No. 610,991. Patented Sept. 20, 1898.

C. B. LENTZ.

PUMP FOR INFLATING PNEUMATIC TIRES.

(Application filed Aug. 20, 1897.)

(No Model.)

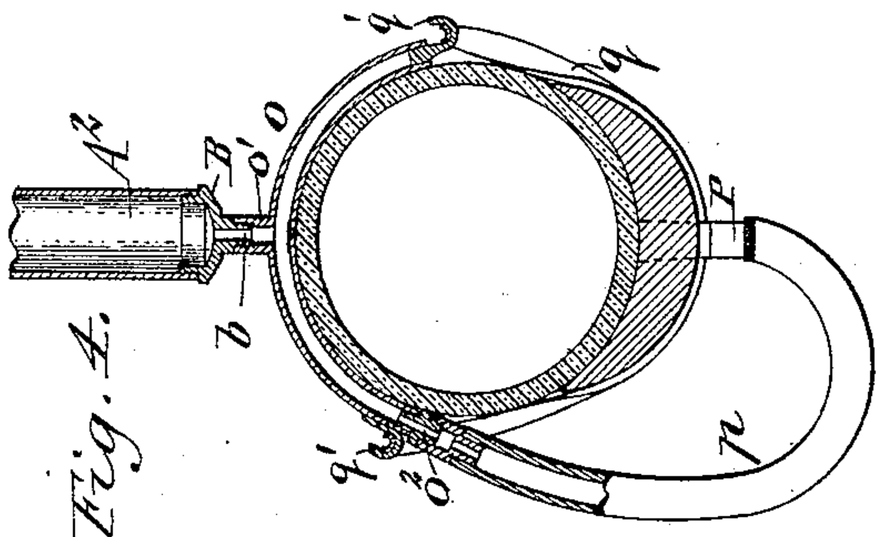

Fig. 4.

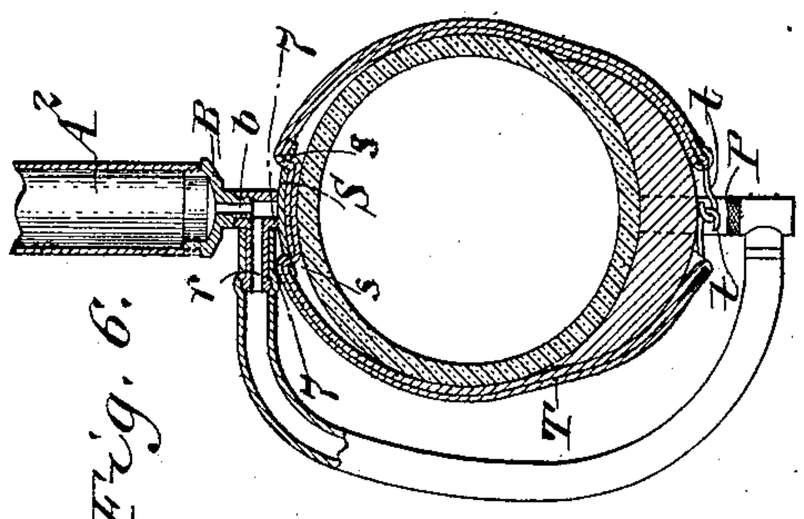

Fig. 6.

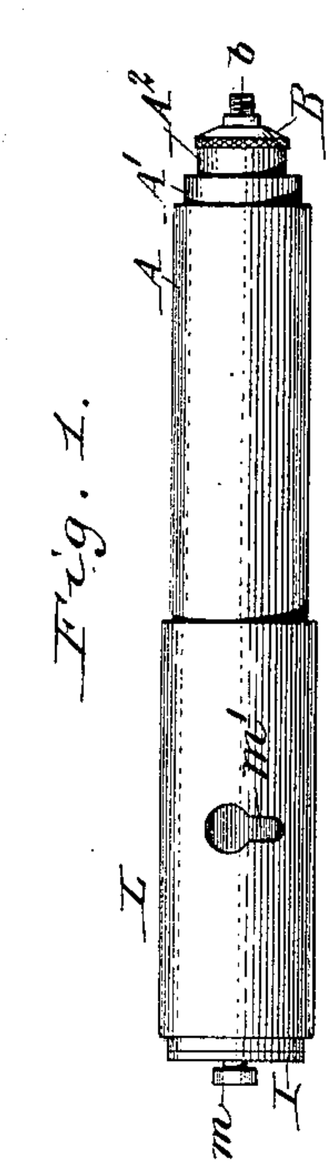

Fig. 1.

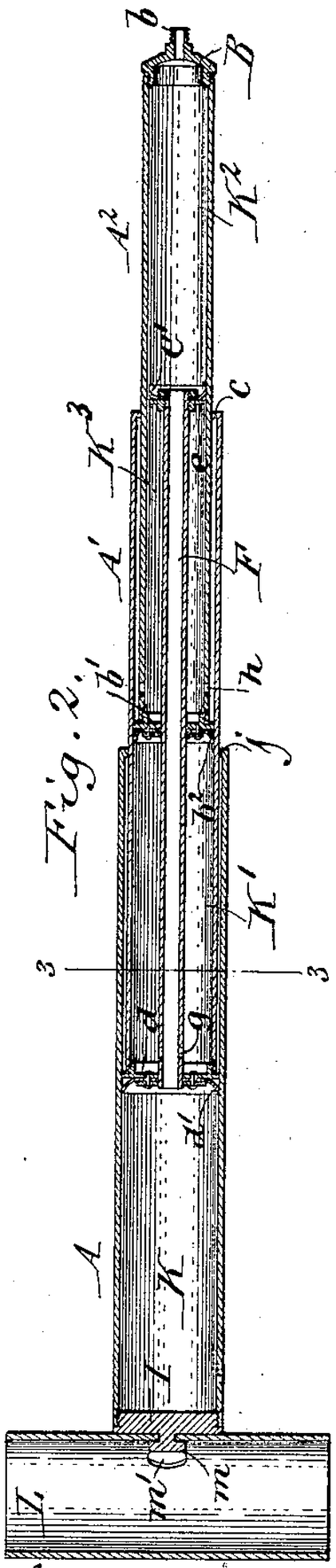

Fig. 2.

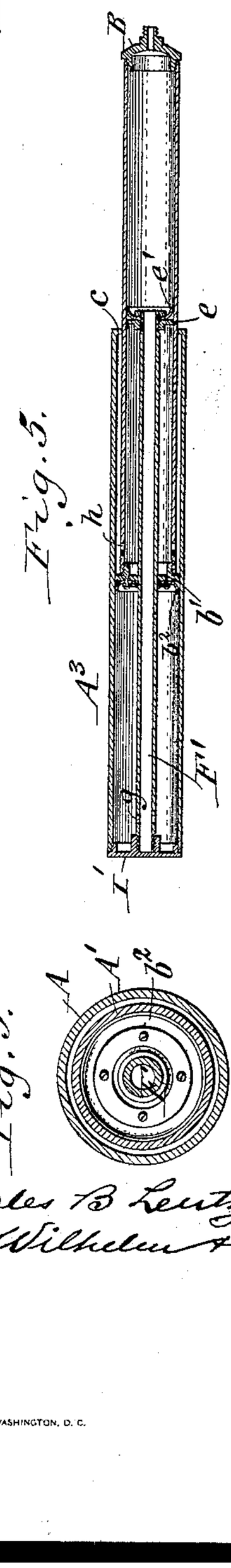

Fig. 5.

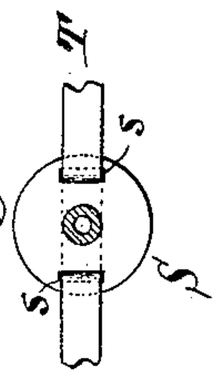

Fig. 7.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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PUMP FOR INFLATING PNEUMATIC TIRES.

SPECIFICATION forming part of Letters Patent No. 610,991, dated September 20, 1898.

Application filed August 20, 1897. Serial No. 648,884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. LENTZ, a citizen of the United States, residing at North Tonawanda, in the county of Niagara, in the State of New York, have invented new and useful Improvements in Pumps for Inflating Pneumatic Tires, of which the following is a specification.

This invention relates to the air-pumps employed for inflating the pneumatic tires of bicycles and similar vehicles, and more especially to the small pumps designed to be carried in the tool-bags attached to bicycles.

One of the objects of my invention is to increase the capacity of such pumps without materially increasing their size and at the same time to render the same simple and compact in construction.

A further object of the invention is to provide the pump with simple and inexpensive means for permitting its thrust to be exerted against the wheel-tire in operating the pump instead of against one hand, as is the custom with the small air-pumps in common use, thus enabling the operator to apply his strength more advantageously.

In the accompanying drawings, Figure 1 is a side elevation of my improved air-pump in its closed or telescoped form. Fig. 2 is a longitudinal section of the pump, showing the sections partly extended. Fig. 3 is a cross-section in line 3 3, Fig. 2, on an enlarged scale. Fig. 4 is a longitudinal section of the thrust-yoke at the delivery end of the pump, showing the same applied to a pneumatic tire. Fig. 5 is a longitudinal section of a modified form of the air-pump. Fig. 6 is a view similar to Fig. 4, showing a modified construction of the thrust-yoke. Fig. 7 is a horizontal section in line 7 7, Fig. 6.

Like letters of reference refer to like parts in the several figures.

Referring to the construction shown in Figs. 1 to 4, A A' A^2 represent three tubes or cylinders arranged to telescope one within another. The front cylinder A^2, which slides within the intermediate cylinder A', is provided at its forward end with a head B, having a delivery-nozzle b, which is adapted to be connected with the air-valve of a pneumatic tire and through which the air is forced into the tire. At its rear end the front cylinder A^2 is provided with a head or piston b', having a flexible washer or packing b^2 of leather or other suitable material, which forms with said head a combined valve and piston. The washer b^2 snugly fits the bore of the intermediate cylinder A' and is cupped, as shown, so that when the pump is extended the edge of the washer yields rearwardly, allowing air to pass by the same and enter the portion of the intermediate cylinder in rear of the washer, while when the pump is telescoped the flexible washer is expanded against the surrounding cylinder by the air-pressure, forming a tight piston, which prevents the passage of the air past the same. The complete withdrawal of the front cylinder from the intermediate cylinder is prevented by an inwardly-extending flange or lip c, located at the outer end of the intermediate cylinder and arranged to overlap the projecting edge of the piston b'. The intermediate cylinder A', which fits within the rear cylinder A, is provided at its rear end with a head or piston d and a cupped washer d', forming a combined piston and valve similar to the corresponding parts b' b^2 of the front cylinder and operating in the same manner.

e is a piston arranged to slide within the front cylinder and provided at its front side with a flexible washer e', forming a valve similar to the washers b^2 and d'. As shown in Fig. 2, this valve or washer is cupped in the opposite direction from the washers b^2 and d', so as to operate in a reverse manner. The front piston e is rigidly connected with the piston d at the rear end of the intermediate cylinder by a hollow rod or tube F, which passes through the intermediate piston b'. The connecting-tube F is open at both ends and is provided near its rear end with one or more side openings g, whereby it communicates with the space or air-chamber between the rear piston d and the intermediate piston b'.

h represents apertures formed in the wall of the front cylinder, near its rear end, for admitting air to the chamber between the front piston e and the intermediate piston b' when the pump is telescoped, such air passing between the front and intermediate cylinders, which latter are fitted together with sufficient looseness for this purpose.

The rear cylinder A is open at its front end to receive the intermediate cylinder, while its rear end is tightly closed by a cap or head I. The complete withdrawal of the intermediate cylinder from the rear cylinder is prevented by an inwardly-extending flange or lip *j*, located at the front end of the rear cylinder and arranged to overlap the piston at the rear end of the intermediate cylinder. As shown in Fig. 2, the connecting-tube F extends through the front and rear pistons *e d* and opens into the front and rear cylinders, respectively.

In the use of the pump, upon extending the same, as shown in Fig. 2, air is drawn into the chamber K between the rear piston and the cap I of the rear cylinder through the open front end of the rear cylinder and the space between the same and the intermediate cylinder, these cylinders being loosely fitted for this purpose. At the same time a portion of the incoming air is drawn into the chamber K′ between the rear piston and the intermediate piston through the tube F and its lateral apertures *g* and also into the chamber K^2 in the front portion of the front cylinder through said tube, while the air in the chamber K^3 between the front and intermediate pistons is expelled partly into the front portion of the front cylinder by passing the front piston and partly into the atmosphere through the lateral openings *h* of the front cylinder by the movement of the front piston toward the intermediate piston. Upon now telescoping the pump the air in the front chamber K^2 is expelled directly through the delivery-nozzle *b* by the advancing front piston *e*, the air in the intermediate chamber K′ is forced by the rear piston *d* into the tube F through the lateral apertures thereof and from said tube into and through the front chamber K^2, and the air in the rear chamber K is expelled by the head I of the rear cylinder through the tube F and into and through the front chamber K^2. The fourth chamber K^3 is dead or unserviceable, and air is simply drawn into the same and expelled therefrom during the operation of the pump. It will be observed that by this construction of the pump three separate volumes of air are simultaneously compressed and forced into the pneumatic tire during every effective stroke of the pump, increasing its capacity threefold and enabling the tire to be inflated with correspondingly fewer movements and in less time. This increase in the capacity of the pump is effected without complicating its construction and without materially increasing its size, so that in its telescoped condition it occupies but little more room in the tool-bag than the small pumps in common use. Moreover, the several pistons are moved positively and do not depend for their action upon springs or other return devices which are liable to get out of order, rendering the pump reliable in action and simple in construction. The pump is preferably provided with a removable tubular handle L, which is adapted to be slipped over the pump when the same is not in use, so as to render the device compact and free from projections. In the construction shown in the drawings the handle consists of a short piece of tubing of sufficient size to pass over the large rear cylinder A of the pump, and it is detachably secured to the cap I′ of said cylinder by a button or headed stud *m*, projecting rearwardly therefrom and interlocking with a transverse keyhole-slot *m′*, formed centrally in the wall of the handle. The enlargement of this keyhole-slot is of sufficient size to receive the head of the button *m*, and after passing the enlargement over the button the handle is partially turned in the proper direction to cause the neck of the button to enter the narrow portion of the slot, when the handle will be firmly attached to the pump. By turning the handle in the reverse direction the same is detached from the button of the pump.

In Fig. 5 of the drawings is shown a modified form of my improved air-pump whereby two instead of three volumes of air are compressed and delivered simultaneously. This construction differs from that first described in that the rear cylinder of the first construction is omitted, and the rear end of the outer cylinder A^3, instead of being provided with a piston and valve, is simply closed by a head or cap I′, and the tube F′ is attached to said head and closed by the same at its rear end.

In the use of small air-pumps it has hitherto been the custom to exert the thrust in pumping against the hand by which the pump is held, and to afford a sufficient bearing for the fingers the piston-rod of the pump has been provided with a curved cross-bar arranged in rear of the nipple, from which the usual rubber tube leads to the tire-valve. This method of using the pump is both inconvenient and tiresome. In order to render this operation more comfortable and enable the operator to use his strength more effectively, the pump is provided at its front end with a yoke or shoe *o*, preferably of concave form, which is adapted to bear upon the tread of the tire on top of the wheel, as shown in Fig. 4, so that the operator may actuate the pump in a standing posture and bear down upon the tire, thus enabling him to exert his weight upon the pump and requiring less muscular effort.

In the construction shown in Fig. 4 the yoke consists of a bow-shaped tube, which is curved to conform to the tread of the tire and provided on its rear side with a central screw-nipple *o′*, adapted to engage with a corresponding nozzle at the front end of the pump. One end of the hollow yoke is closed, while its opposite end is open and provided with a suitable nipple or coupling o^2 for the attachment of the usual rubber tube *p*, which leads to the tire-valve P. The hollow yoke thus forms an air-passage connecting the nozzle *b* with the rubber tube. The yoke is held in

place against the tire preferably by a band *q* of flexible material, such as leather or rubber, which band is passed around the inner side of the wheel-rim and has its ends detachably connected with the yoke by hooks *q'*, arranged at the ends of the same, as shown, or by any other suitable means. An ordinary rubber band may be used for this purpose. If desired, the attaching-band may be permanently secured to one end of the yoke, in which case only a single hook is required at the other end of the yoke. By applying and attaching the pump to the tire in this manner the pump can be operated with one hand, if desired, the band *q* holding the pump-yoke against the tire during the return stroke of the pump. By the use of such a yoke a pump having double the capacity of an ordinary small bicycle-pump can be operated as easily as such a small pump in which the thrust is exerted against one hand of the operator and with less discomfort.

In the modified construction of the yoke shown in Figs. 6 and 7 the delivery-nozzle of the pump is provided with a lateral discharge branch *r*, to which the rubber tube or hose is connected, and the yoke is constructed in the form of a concave plate S, which is secured to the delivery-nozzle in front of said discharge branch. In this construction the yoke is provided with a pair of slots *s*, through which passes a flexible band T, of rubber or leather, the ends of which band are provided with hooks *t*, which are engaged with each other on the under side of the wheel-rim, as shown in Fig. 6. The middle portion of this band is arranged on the under side of the yoke-plate, forming a soft facing for the plate. In some styles of ladies' bicycles the mud-guard will not permit the yoke to be conveniently placed against the wheel-tire, and in such cases the yoke may be placed against the adjacent wheel-fork, the soft facing of the yoke-plate preventing marring of the fork.

In each of the constructions shown the yoke, with its nipple, is an attachment which is applicable not only to the pumps herein shown and described, but to any tire-pump of this type and to the ordinary bicycle-pumps now in use. In both forms of the yoke its delivery branch, to which the rubber tube is attached, is located at a point in rear or outside of the bearing-surface of the yoke, so as to leave the bearing-surface free from projections and permit the same to rest firmly upon the tire.

I claim as my invention—

1. The combination with an air-pump, of a yoke or shoe arranged at the front end of the pump and having an unobstructed front face or bearing-surface adapted to bear against a pneumatic tire, and a lateral delivery branch for the attachment of a hose arranged in rear or outside of the bearing-surface of the yoke, substantially as set forth.

2. An attachment for an air-pump consisting of a nipple adapted to be attached to the delivery end of the pump, a yoke or shoe arranged at the front end of said nipple and having an unobstructed concave face adapted to bear against a pneumatic tire, and a lateral discharge branch connected with said nipple, substantially as set forth.

3. An attachment for an air-pump, consisting of a nipple adapted to be attached to the delivery end of the pump, a concave yoke arranged at the front end of said nipple and adapted to bear against a pneumatic tire and containing an air-delivery passage which extends from said nipple to one end of the yoke, substantially as set forth.

4. An attachment for an air-pump consisting of a nipple adapted to be attached to the delivery end of the pump, a yoke or shoe arranged at the front end of said nipple and having an unobstructed concave face adapted to bear against a pneumatic tire, a lateral discharge branch connected with said nipple, and a retaining-band connected with the yoke and adapted to embrace the wheel-rim, substantially as set forth.

Witness my hand this 9th day of June, 1897.

CHARLES B. LENTZ.

Witnesses:

CARL F. GEYER,

KATHRYN ELMORE.