the piston and the cover of the cylinder, the spring being then compressed when the piston moves inward. For the same reason the tube *n* may start from the very bottom of the cylinder and the counter-valve *o* be placed close to this one.

Having now particularly described and ascertained the nature of this said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In combination, the wheel-hub *a*, a pump-cylinder having its axis parallel with the axis of the hub, a piston in said cylinder, a connection between the said cylinder and the tire, a cylinder *q* arranged at substantially a right angle to the pump-cylinder, a catch-lever pivotally supported and having one arm moving toward and from the piston-rod to engage the same, a piston in the cylinder *q* arranged to bear at its front end upon a portion of the catch-lever to move the same by direct

action, and a catch on the said piston to engage the catch-lever to retract the same, substantially as described.

2. In combination, a piston r in a tube q which by another tube p is in connection with the pneumatic tire d, the said piston r being actuated by a spring s, in combination with a turnable lever v, w whose one arm v has a hook y that may catch into a hole z upon the piston-rod g, while the other arm w is actuated by a spring 5 whose plane is at right angle with the arm w when this one is exactly between its two extreme positions, while the piston-rod u, when the spring s is compressed, may press against the arm v and thereby bring the hook y to gear into the hole z, the piston-rod u being provided with a spring-trigger 8 whose hook 9 is opposite a lug 10 upon the arm v when the hook y is catching into the hole z.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

ANDERS CHRISTIAN ANDERSEN.
LAURITS SOPHUS ANDERSEN.

Witnesses:
ERNEST BOUTARD,
EMIL MAÜRITZEN.