

No. 712,048.

Patented Oct. 28, 1902.

S. DIAMANT & C. MARGONI.

LIQUID BRAKE.

(Application filed Oct. 1, 1900.)

(No Model.)

8 Sheets—Sheet 1.

Fig. 1.

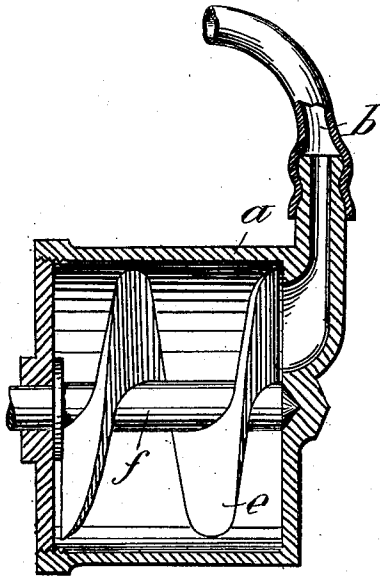


Fig. 2.

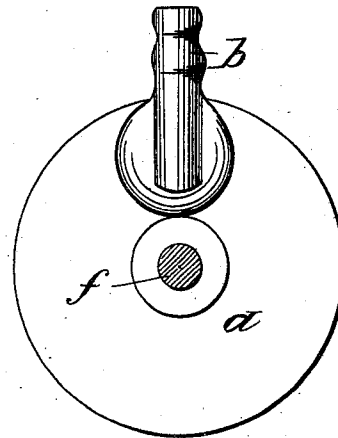
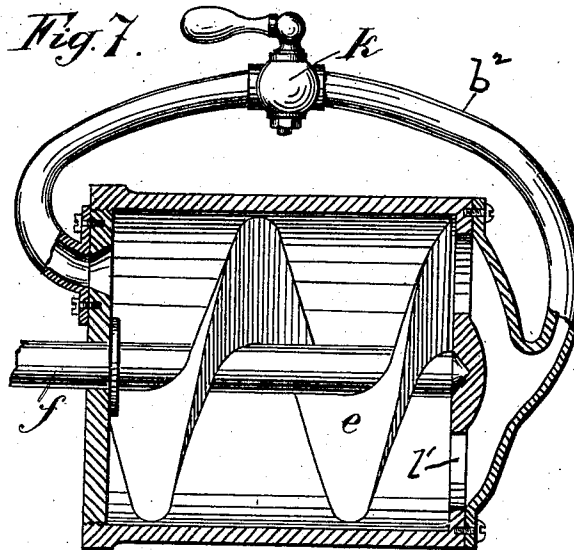


Fig. 7.



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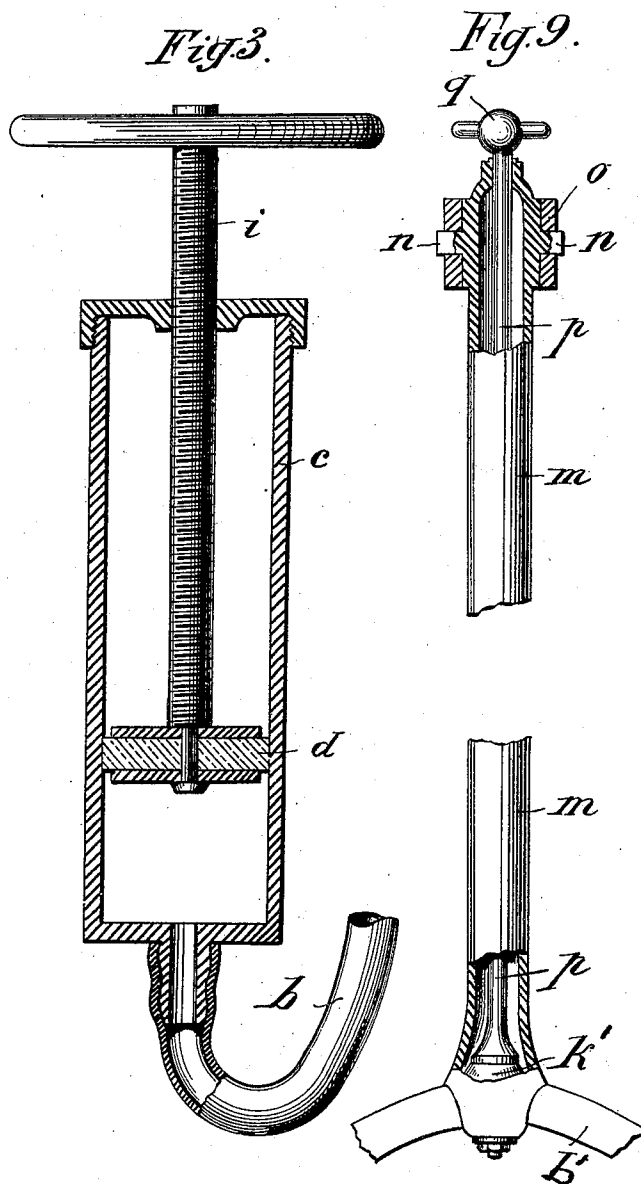
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8 Sheets—Sheet 2.



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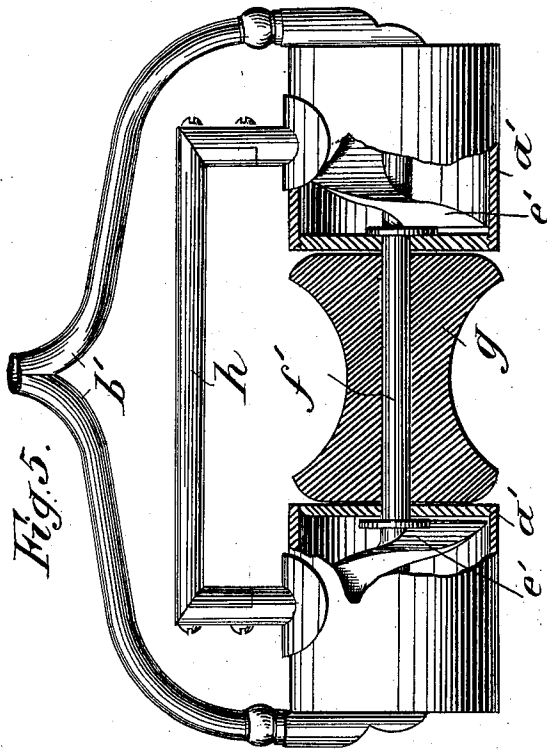
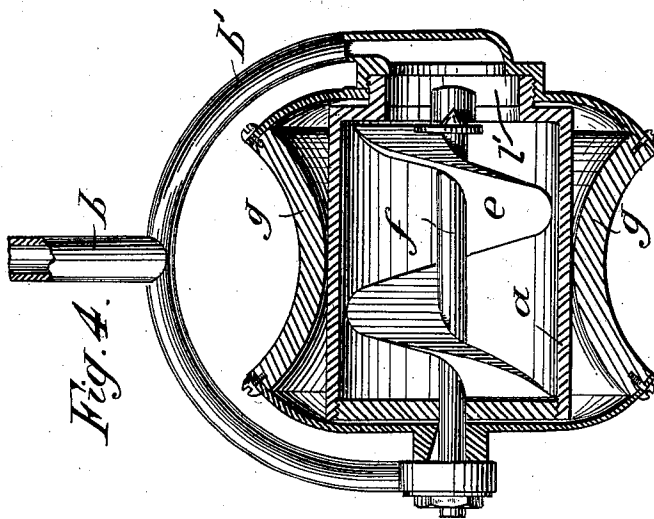
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8 Sheets—Sheet 3.



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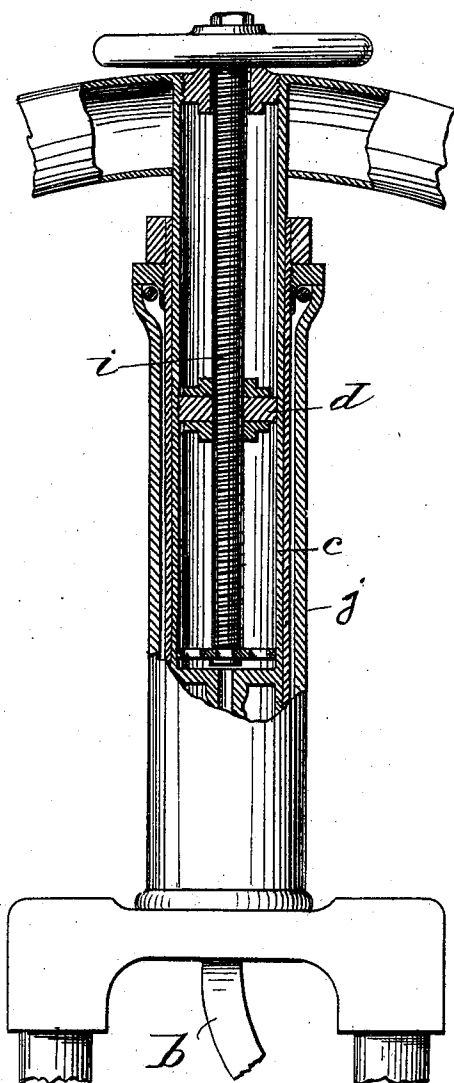
LIQUID BRAKE.

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Fig. 6



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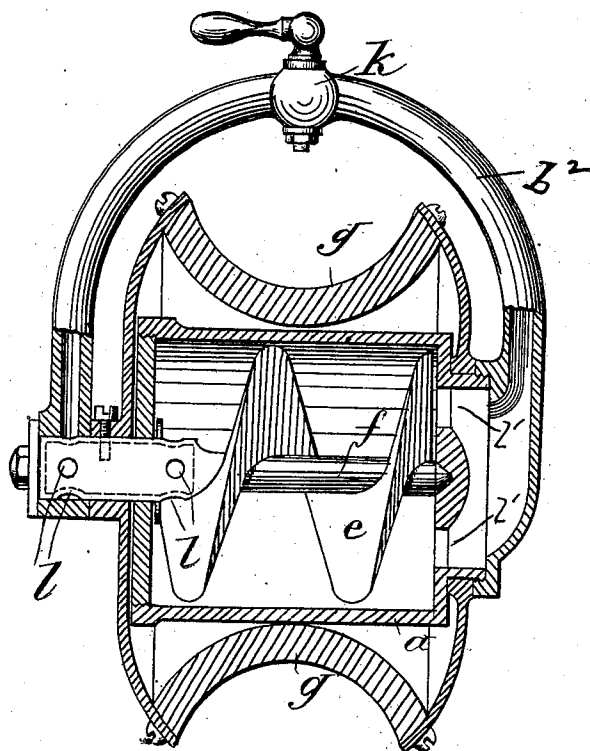
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Fig. 8.



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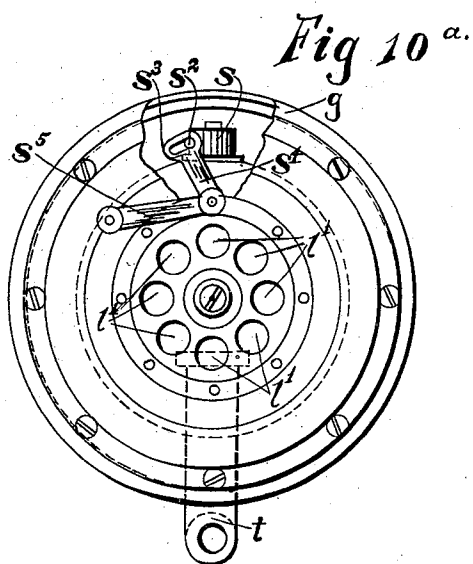
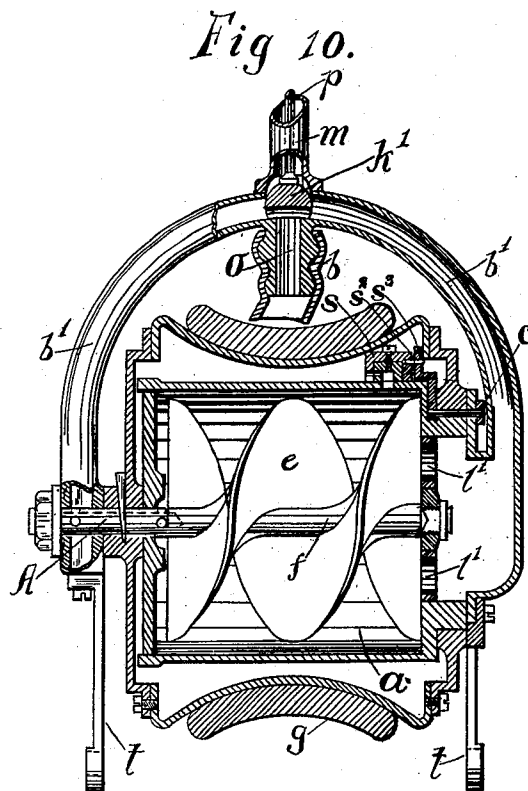
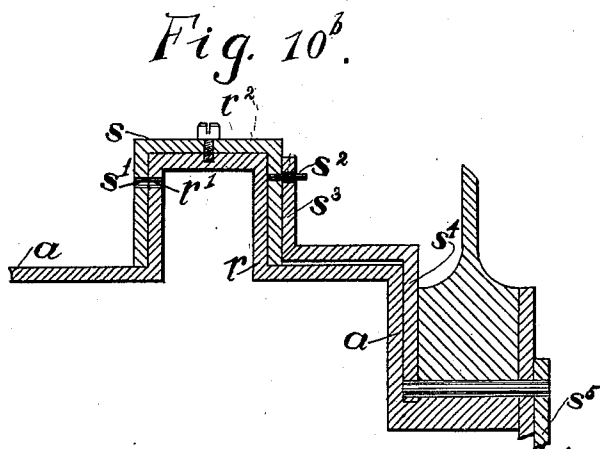
S. DIAMANT & C. MARGONI.

LIQUID BRAKE.

(Application filed Oct. 1, 1900.)

(No Model.)

8 Sheets—Sheet 6.



Witnesses.

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No. 712,048.

Patented Oct. 28, 1902.

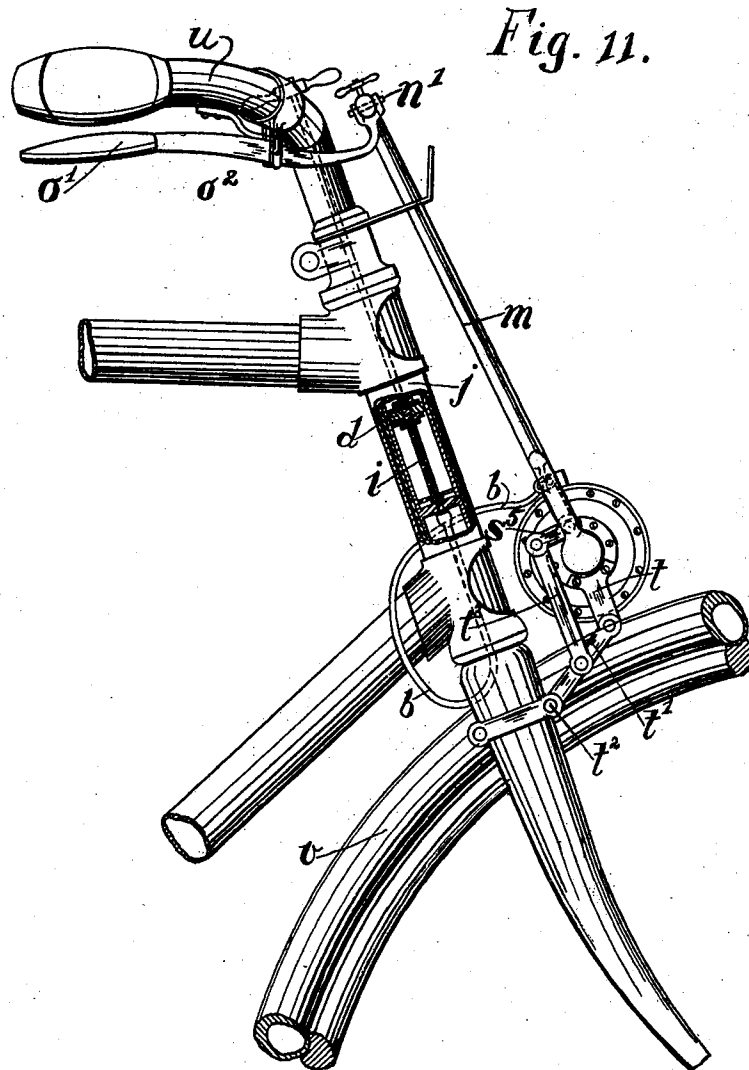
S. DIAMANT & C. MARGONI.

LIQUID BRAKE.

(Application filed Oct. 1, 1900.)

(No Model.)

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Witnesses.

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(No Model.)

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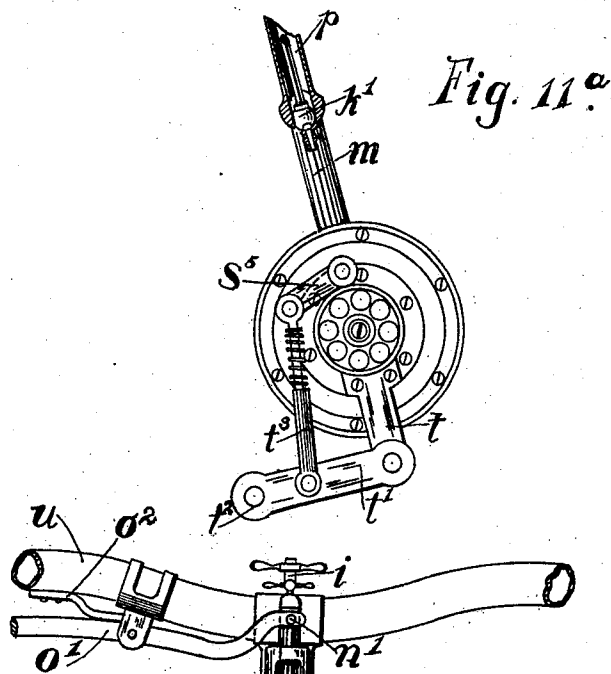


Fig. 11.

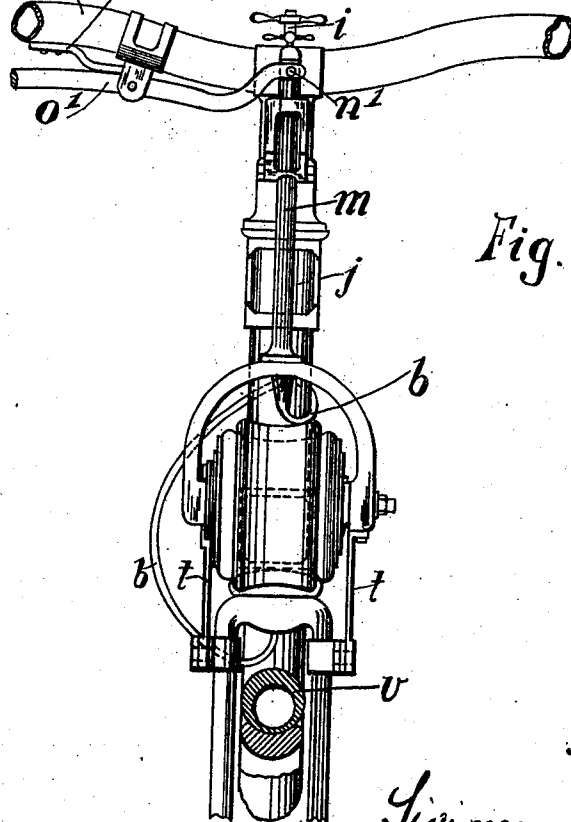


Fig. 12.

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UNITED STATES PATENT OFFICE.

SIGISMONDO DIAMANT AND CARLO MARGONI, OF TRIEST, AUSTRIA-HUNGARY.

LIQUID BRAKE.

SPECIFICATION forming part of Letters Patent No. 712,048, dated October 28, 1902.

Application filed October 1, 1900. Serial No. 31,645. (No model.)

To all whom it may concern:

Be it known that we, SIGISMONDO DIAMANT, a subject of the King of Italy, and CARLO MARGONI, a subject of the Emperor of Austria-Hungary, both residents of Triest, Austria-Hungary, have invented certain new and useful Improvements in Liquid Brakes, of which the following is a specification.

Our present invention relates to a brake for vehicles and mechanism of any kind in which the resistance of a liquid forced through narrow spaces is utilized for producing a brake action.

The invention consists, broadly, in combining in a liquid brake a closed cylindrical casing, a screw rotatably arranged within said casing, means for connecting said casing to the mechanism to which the brake is to be applied, and means for regulating the degree of filling of the casing.

It consists, further, in certain other combinations and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical section, and Fig. 2 is a side elevation, of the improved liquid brake. Fig. 3 shows the device for regulating the brake action. Figs. 4 and 5 show two arrangements of the brake-roller. Fig. 6 shows a partial vertical section of the regulating device arranged within the front fork of a bicycle. Figs. 7 and 8 show modifications of the brake. Fig. 9 shows a detail of the bicycle-brake. Figs. 10 and 10^a are details, respectively, partly in section and partly broken away, of our brake with air-valve or tap applied thereto; and Fig. 10^b is an enlarged detail of said tap and the bell-crank by which it is immediately actuated. Fig. 11 is a side elevation of the steering-head and part of the front wheel of a bicycle having our invention applied thereto and showing in connection with the two preceding figures the system of levers by which the brake is raised and lowered and the air-tap operated. Fig. 11^a is an enlarged detail, slightly modified, of mechanism for operating the air-valve as the brake is raised and lowered. Fig. 12 is a front elevation of the upper part of said steering-fork and lever system.

Referring to the drawings, *a* represents a

closed cylindrical casing connected at one end by a tube *b* with the regulating-cylinder *c*, Fig. 3, and adapted to be filled to a greater or less extent with liquid—such as oil, glycerin, and the like—by means of a plunger *d*, movably arranged in the cylinder *c*, and an air cock or tap, as hereinafter described.

Rotatably arranged in the cylinder *a* is a screw *e*, the shaft *f* of which is extended to the outside of the cylinder to receive a belt-pulley, a gear-wheel, or similar device connected with the mechanism to which the brake is to be applied. The outer diameter of the screw *e* is or may be somewhat smaller than the inner diameter of the cylinder *a*. When the shaft *f* is rotated with the screw *e*, the latter forces the liquid from one end of the cylinder *a* to the other end. As the liquid cannot escape from the cylinder it flows back along the inner wall of the latter—that is, it is forced through the narrow space between the screw and the cylinder. The resistance of the liquid thus created and which increases with the amount of liquid contained in the cylinder *a* produces a brake action on the part actuating the shaft *f*.

Brakes of this kind may be advantageously applied to vehicles having wheels with pneumatic tires. Fig. 4 shows a brake of this kind. *g* represents a contact-roller fast on the shaft *f* and adapted to freely move around the cylinder *a*. The shaft *f* is journaled in the cylinder *a* and in one branch of the forked tube *b'*, connected by a flexible tube *b* with the regulating-cylinder *c*. A separate system of levers (explained farther on) serves to press the roller *g* on the periphery of the wheel to which the brake action is to be applied.

When the brake action is to be increased, we preferably employ a pair of brake-cylinders *a'*, Fig. 5, containing screws *e'*, mounted on a common shaft *f'*, said cylinders receiving liquid through a forked tube *b'*. The cylinders *a* are rigidly connected by means of a bridge *h* and are separated by a free space serving to receive the brake-roller *g*, mounted on the shaft *f'* at this point.

The brake action of the devices just described is regulated by the degree of filling of the cylinder or cylinders. The filling may be

changed by means of the cylinder *c* (shown in Fig. 3) and containing the plunger *d*, adapted to be moved by means of a screw *i*.

The construction shown in Fig. 6 is preferably applied to bicycles. In said construction the cylinder *c* is arranged within the stem *j* of the front fork of the bicycle-frame, the plunger *d* forming a movable nut for the screw *i*, held against longitudinal movement.

The brake action may also be produced by connecting the two ends of the cylinder *a* by means of an outer tube *b*², Fig. 7, provided with a regulating device *k*—for instance, a cock—whether or not the diameter of the screw exactly corresponds to the internal diameter of the cylinder, enabling the free cross-section of the passage for the liquid moved by the screw *e* to be regulated as desired, whereby the brake action may be regulated within wide limits. In this arrangement the screw *e* may snugly fit into the cylinder *a*. Fig. 8 shows a brake constructed in accordance with this part of the invention and applicable to wheels having pneumatic tires. The brake-roller *g* is fast on the shaft *f*, having a hollow end provided with perforations *l*, through which liquid may flow from the cylinder or casing *a* into the left-hand branch of the tube *b*² in a volume regulated by the size of said openings and the adjustment of the cock or through which the cylinder may be exhausted by means of the pump. The right-hand branch of said tube *b*² makes a bell-mouth connection with the corresponding end of cylinder *a* and discharges freely therein through a concentric series of large ports or openings *l'* in the head of the cylinder when the cock is set to apply the brake, the effect being that the fluid enters in excess through the large right-hand ports or openings *l'* and is forced by the screw through the relatively diminished ports or openings *l* at the left-hand end.

Fig. 9 shows an arrangement whereby the regulating-cock may be actuated for any position of the brake-roller *g*. The tube *b'* and the casing of the cock *k'* are connected with a tube *m*, suspended by means of horizontal pivots *n* from a port *o* of the vehicle-frame, thus enabling the brake apparatus to occupy any desired position. The plug of the cock is connected with a rod *p*, arranged within the tube *m* and provided with a handle *q* at its free end.

As already intimated, a tap is provided to permit the escape of air from the brake casing or cylinder as fluid is pumped therein. This tap may be of various constructions and operated by mechanism of the varying nature demanded by such constructions. Herein we have shown it as consisting of a cylindrical metal tube or boss *r*, opening from the brake casing or cylinder (see Figs. 10 to 10^b) and closed at the upper or outer end, but having a lateral port *r'*. Sitting over and closely embracing this boss and held thereto by a headed axial bolt *r*² is a cylindrical sheath or cap *s*,

provided with a port *s'*, revoluble about said boss as a journal to aline said port with the port *r'*, and thus constituting the movable member of the valve or tap. Projecting from the side of the sheath or rotary valve-piece is a pin *s*², with which engages one arm *s*³ of a bell-crank lever *s*⁴, the other arm *s*⁵ of which is so connected that when the brake is lifted the sheath *s* is rocked in a direction to open the valve, and when said brake is depressed the valve is automatically closed. In order that there may be an interval of delay between the initial movement of the bell-crank in either direction, the lever-arm *s*³ receives the pin *s*² in an elongated slot described on an arc concentric with the axis of said bell-crank, so that the movable valve-sheath will be actuated only when one end or the other of the slot comes in contact with it. Now referring to Figs. 11, 11^a, and 12, which are to be taken in connection with the two preceding figures, hangers *t* from the brake are hingingly connected with the forward ends of radius-bars *t'*, pivoted in eyes *t*², secured to the steering-forks. Midway, or thereabout, between its ends this radius-bar is connected by a link *t*³ with the lower or power arm *s*⁵ of the bell-crank, so that when the brake is raised, as in Fig. 11, the link *t*³ will pull down upon lever-arm *s*⁵ and open the air-tap; but when depressed, as in Fig. 11^a, the link will be pushed up against said lever-arm and close the tap. It results from this that the regulation of the brake by means of the pump, Figs. 6 and 11, takes place when the brake is lifted. The raising and lowering of the brake may be accomplished by means of the sheathing-tube *m*, Figs. 9, 10, 11, and 12, inclosing the valve-rod *p* and connected to the brake-casing by means of the forked tubes *b*² and to the pump by a nipple *o* and flexible pipe *b*, as shown, for instance, in Fig. 10. The upper end of this tube is jointed to the brake-lever *o'* by pivots *n'*, so that when said lever is opened by the spring *o*², interposed between it and the handle *u*, the tube *m* will be lifted, the brake raised, its air-tap opened, and upon properly manipulating valve *k'*, by means of valve-rod handle *p*, and the pump in front-fork standard, by means of the screw-spindle *i*, liquid may be exhausted from or forced into the brake; but when the brake-lever is closed up against the steering-handle by hand-grasp the brake will be forced down upon the wheel-tire *v* and the air-tap closed by means of the lever system, thus preventing escape of liquid from the brake-casing and subjecting the Archimedean screw to its resistance.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a liquid brake, the combination with a closed cylindrical casing, of a screw rotatably arranged within said casing, means for leading liquid into the latter, means for regulating the degree of filling of the casing, and means for connecting said casing to the mech-

anism upon which the brake is to be utilized, substantially as set forth.

2. In a liquid brake, the combination with a closed cylindrical casing, of a screw rotatably arranged within said casing and adapted to be mechanically connected with any desired mechanism to which the brake action is to be applied, the outer diameter of said screw being somewhat smaller than the inner diameter of the casing, a regulating liquid-reservoir, communicating connections between the latter and the casing, and a movable device within the liquid-reservoir adapted to force liquid into said casing substantially as set forth.

3. In a liquid brake, the combination with a closed cylindrical casing, of a screw rotatably arranged within said casing and adapted to be mechanically connected with the mechanism to which the brake action is to be applied, an outer passage or channel leading from one end of the casing to the other, regulating devices on said outer passage, a regulating liquid-reservoir, communicating connections between the latter and the casing, and a movable device within the liquid-reservoir adapted to force liquid into said casing, substantially as set forth.

4. In a liquid brake, the combination with

a closed cylindrical casing, of a screw rotatably arranged within said casing and adapted to be mechanically connected with the mechanism to which the brake action is to be applied, means for supporting said casing upon the machine in which the brake is to be applied, a pump connected with the casing to supply liquid through an end thereof and determine its amount and a valve to exhaust air from said casing as liquid is introduced.

5. In a liquid brake the combination with a closed cylindrical casing, of a screw rotatably arranged within the casing, a contact-roller surrounding the casing and operatively connected with the screw, means for raising the casing and contact-roller away from, and forcing them against a wheel-rim, a valve for exhausting air from said casing as liquid is introduced therein, and a lever system whereby said valve is opened as the apparatus is raised and closed as it is depressed.

In testimony whereof we have hereunto set our hands in presence of two witnesses.

SIGISMONDO DIAMANT.
CARLO MARGONI.

Witnesses:

EMILIO MONTI,
VINCENT BURER.