

(No Model.)

E. A. COZENS.
PNEUMATIC MOTOR FOR BICYCLES.

No. 597,394.

Patented Jan. 18, 1898.

FIG. 1.

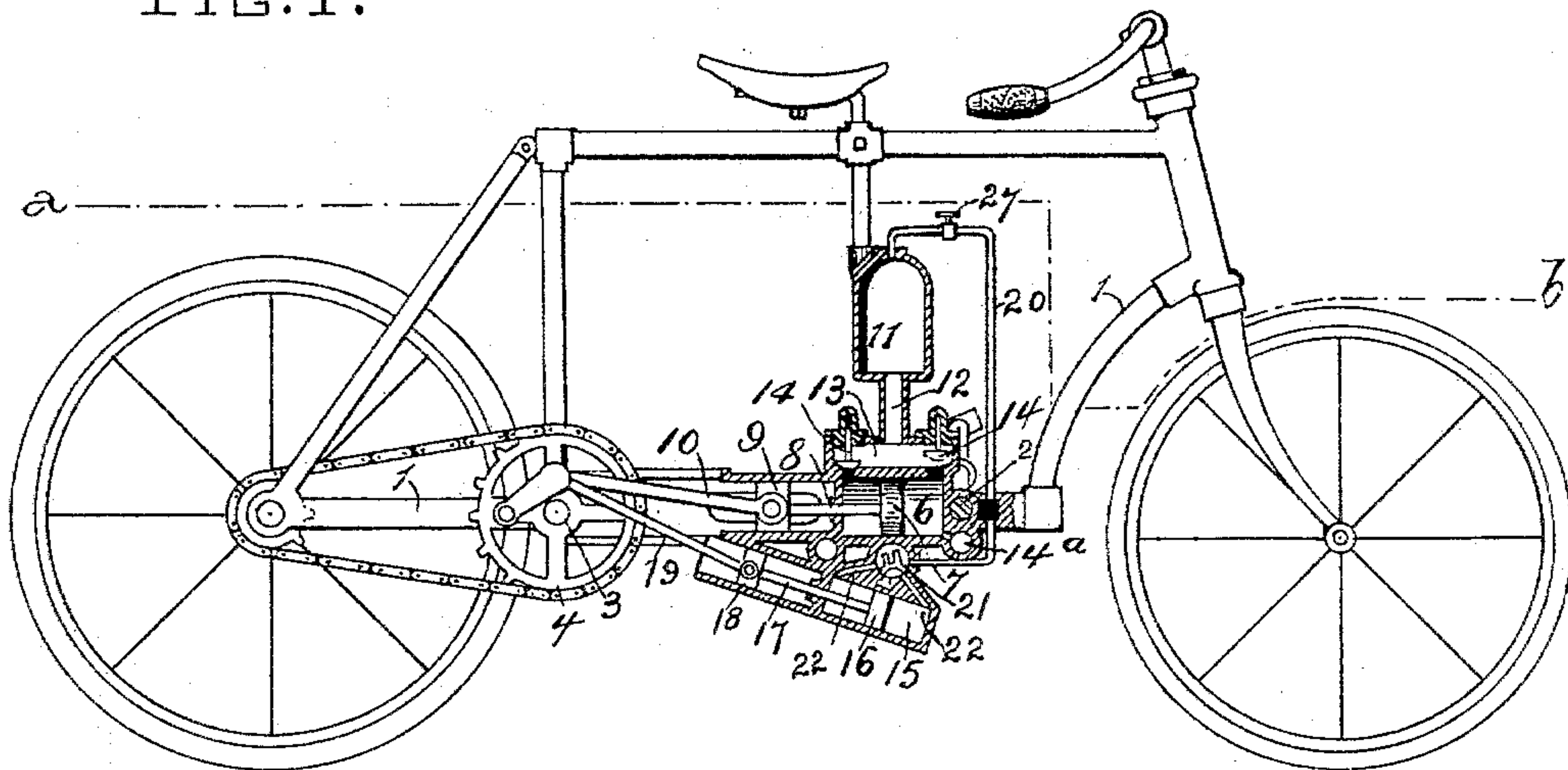


FIG. 2.

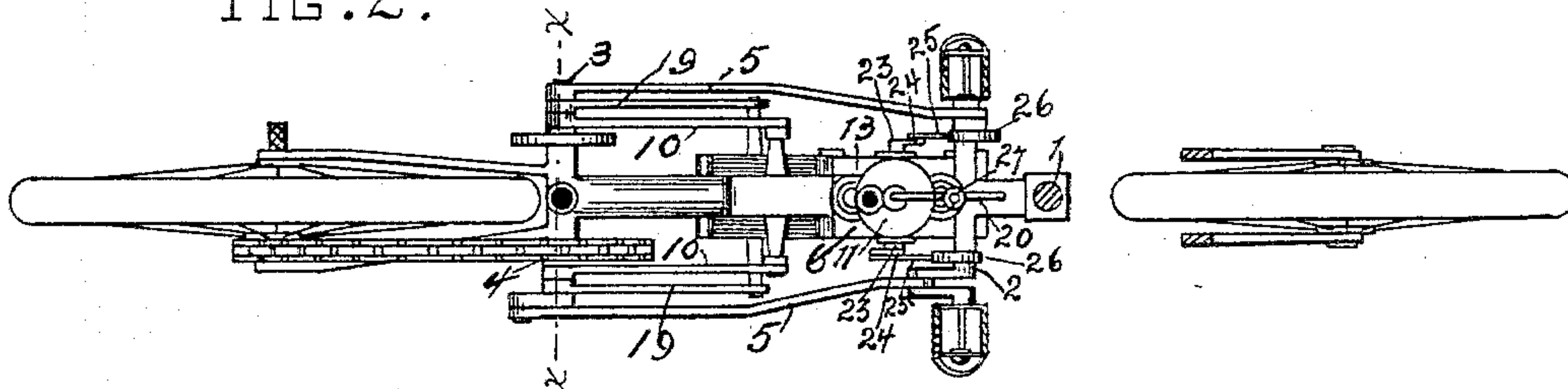


FIG. 3.

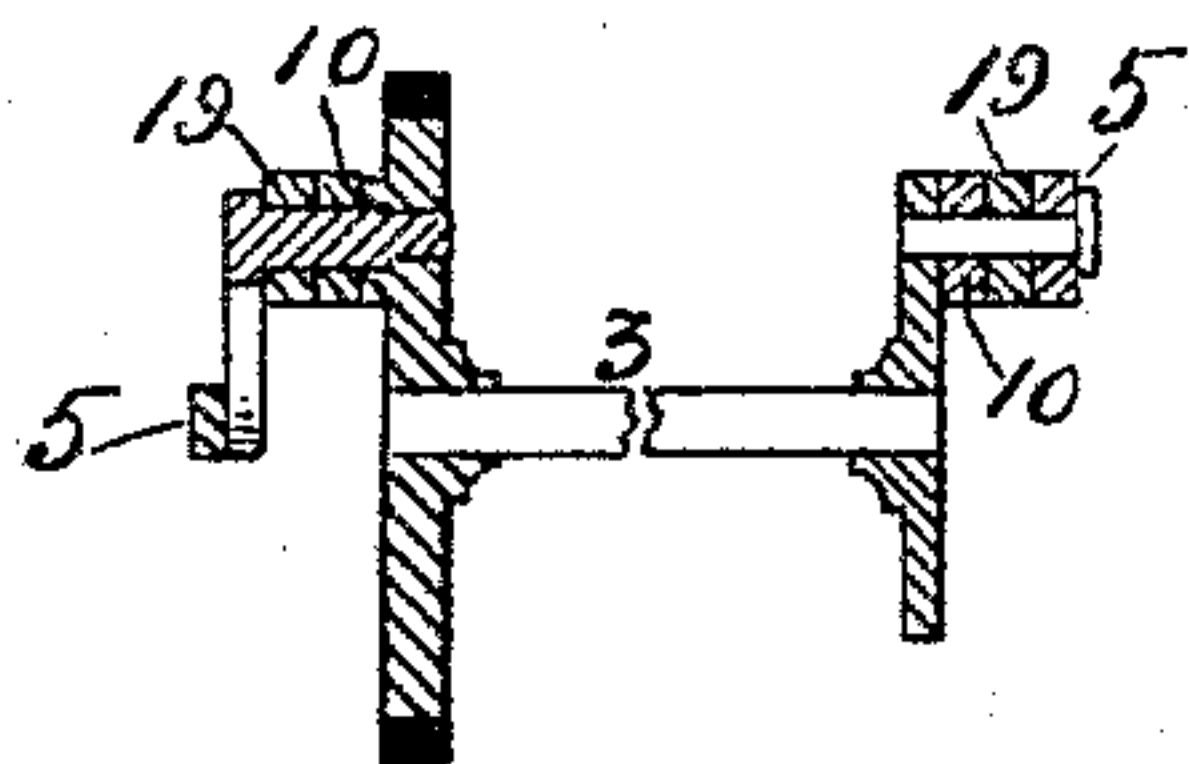
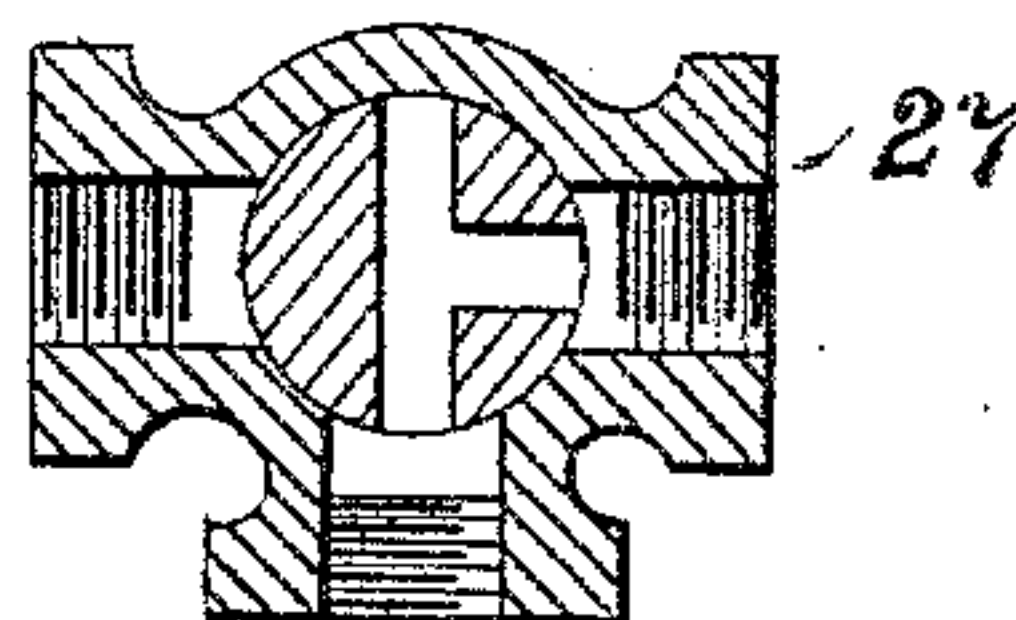


FIG. 4.



WITNESSES.

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EZRA A. COZENS, OF TOLEDO, OHIO.

PNEUMATIC MOTOR FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 597,394, dated January 18, 1898.

Application filed December 11, 1896. Serial No. 615,387. (No model.)

To all whom it may concern:

Be it known that I, EZRA A. COZENS, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented certain new and useful Improvements in Pneumatic Motors for Bicycles, of which the following is a specification.

My invention relates to a pneumatic motor for bicycles and other vehicles; and its object is to provide a device and arrangement of parts which shall be light, cheap, simple, and easily operated. I accomplish these objects by means of the device hereinafter described and shown and illustrated in the accompanying drawings, made part hereof, in which—

Figure 1 is a side elevation showing the air-chambers and valve-chamber hereinafter referred to in central vertical section; Fig. 2, a plan view, with the top of the frame removed, upon the dotted line *a b* of Fig. 1; Fig. 3, a central vertical section of a crank-axle and crank hereinafter referred to; and Fig. 4 is a detail view of the two-way cock.

Like numerals of reference indicate like parts throughout the several views.

In the drawings, 1 is a reach supported at front upon the bicycle-head and at rear upon the axle of the rear wheel. Upon this reach are journaled two crank-axles, the front one, 2, being provided with the pedals, the rear one, 3, carrying the driving sprocket-wheel 4. The crank-axle 3 is connected, by means of connecting-rods 5, with cranks on the forward crank-axle, by means of which, when foot-power is used, the pedals on the front crank-axle drive the rear crank-axle and its connected mechanism. Rigidly mounted upon the reach 1 is an air-compression cylinder 6, having piston 7, piston-rod 8, cross-head 9, and connecting-rods 10 10, leading from the cross-head to the cranks on crank-shaft 3.

11 is an air-chamber connected with the interior of the air-compression cylinder 6 through conduit 12 and valve-chamber 13. This valve-chamber has an opening or port into each end of the cylinder 6, which openings are controlled by valves 14, which, yielding to the pressure of the air as it is driven by the piston 7, are alternately lifted as the piston travels to and fro, permitting the escape of compressed air from the cylinder into

the compression-chamber 11, but preventing its return. Air is admitted into the cylinder from either end, behind the retreating piston, from the outer air through ports 14^a, controlled by valves similar to the valves 14, but not shown in the drawings, which valves permit the ingress but prevent the egress of the air.

15 15 are a pair of cylinders having pistons 16, piston-rods 17, cross-heads 18, and connecting-rods 19, the outer extremities of which connecting-rods are connected with the cranks on crank-shaft 3. A pipe 20 connects the air-chamber 11 with the pair of cylinders 15 through oscillating valve 21, which, through ports 22, alternately admits the compressed air at opposite sides of piston 16, at the same time permitting the escape of air from the front of the advancing pistons. The valve 21 is actuated and controlled by valve-stem 23, having arms 24, connected by means of rods 25 to cam-straps 26, running upon cams secured to and revolving with the crank-axle 2. In the pipe 20 is a two-way cock 27, by means of which the escape of air from the compression-cylinder 11 to the pair of engines 15 may be controlled. The cock 27 may also be used to permit the escape of compressed air into the open air as rapidly as may be desired.

The operation of my device is as follows: Assuming that the rider is in position and that the machine is moving forward, being driven by the pedals through the connecting-rod 5, cranks 3, and sprocket-wheel 4, which drives the rear wheel through a sprocket-wheel on the rear axle and a sprocket-chain in the usual manner, at each revolution of the crank-axle 3 the air-compression piston 7, through connecting-rods 10, is driven to and fro, compressing and driving air into the compression-chamber 11 through valves 14 and valve-chamber 13. If the cock 27 be now opened, compressed air will be supplied to the pair of engines 15 through valve and ports 21 22, causing the reciprocation of pistons 16 and through connections 17, 18, and 19 rotation of the driving sprocket-wheel. In descending a declivity the gravity and momentum of the machine may be used to store air under high compression in the chamber 11, which air may be utilized on reaching

heavy roads or upgrades. If the air-compression apparatus is not to be used, the turning of the two-way cock 27 in the right direction permits the escape of the air as fast as it is driven into the chamber 11.

What I claim as my invention, and desire to secure by Letters Patent, is—

In a pneumatic motor for bicycles, a crank-axle journaled in the bicycle-frame, foot-pedals on said crank-axle, a second crank-axle journaled in said frame, rods connecting the cranks of said two axles, an air-com-

pressor operatively connected with the driving-crank of the machine, an air-storage chamber connected with said compressor, an air-engine connected with said storage-chamber, connections intermediate said engine and said second crank-axle and connections intermediate said second crank-axle and the driving-wheel of the machine.

EZRA A. COZENS.

In presence of—

H. E. ADELSPERGER,

L. A. SMITH.