H. M. WILLIAMS.

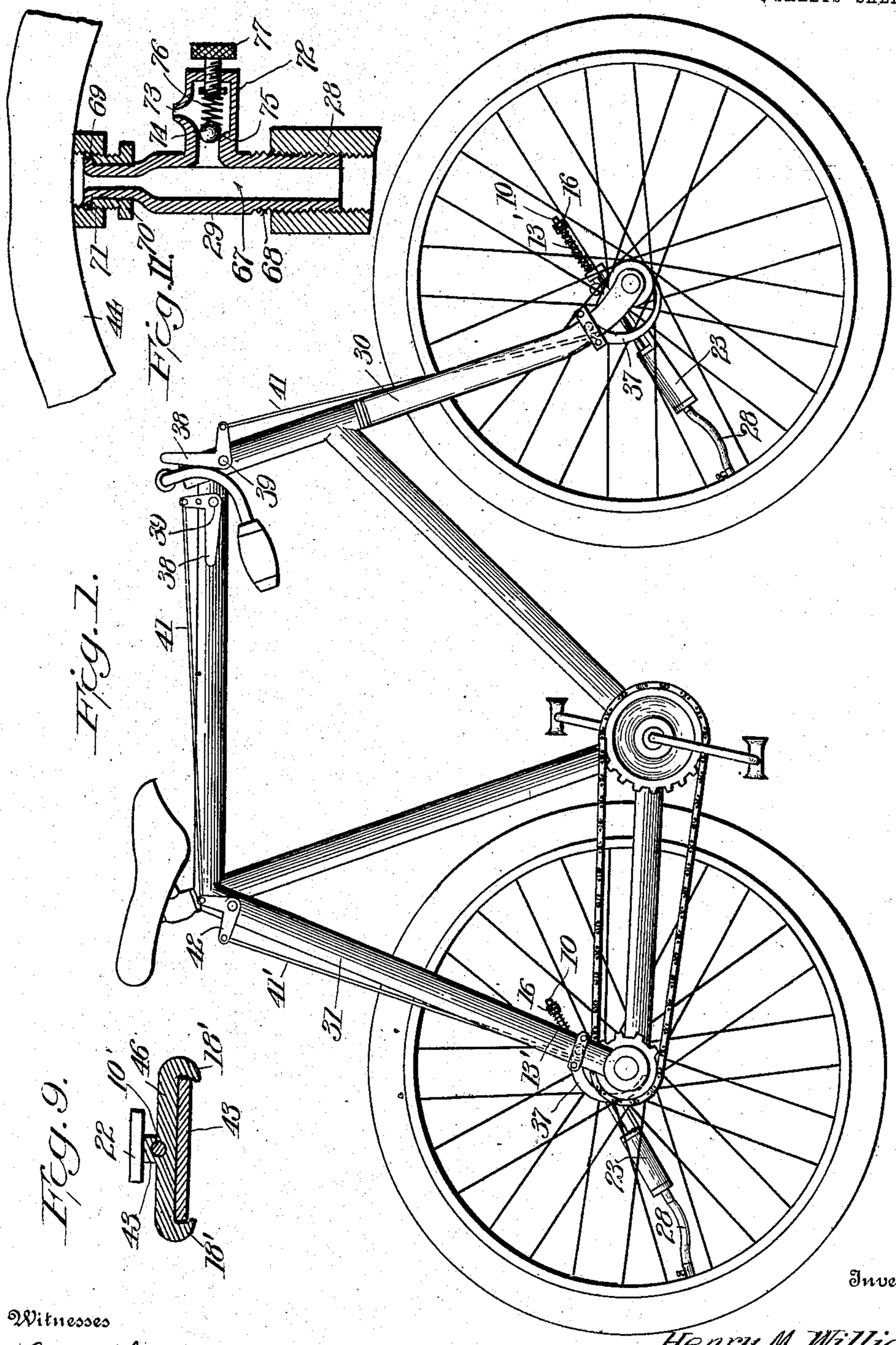
PUMP FOR PNEUMATIC TIRES.

APPLICATION FILED JULY 8, 1907.

900,632.

Patented Oct. 6, 1908.

3 SHEETS—SHEET 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

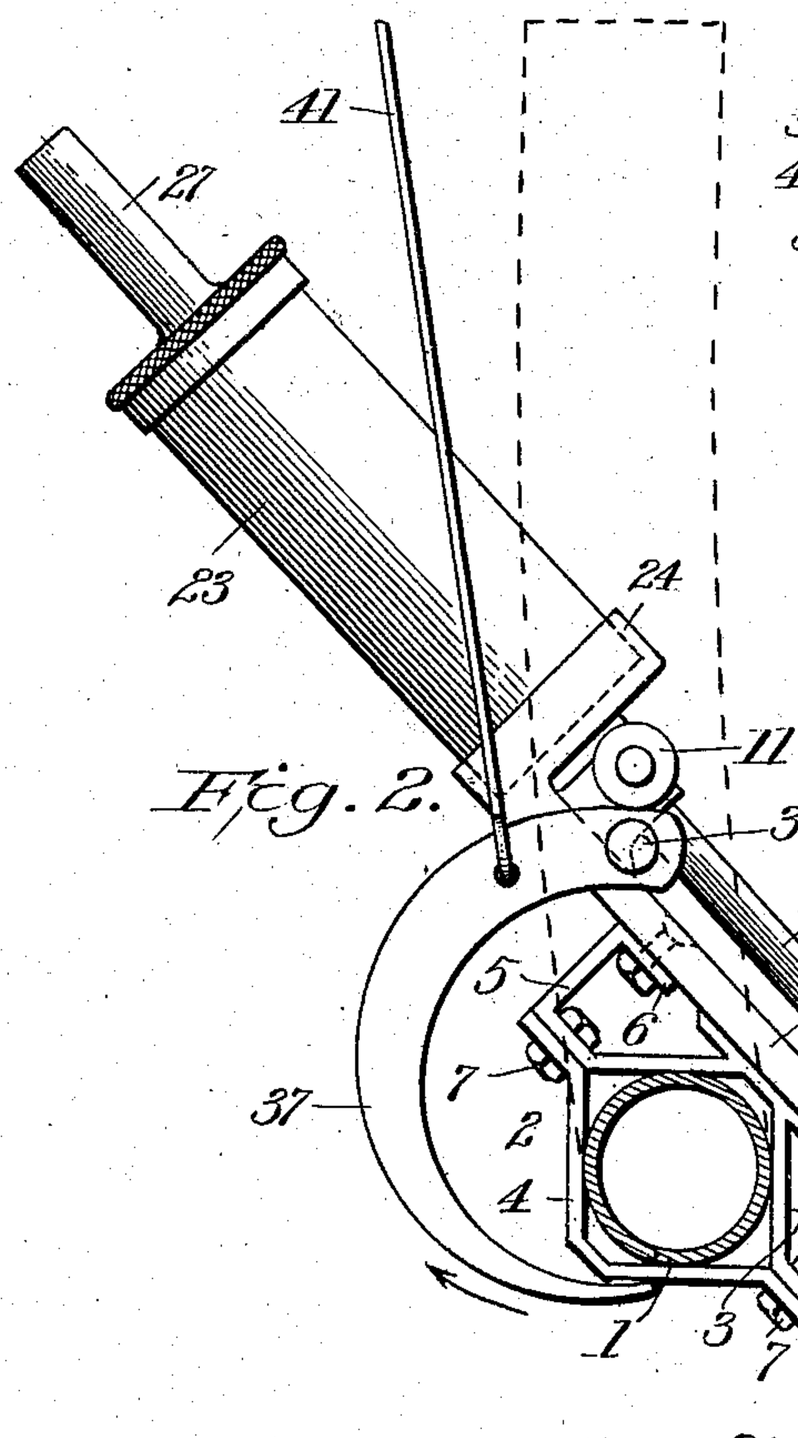


Fig. 3.

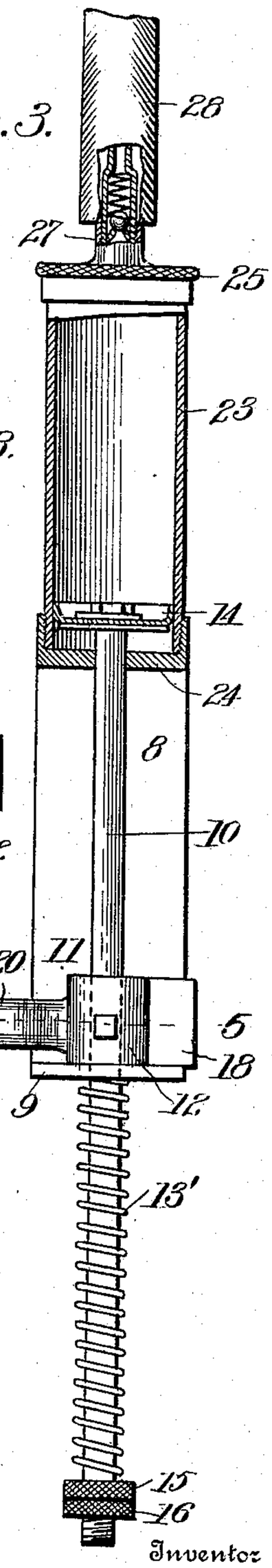


Fig. 4.

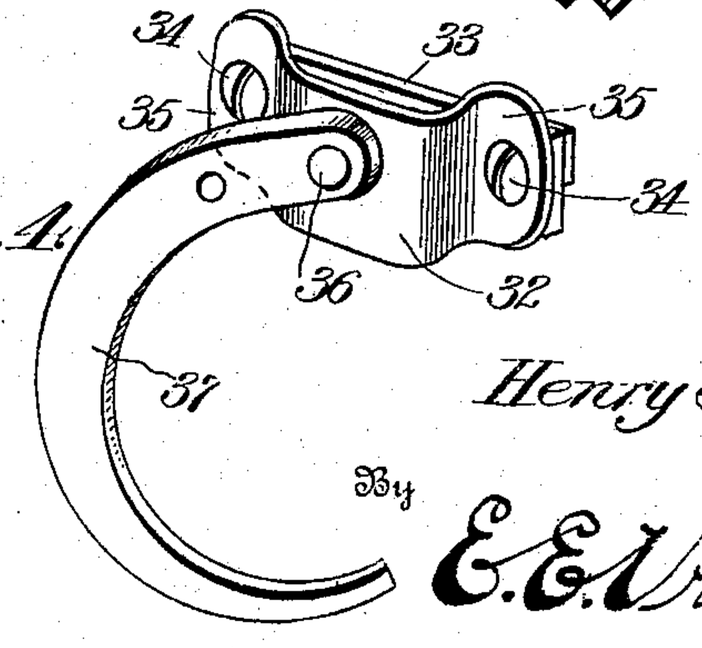


Fig. 7.

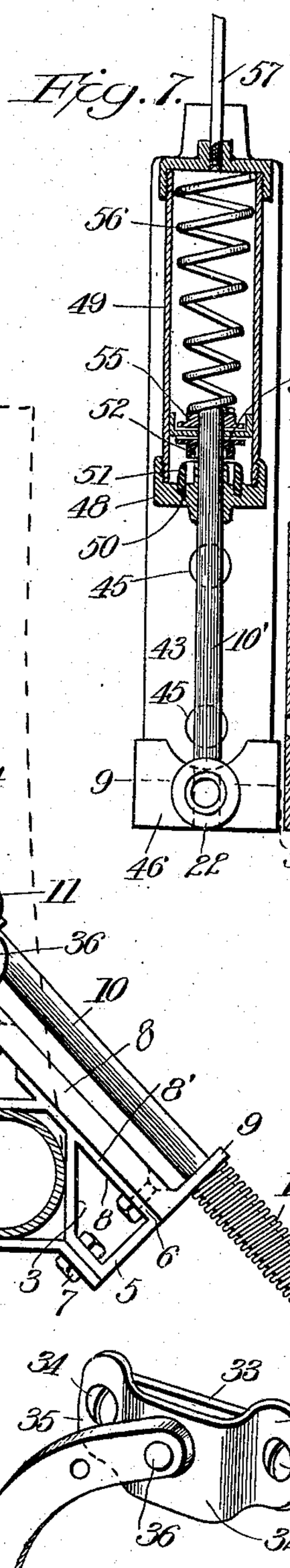
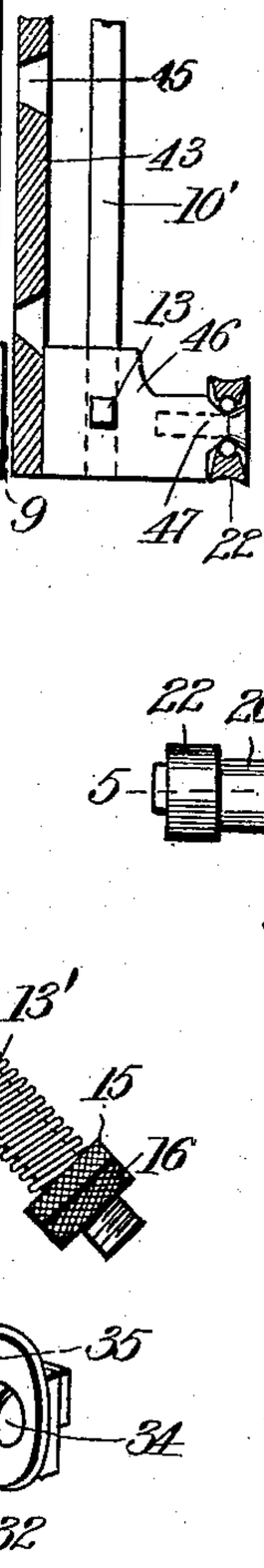


Fig. 8.



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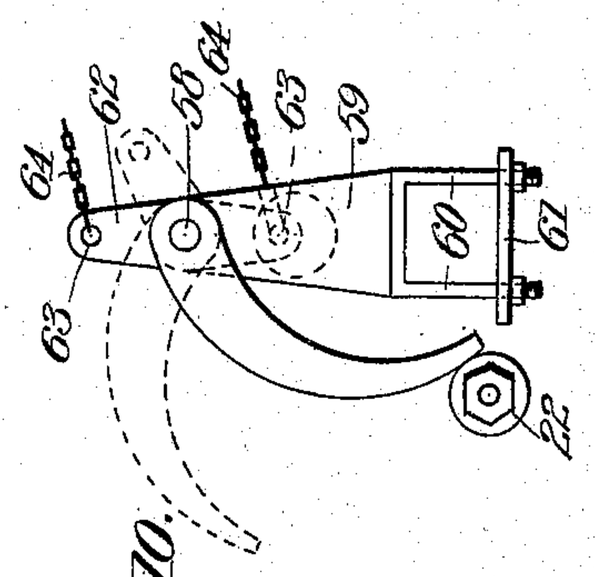

Fig. 10.

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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PUMP FOR PNEUMATIC TIRES.

No. 900,632. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed July 8, 1907. Serial No. 382,644.

To all whom it may concern:

Be it known that I, HENRY M. WILLIAMS, a citizen of the United States, residing at Vincennes, in the county of Knox and State of Indiana, have invented certain new and useful Improvements in Pumps for Pneumatic Tires, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in a pump for pneumatic tires, and has for its object the provision of means for facilitating the filling of hollow or pneumatic tires, preferably, with air, while the wheel of which the tire is a part, is rotated.

Another object of the invention is the construction of an automatic pump to be attached to a bicycle, automobile, or any suitable vehicle provided with wheels having pneumatic tires, the operation of which pump is controlled by the occupant of the vehicle.

With these and other objects in view, the invention consists of certain novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the drawings: Figure 1 is a view in side elevation of a bicycle, to which is secured a plurality of pumps constructed in accordance with the present invention. Fig. 2 is a view in side elevation of one of the pumps shown in Fig. 1. Fig. 3 is a front view, partly in vertical section, of the pump depicted in Fig. 2. Fig. 4 is a perspective view of a cam device for actuating the piston of the pump. Fig. 5 is a transverse, sectional view taken on line 5, 5, Fig. 3. Fig. 6 is a view in side elevation of a motor vehicle, to which is attached another embodiment of the present invention. Fig. 7 is a front view, partly in section, of the embodiment partly illustrated in Fig. 6. Fig. 8 is a fragmentary, longitudinal sectional view of the structure depicted in Fig. 7. Fig. 9 is a transverse, sectional view taken on line 9, 9, Fig. 7. Fig. 10 is a fragmentary view in elevation of the embodiment or device depicted in Fig. 6, showing particularly the cam device in this view. Fig. 11 is an enlarged, sectional view of my improved relief valve.

Referring to the drawings by numerals, 1 designates the hub or rotatable support, to which is secured the sectional bracket 2 carrying the pump. This bracket 2 comprises a part of the pump, as it is absolutely essential in the construction of an operative pump, to employ a fastening means, whereby it is operably assembled with the wheel and the cam device, hereinafter specifically described.

The bracket 2 comprises a primary section 3 and an auxiliary section 4. The primary section 3 is provided with a substantially V-shaped body provided at its ends with lugs 5, which lugs 5 terminate at their inner ends with inwardly-extending feet 6. The auxiliary section 4 comprises a substantially V-shaped body, the same as the body of the primary section, and said auxiliary section is provided at its ends with horizontal, straight lips or lugs engaging similarly constructed portions on the primary section. Suitable fastening means, as for instance, bolts, or rivets 7, extend through these parallel lips or lugs of the primary and auxiliary sections, and secure said sections together, whereby the bracket is clamped upon the hub or rotatable support 1. A guide-plate 8 is secured to the inwardly-extending feet 6, by any suitable fastening means; said guide-plate is provided with a longitudinally-extending, reinforcing rib 8′ upon its inner face, contiguous to the sectional bracket, see Figs. 2 and 5. This guide-plate is provided at its lower end with an angularly-disposed lug or stop 9, which is apertured for permitting the plunger rod 10 to slide freely therein.

The cross-head 11 comprises an enlarged body portion 12 provided with an aperture within which is positioned the plunger-rod 10. The cross-head 11 is provided with a threaded bolt or set-screw 13 extending into the body portion 12 and engaging rod 10 for clamping and fixedly securing said cross-head in an adjusted position upon rod 10, whereby the tension of the spring 13′ and the stroke of the plunger-head 14 is controlled. The spring 13′ is positioned upon the plunger-rod 10 between the right-angled portion 9 of the guide-plate and the nuts 15 and 16. The nuts 15 and 16 are capable of longitudinal adjustment upon the lower or outer end of the plunger-rod, whereby an additional adjustment of the spring may be obtained for controlling the tension other than the adjustment of the cross-head. The cross-head is provided, see Fig. 5, with a flat, inner face 17 normally engaging the similar face of the guide-plate, and said

cross-head is provided at one side with a depending lip or guide 18, engaging, preferably, a beveled edge 19 of the guide-plate, whereby the cross-head is guided in its stroke. Upon the opposite side of the body 12 of the cross-head 11, there is formed a laterally-extending stud or finger 20, which is provided with a stub-shaft 21, on which is journaled, preferably, a ball-bearing roller 22. It is to be noted that the lug or finger 20 is upwardly or outwardly curved, whereby the roller is placed a considerable distance away from the guide-plate 8, so as to permit a free and unobstructed movement of the roller 22 with respect to the cam device, hereinafter described.

The plunger-head 14 slides within, preferably, a cylindrical casing 23, which casing is screw-threaded upon its outer face at each end, whereby the lower end is threaded into a cap 24, preferably, integral with the guide-plate 8, near one end, and a cap 25 is detachably secured, similar to cap 24, to the upper or outer end of cylinder 23. A spring-pressed ball-valve 26 is positioned within the hollow stem or tubular extension 27 of cap 25, and upon the hollow stem or extension 27 is mounted, preferably, a flexible or rubber tubing 28, which is connected to the relief valve 29 hereinafter described. On one of the forks 30 and one of the rear posts 31 of the bicycle, constituting a support, is secured a cam device.

Referring particularly to Fig. 4, the cam device comprises a primary cam section or member 32, which is provided with a substantially U-shaped body adapted to fit around a portion of the fork 30 or post 31. Coöperating with this member 32, is an auxiliary, preferably straight member 33, which member 33 is detachably secured to the primary member 32 by any suitable fastening means, as for instance, bolts 34. The bolts 34 extend through lugs or lips 35, parallel with the end portions of the auxiliary member 33. The primary clamping member 32 is provided with a suitable support 36, as for instance, a pin or stud, upon which is pivotally mounted the cam member 37. The cam 37 is curved throughout its length, and is, preferably, of greater width near its inner end and gradually converges towards its outer end. This member 37 constitutes an eccentric for actuating the piston-rod and piston-head, through the medium of the roller 22. As the clamp, constituted by members 32 and 33, is secured to the fork or post, contiguous to the hub, and thereby placing the cam 37 in the path of movement of the roller 22, as the pump revolves upon the hub, said roller will normally travel over the cam member and will cause a stroke of the piston and, consequently, the spring 13′ will be compressed. As soon as the roller 22 passes off of the inner or pivot-end of the cam member 37, the spring will force the cross-head towards the outer end of the guide-plate 8, consequently, striking the angle portion or stop 9, whereby the movement of the piston-rod 10 is limited in one direction, when the tire is being filled.

It is often desirable to place the pump out of operation, and, therefore, I have, preferably, shown a manually-operated, bell-crank lever 38 pivotally mounted, at 39, upon the frame of the bicycle. This lever 38 is provided with, preferably, a plurality of apertures 40, whereby the connecting link 41 may be adjusted upon the lever 38 for controlling the height or the pivotal movement of the cam member 37 upon its pivot, constituted by the pin, or stud 36. It will be noted that when the lever 38 is swung upon its pivot, in one direction, the cam member 37 will be placed out of the path of movement of the roller 22, and, consequently, the pump may be revolved upon the wheel without compressing air in the cylinder 23. In Fig. 1, I have shown an intermediate bell-crank lever 42, to which connecting link 41 is attached, and an auxiliary connecting link 41′ is employed, in this instance, which link 41′ is connected also to bell-crank lever 42, and to the cam member 37, secured to the post 31. It will be noted that by this arrangement, the rider can easily and quickly control the operation of the rear pumping device.

Referring particularly to Figs. 6 to 10, the guide-plate 43 is, preferably, attached to the wheel 44, by any suitable fastening means positioned in apertures 45. The cross-head 46 slides upon the plate 43, and is very similar in structure to the cross-head 11. The cross-head 46 is provided with flanges 18′ formed upon opposite sides thereof, which engage the sides or edges of plate 43. A short shaft 47 extends outwardly in a horizontal plane from the cross-head, and journaled upon the shaft is a ball-bearing roller or wheel 22. The piston rod 10′ is, preferably, positioned near its lower end in the cross-head 46. The cross-head may be adjusted longitudinally of the piston-rod 10′, and secured in an adjusted position by a set-screw 13.

The piston-rod 10′ extends through cap 48 of cylinder 49, and in cap 48, is formed an annular groove 50, within which is seated an annular rubber ring 51. An annular ring 52 fits upon the piston-rod 10, and between the rings 51 and 52, the annular flange 53 of the rubber cap 54, is adapted to be positioned upon the piston-head 55, reaching its lowest position within the cylinder 49. Interposed between the piston-head 55 and the outer or upper end of the cylinder 49, is a spiral spring 56, which is adapted to be compressed within the cylinder 49 upon the outer or upward stroke of the piston-head 54. This spring 56 will normally hold the piston-head

54 in its lowest position ready to be acted upon by the roller or wheel 22, coming in contact with the cam member 37. A suitable outlet pipe 57 is connected to the cylinder, and this pipe 57 is connected, by any suitable means, as for instance, a hose or tubing 28 to the pneumatic tire, through the medium of, preferably, relief-valve 29.

In Fig. 10, I have shown another embodiment of the cam device, which comprises a cam member 37′, secured to shaft 58, which shaft is journaled upon the bracket 59. The bracket 59 is provided with downwardly-extending arms 60, which are screw-threaded upon their lower or outer ends, for receiving nuts for holding the clamping-bar 61 in position, whereby the bracket 59 can be secured to, preferably, the axle of the vehicle. While the cam member 37 is secured, at one end, to shaft 58, near the opposite end of shaft 58, there is a bar or member 62, which is provided with apertures 63, near its ends, and in these apertures, are, preferably, secured chains 64, constituting connecting means, whereby the bars 62 are operably connected to the manually-actuated lever 65. The levers 65 are pivoted, at 66, upon the body of the vehicle, and it will be noted that as each two of the connecting means 64 are connected to a lever upon opposite sides of the pivot 66, upon movement of the lever, the cam members 37 will be swung, for either placing the same out of the path of movement of the rollers 22, or in the path of movement of the same, whereby the operation of the pump is controlled.

It is to be noted that the rubber rings in the cylinder 49 will prevent any clicking of the piston-head striking against the cylinder, and if desired, the same kind of buffer may be placed in the cylinder 23. Furthermore, I provide manually-actuated lever means for controlling the cam member in both the structure depicted in Fig. 2, and in Fig. 10.

To prevent a tire from becoming overcharged with compressed air, I, preferably, employ a relief-valve 29 in the construction of each complete pumping device, and said valve comprises a hollow body 67, which is provided at its lower or outer end with a roughened surface 68, upon which may be secured one end of the flexible tubing or rubber pipe 28. Upon the opposite end of the body 67, there is formed a flange 69, and between the body and flange 69, there is revolubly mounted a nut 70. This nut 70 is adapted to be threaded into the valve 71 of the pneumatic tire on wheel 44. Extending laterally from the body 67, is a hollow, auxiliary casing 72, which is provided with an outlet 73, and in the auxiliary casing 32 is mounted a ball valve 74, which is normally held against the shouldered portion 75 by a spring 76, for preventing communication between the auxiliary casing and the primary casing. The tension of the spring is controlled by the adjustable thumb-bolt 77, which is threaded into the outer end of the auxiliary casing 72. It will be obvious that when the pressure in the tire is sufficient to overcome the resistance of the coil spring, that the ball-valve will be moved away from its valve-seat or shoulders 75, and, consequently, will permit escape of air, thereby preventing the tire from being injured. The escaping of air through the outlet 73 will also warn the operator to raise the cam member, and thereby throw the pump out of operation.

What I claim is:

1. In a mechanism of the class described, the combination with a revoluble support, of a guide-plate carried by said support, a cross-head slidably mounted on said guide-plate, a cylinder carried by said guide plate, a piston-head in said cylinder, means connecting said cross-head to said piston-head, a roller secured to said cross-head, and an adjustable cam member positioned contiguous to said cross-head and capable of being placed in the path of movement of said roller, whereby said piston will be reciprocated in said cylinder, when said revoluble support is rotated.

2. In a mechanism of the class described, the combination of a guide-plate, a cylinder secured near one end of said guide-plate, a cross-head slidably mounted upon said guide plate between said cylinder and the opposite end of said guide-plate, a piston-rod connected to said cross-head, a piston-head positioned within said cylinder and connected to said piston-rod, and means coöperating with said cross-head for reciprocating said piston-head within said cylinder.

3. A pump of the class described, comprising a guide-plate provided near one end with a stop, and at its opposite end with a cylinder, a piston-rod extending into said cylinder and through said stop, a piston-head positioned within said cylinder and secured to said piston-rod, a spring mounted upon said piston-rod and interposed between said stop and the outer end thereof, and means cooperating with said piston-rod between said cylinder and stop for reciprocating said rod and piston-head.

4. A pump of the class described, comprising a guide-plate provided at one end with an extension or stop and at its opposite end with an internally threaded portion constituting one end of a cylinder, the cylinder-casing threaded into said end, a piston-head mounted in said cylinder-casing, a piston-rod secured to said piston-head and extending beyond the outer face of said extension or stop, a nut threaded upon the outer end of said piston-rod, yieldable means positioned upon said piston-rod between said stop and

nut, and means connected with said piston-rod between the ends of said guide-plate and adapted to intermittently move said piston-rod and slide said piston-head within said cylinder.

5. In a device of the character described, the combination with a support, of a curved cam member pivotally mounted near one end upon said support, a bell-crank lever, a link connected near one end to said lever near one of its ends, and said link connected at its opposite end to the cam member intermediate its ends, a cylinder, a piston-head mounted in said cylinder, a piston-rod connected to said piston-head, and means coöperating with said piston-rod and said cam-member whereby said piston-head may be moved within said cylinder.

6. In a mechanism of the class described, the combination with a support, of a cylinder carried by said support, said cylinder provided with a yielding ring at one end, a piston-head, a piston-rod connected to said piston-head, a yieldable cap upon said piston-rod and positioned contiguous to said piston-head, said cap provided with an annular portion, the cap adapted to engage said ring when the piston-head is at its furthermost stroke at one end of said cylinder, and means for reciprocating said piston-head within said cylinder.

7. In a mechanism of the class described, the combination with a wheel, of a guide-plate positioned contiguous to said wheel, a bracket positioned contiguous to one side of said guide-plate, said bracket provided with inwardly-extending feet, the feet lying parallel to said guide-plate, transverse fastening means extending through said feet and said guide-plate, said bracket engaging a portion of said wheel, and means securing said bracket to said wheel, a cylinder secured to said guide-plate near one end, a piston-head in said cylinder, a piston-rod secured to said head, a cross-head slidably mounted upon the opposite side of said guide-plate to said bracket, said cross-head provided with a roller, and means adapted to engage said roller for reciprocating said piston-rod and piston-head.

8. In a mechanism of the class described, the combination with a wheel provided with a pneumatic tire, a cylinder carried by said wheel, a piston-head mounted in said cylinder, means for actuating said piston-head, of a relief-valve connected to the tire of said wheel, said relief valve comprising a hollow body provided with a laterally-extending, auxiliary body, the auxiliary body provided intermediate its ends and upon one side with an outlet, said auxiliary body provided with a valve-seat near its inner end and provided at its outer end with a threaded aperture, a bodily-movable valve-member positioned in said auxiliary body and normally engaging said valve-seat, a thumb-bolt threaded into said threaded aperture and having its inner end extending into said auxiliary body, a spring interposed between the inner end of said bolt and bodily-movable valve-member for holding the valve-member upon the seat, the bolt being capable of manual adjustment for controlling the tension of said spring, and means for supplying air, under pressure, to the body of the relief-valve.

9. In a mechanism of the class described, the combination with a wheel and a support, of a clamp-device carried by said support, said clamp-device comprising a primary and an auxiliary member, said primary-member provided with a curved or bowed body terminating in apertured ends, said auxiliary member being formed straight and having apertures registering with the apertures of the ends of said primary member, fastening means extending through the registering apertures of said members and securing the same together, a crescent-shaped cam-member pivotally mounted at its inner end upon the bulged portion of said primary-member of the cam-device, means connected to said cam-member intermediate its ends for lifting the same, a cylinder, a piston-head within said cylinder, and means connected to said piston-head and being adapted to pass over one edge of said cam-member for actuating said piston-head within said cylinder.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

HENRY M. WILLIAMS.

Witnesses:
H. D. Hinkle,
R. C. Merchant.