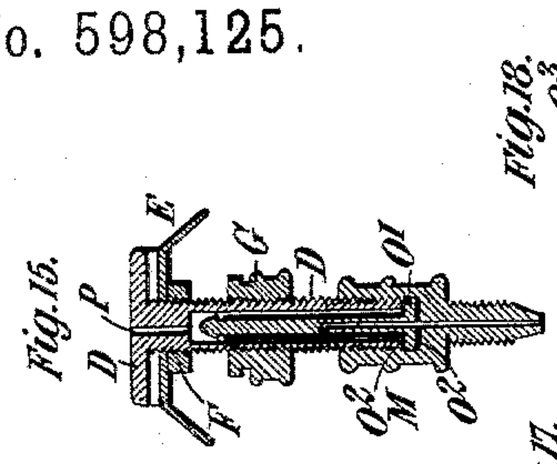
(No Model.)

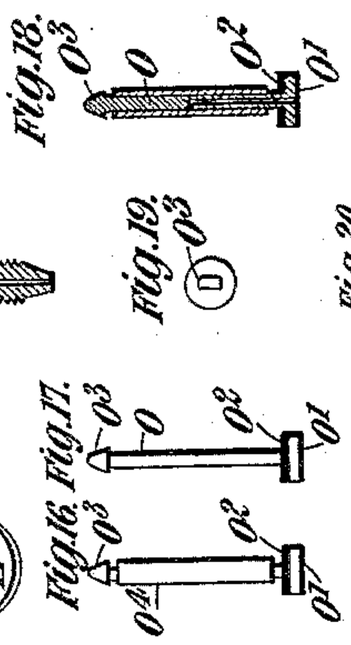
3 Sheets—Sheet 1.

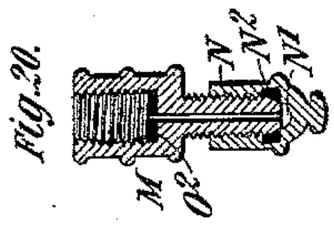
C. K. WELCH.

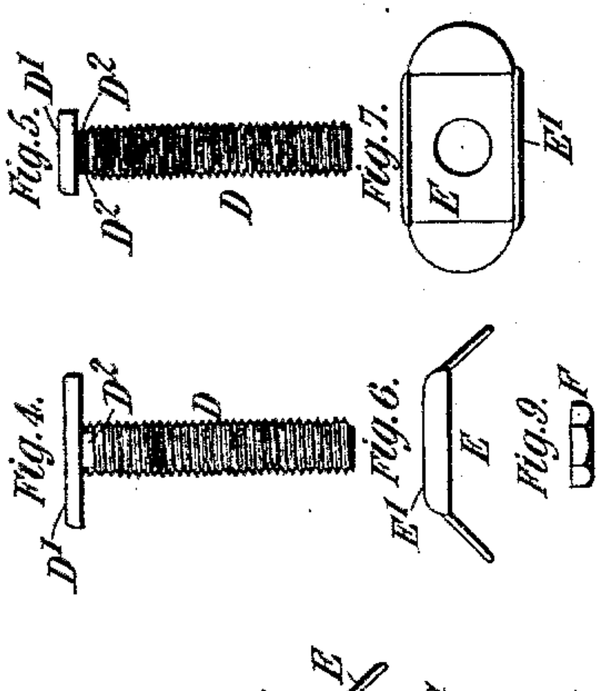
VALVE.

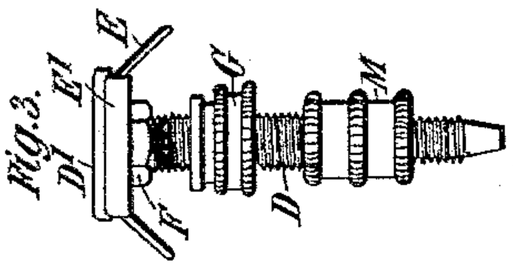
No. 598,125. Patented Feb. 1, 1898.

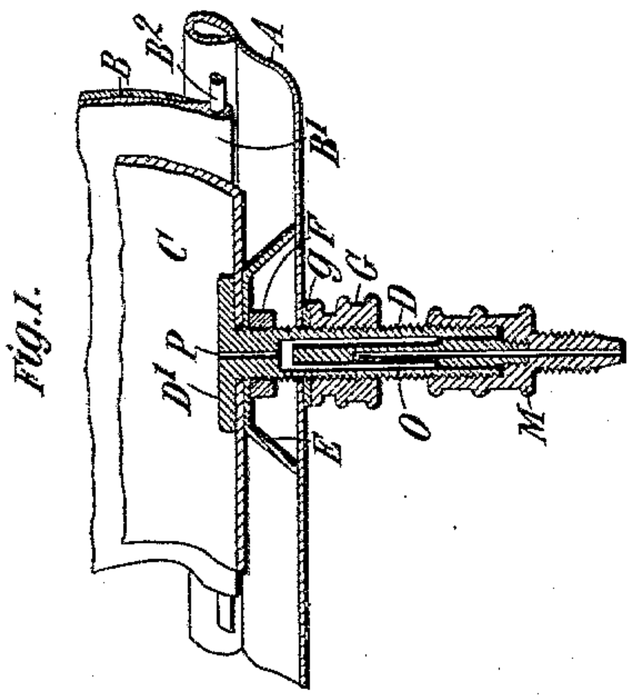


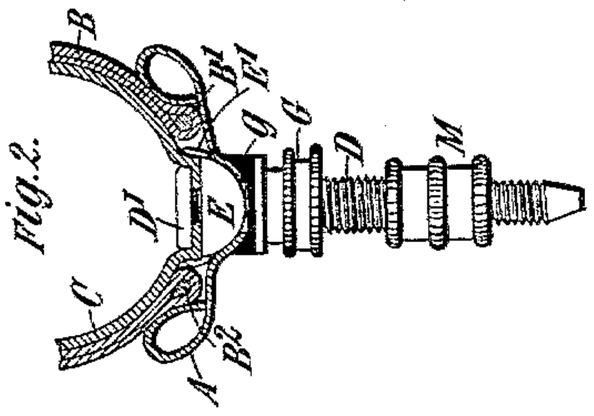












Witnesses:
Raphael Netter
James M. Catlow.

Charles K. Welch, Inventor
by Duncan & Page Attorneys.

(No Model.) 3 Sheets—Sheet 2.

C. K. WELCH.

VALVE.

No. 598,125. Patented Feb. 1, 1898.

Fig. 26.

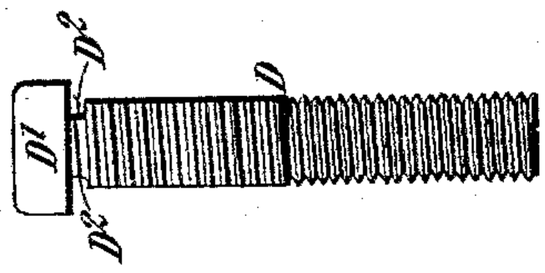


Fig. 27.

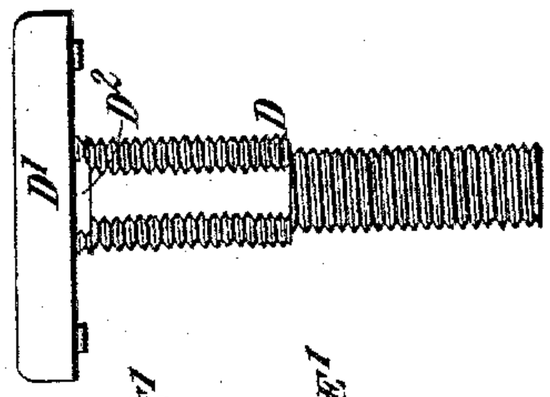


Fig. 28.

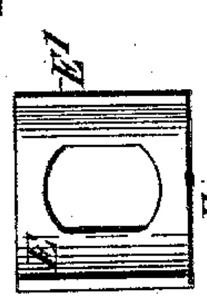


Fig. 29.

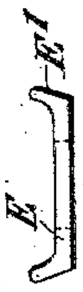


Fig. 22.

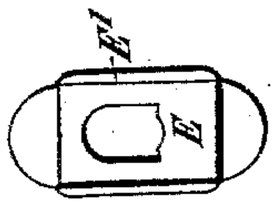


Fig. 23.

Fig. 21.

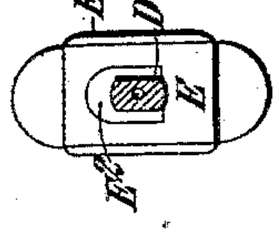


Fig. 25.

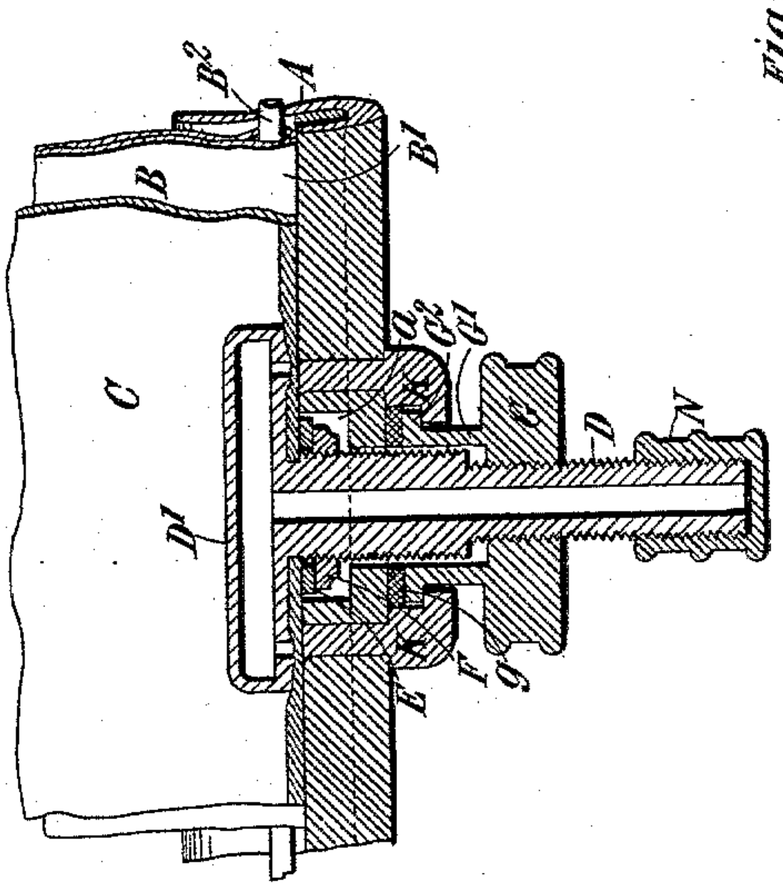
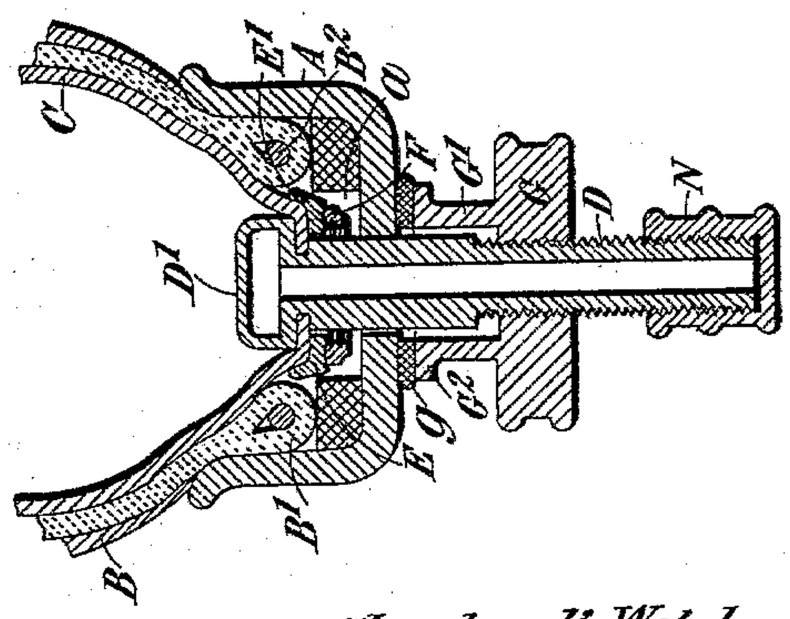


Fig. 24.



Witnesses:
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(No Model.) 3 Sheets—Sheet 3.

C. K. WELCH.

VALVE.

No. 598,125. Patented Feb. 1, 1898.

Fig. 34.

Fig. 33.

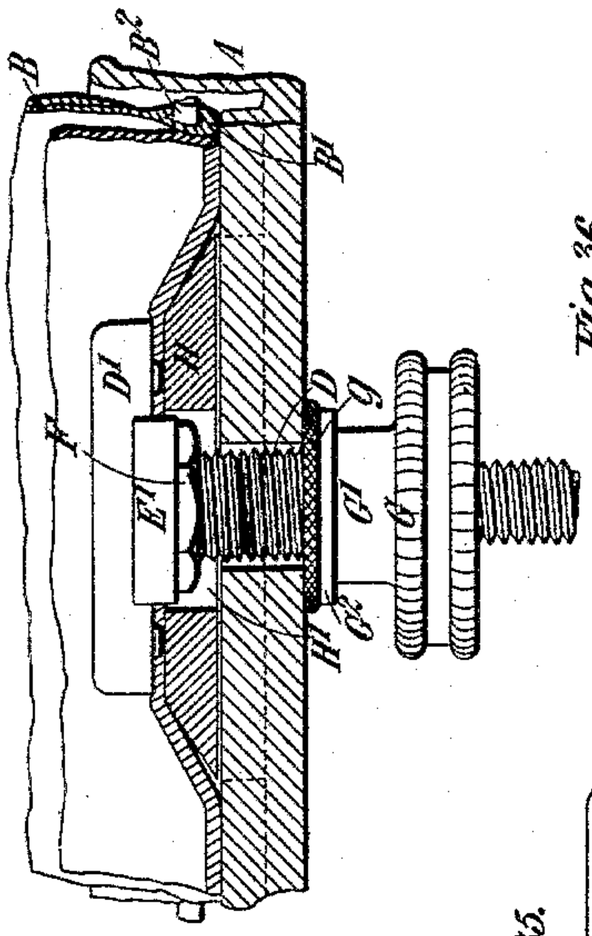


Fig. 36.

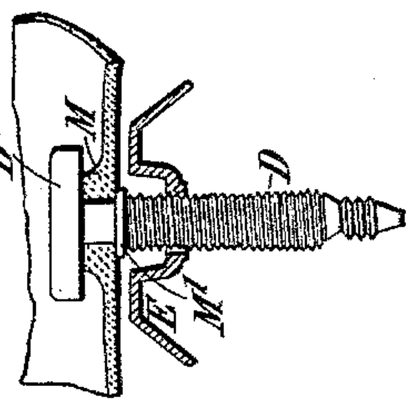


Fig. 35.

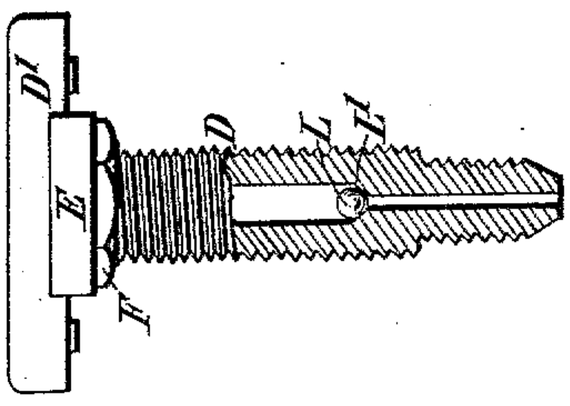


Fig. 32.

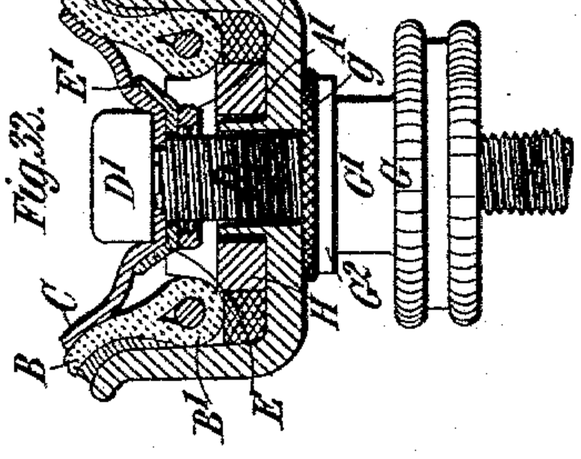


Fig. 30.

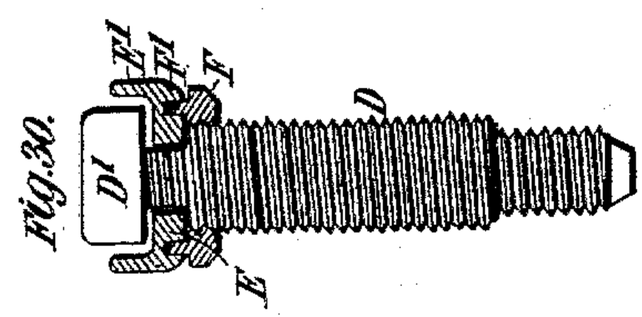
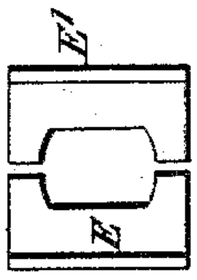


Fig. 31.



Witnesses:
Raphael Netter
James N. Catlow.

Charles K. Welch, Inventor
by Duncan & Bag Attorneys

UNITED STATES PATENT OFFICE.

CHARLES KINGSTON WELCH, OF COVENTRY, ENGLAND, ASSIGNOR TO THE PNEUMATIC TYRE COMPANY, LIMITED, OF DUBLIN, IRELAND.

VALVE.

SPECIFICATION forming part of Letters Patent No. 598,125, dated February 1, 1898.

Application filed August 30, 1895. Serial No. 561,033. (No model.) Patented in England May 8, 1895, No. 9,130; in France July 20, 1895, No. 249,037; in Belgium July 22, 1895, No. 116,658; in Denmark July 3, 1896, No. 621; in Victoria March 3, 1897, No. 13,989, and in Canada April 8, 1897, No. 55,568.

To all whom it may concern:

Be it known that I, CHARLES KINGSTON WELCH, engineer, a subject of the Queen of Great Britain, residing at Coventry, England, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had to the accompanying drawings.

I have obtained patents for this invention in the following countries: Great Britain, No. 9,130, dated May 8, 1895; France, No. 249,037, dated July 20, 1895; Belgium, No. 116,658, dated July 22, 1895; Denmark, No. 621, dated July 3, 1896; Victoria, No. 13,989, dated March 3, 1897, and Canada, No. 55,568, dated April 8, 1897.

This invention relates to valves chiefly intended for use with pneumatic tires for the wheels of road-vehicles.

One object of the said invention is to construct the head of the tubular valve-body sufficiently narrow to allow the edges of the tire-cover with their cores or equivalent retaining devices to pass freely into place between the said head and the sides of narrow rims now in demand, while at the same time the head shall have sufficient grip on the rubber inflatable tube or chamber to insure a good and secure joint therewith.

Another object of this invention is an improved washer to hold or retain the sides of the rubber inflatable tube in such a manner as to leave a free passage for the edges of the cover when placing the same in position on the rim previous to inflation, whereby the risk of nipping the inflatable tube under the cores or edges of the cover is minimized. By this construction the cores are not as liable as heretofore to be accidentally left in a position eccentric to the rim. The said improved washer also gives increased support to the rubber between it and the head of the valve-body.

A further object of this invention is the provision of efficient means for preventing the rotation of the tubular valve-body with respect to the inflatable tube when attaching or detaching the pump or accessories of the valve in lieu of or in combination with the flat usually provided on the said body for this purpose.

Other objects of the said invention are improvements in detail, hereinafter fully described.

Referring to the accompanying drawings, Figure 1 is a longitudinal central section through a valve constructed according to this invention, the same being shown applied to the rim of a velocipede-wheel. Fig. 2 is a transverse section of the rim and showing the valve in side elevation. Fig. 3 is a side elevation of the valve detached from the rim. Figs. 4 and 5 are two views of the tubular valve-body. Figs. 6, 7, and 8 are a side view, plan, and an end view, respectively, of a washer hereinafter described. Figs. 9 and 10 are views of the retaining-nuts detached. Fig. 11 is a central longitudinal section of the valve-stem and valve. Fig. 12 is a side view of the valve-stem alone. Fig. 13 is a side view, and Fig. 14 is a central longitudinal section, of the valve-stem and valve applied to the connector. Fig. 15 is a central longitudinal section of a slightly-modified valve. Fig. 16 is a side view of the valve-stem and valve detached. Fig. 17 is a side view of the valve-stem alone. Fig. 18 is a central longitudinal section of the valve-stem and valve, and Fig. 19 is an end view of the same. Fig. 20 is a central longitudinal section of the connector and dust-cap. Fig. 21 is a plan of a modified form of washer and filling-piece hereinafter described and showing the neck of the valve-body in section. Fig. 22 is a plan of the washer alone, and Fig. 23 is a plan of the filling-piece. Fig. 24 is a transverse section through the rim of a carriage-wheel fitted with a pneumatic tire having a valve shown in longitudinal central section constructed according to this invention. Fig. 25 is a central section taken at right angles to that in Fig. 24. Figs. 26 and 27 are two views of the tubular valve-body. Fig. 28 is a plan, and Fig. 29 is a side view, of a washer to fit said valve. Fig. 30 is a side view of the valve-body fitted with a split washer and peculiar nut shown in sec-

tion and hereinafter described. Fig. 31 is a plan of the washer. Fig. 32 is a transverse section of a rim of a carriage-wheel and tire, showing the valve in elevation and a modified washer, hereinafter described. Fig. 33 is a central section taken at right angles to that in Fig. 32. Fig. 34 is a view of the washer detached. Fig. 35 is a side view, partly in section, of a tubular valve-body furnished with an internal valve-seat and ball-valve. Fig. 36 illustrates a modified mode, hereinafter described, of attaching the valve-body to the inflatable tube by means of a teat.

Like letters denote corresponding parts throughout the drawings.

A is the metal rim of the wheel.

B is the tire-cover.

C is the inflatable tube.

D is the tubular valve-body, which is passed through a hole in the inflatable tube and through another in the rim in the usual manner, the head D′ of the valve-body being retained inside the inflatable tube.

The valve shown in Figs. 1 and 15 is one in which a rubber tube forms the valve proper. That shown in Figs. 24 and 25 and in Figs. 30, 32, and 33 is one in which the closure of the passage is effected by compressing the inflatable tube between the rim and the head of the valve-body.

The head D′ is made sufficiently narrow to allow room for the edges B′ of the tire-cover with their cores B^2 or equivalent retaining devices to pass in and out freely between the sides of the rim A and the said head D′, when attaching and detaching the cover, and the retaining-washer E is furnished with flanged edges or shoulders E′, as shown, to keep the inflatable tube at that part thereof near the valve away from the bottom and sides of the rim. The depth of the said flanged edges or shoulders E′ is in some instances but slight, so as to merely direct the sides of the tube away from the bottom and sides of the rim, while in other instances it is more considerable. For bicycle-rims, such as shown in Fig. 1, the washer E rests on the bottom of the rim in the well-known manner and supports the head D′ when the valve-body is screwed tight to the rim by its nut G. The washer E (shown in Figs. 24 and 25) is received in a recess *a* in the rim, which allows the head D′ to close the apertures through the valve by pinching the rubber between it and the rim. In neither case can the washer turn around in the rim. The shoulders E′ of the washer operate in combination with the flat sides of the head D′ of the valve-body to prevent the rotation of the latter in the hole in the inflatable tube C and in the rim when the pump or parts of the valve are being connected or disconnected, and they thus prevent injury to the joint between the valve-body and inflatable tube.

In order to insure that the washer E and head D′ shall have sufficient grip on the inflatable tube to prevent leakage of air around the valve-body, the width of the latter is reduced at that part immediately under the head by forming recesses therein, as shown at D^2, so as to obtain an increased grip upon the rubber tube around the edge of the hole.

When fixing the valve in position, the tubular valve-body is passed through the hole provided to receive it in the rubber tube and a piece of fabric is then fastened by rubber solution or otherwise to the tube to support and stiffen the rubber at this part. The edges of the rubber and fabric around the hole aforesaid are next pressed into the recesses D^2 under the head and secured by the washer E and nut F. The washer is sometimes provided with a non-circular hole, as shown in Fig. 22, in which is fitted a filling-piece E^2, Fig. 23, having flat sides that enter the recesses D^2 and engage with the flat sides of the valve-body, as shown in Fig. 21. The said filling-piece, which is held in place by the nut F, insures an ample grip on the tube and prevents the rotation of the valve-body in the washer.

In some instances a divided washer, as shown in Fig. 31, is provided to engage with the recesses D^2 in the valve-body. The parts of this washer are held together by a nut F, Fig. 30, which is provided with an annular shoulder F′ to fit in an annular recess in the washer or is otherwise suitably constructed for this purpose. The washer, as before stated, is made to fit in the rim, so that it cannot turn. In some cases, however, it is received in a non-circular recess or hole provided in another washer H, Figs. 32 and 33, that fits the rim. This washer is shaped somewhat like a saddle to straddle the central rib A′ of the rim, thereby insuring that the washer shall not turn in the rim. It is pierced at H′, Fig. 33, with a non-circular hole in which the washer E fits and is thereby prevented from turning.

With the aforesaid improvements the tubular valve-body need not have a flat formed thereon to prevent rotation, as has been heretofore the common practice. An important advantage arising from the avoidance of flats on the tubular valve-body is that there is less chance of water leaking through into the tire to the injury of the fabric. As a further security against the admission of water a leather, fiber, rubber, or other suitable washer *g* may be used under the nut G, that secures the valve-body to the rim.

In valves intended for pneumatic tires for cabs, carriages, and like vehicles I preferably make the valve-body of two diameters and screw the nut on the smaller part thereof. I form the nut with a tubular extension G′, Figs. 24 and 25, that incloses the outer end of the larger part of the valve-body. The tubular part G′ is flanged at G^2 to engage with the hooks K, Fig. 25, that retain the nut in place on the rim. The larger part of the valve-body may have flats formed on opposite sides thereof, as shown in Figs. 26 and

27, to engage with the flat sides of the non-circular hole in the rim through which the valve-body is passed.

These improvements are applicable to many other well-known valves besides those shown in the drawings. When applied to valves of the kind shown in Figs. 24 and 25, the tubular body may be fitted with a suitable non-return valve, such as that shown in Fig. 1, for example, with or without the modifications hereinafter described. The said non-return valve may be inclosed in the tubular body D or it may be attached thereto. One advantage of this combination is that the non-return valve proper may be removed for examination or repair without necessarily deflating the tire. In some instances the tubular valve-body is fitted with a suitable ball-valve L, such as shown in Fig. 35, or other similar valve, in combination with a suitable valve-seat L'. The ball is introduced through an opening in the valve body or head, which opening is then closed.

In cases where the head is reduced very much to fit very narrow rims I sometimes provide in combination with or in lieu of the other means of attachment above described a conical-shaped enlargement of the rubber M, Fig. 36, around the neck between the head D' and a collar M', formed on the valve-body and operating to prevent leakage of air around the valve-body. The conical enlargement, which constitutes in effect a washer, may be molded integrally with the air-tube or may be made separately and secured to the rubber tube by rubber solution or otherwise.

The end of the connector M, Figs. 1, 2, and 20, is preferably made conical to fit the pump connections and the dust-cap N, Fig. 20, which is made with a recess N' at the end, so as not to bear upon the conical point of the connector. The said cap may be fitted with a lead, vulcanite, or other seating-ring N^2 to prevent leakage. The delivery-tube of the pump may be similarly fitted.

The spindle or stem O of the non-return valve, where such is used, may be secured to the connector M by screwing, as shown in Figs. 1 and 14, any suitable means being provided to prevent leakage past the screw-threads, or it may be otherwise secured. For example, the stem may be furnished with a flange or head O', Figs. 16, 17, and 18, which enters the connector and is secured against the end of the tubular valve-body when the connector is screwed thereon. Washers O^2 are provided on both sides of the head to prevent leakage. I sometimes make the stem O of vulcanite, lead, or other soft metal or material that will not attack the rubber. In such case the washers O^2 may be dispensed with. The stem may be made oval or other shape, or it may be round and solid and have flutes or grooves cut in its side to serve as the passages for the air. The end of the stem is sometimes provided with a head O^3 to prevent the blowing off of the rubber valve-tube O^4. This head is preferably made with flat sides, as shown in Fig. 19, to allow a free passage for the air. The air-passage P through the reduced part of the valve-body is made of reduced size to insure sufficient strength in the body and to prevent the rubber valve-tube being blown into the inflatable tube. The tubular valve-body D, especially when used for cycle-wheels, may be made of much smaller diameter than has been usually the case with certain classes of valves, so that great lightness is obtained, and it is then not necessary to make a large hole in the rim, which is an important consideration in light and narrow rims.

I claim—

1. The combination with a pneumatic tire or inflatable tube, of a tubular valve-body having a head extended in the direction of the circumference of the tire and with flat sides, recesses formed in the valve-body under the head for giving increased grip on the air-tube, and a washer of a shape corresponding to that of the sides of the head and with upturned side edges that inclose the head and grip the air-tube between the said side edges and the sides of the head of the valve-body, as described.

2. The combination with a pneumatic tire or inflatable air-tube, of a tubular valve-body having an elongated head with straight or flat sides, recesses formed in the valve-body under the head for giving it increased grip on the air-tube, a washer having upturned sides to grip the air-tube between the said sides and the head of the valve-body, said washer having a non-circular hole, and a filling-piece fitting within said hole and constructed to engage with the flats formed by the recesses under the head, substantially as described.

In witness whereof I have hereunto set my hand this 13th day of August, 1895.

CHARLES KINGSTON WELCH.

Witnesses:

ALBERT BROWN,

ERNEST OVERTON.