(No Model.)

2 Sheets—Sheet 1.

M. TOULMIN.

PNEUMATIC STREET CAR PROPULSION.

No. 440,666. Patented Nov. 18, 1890.

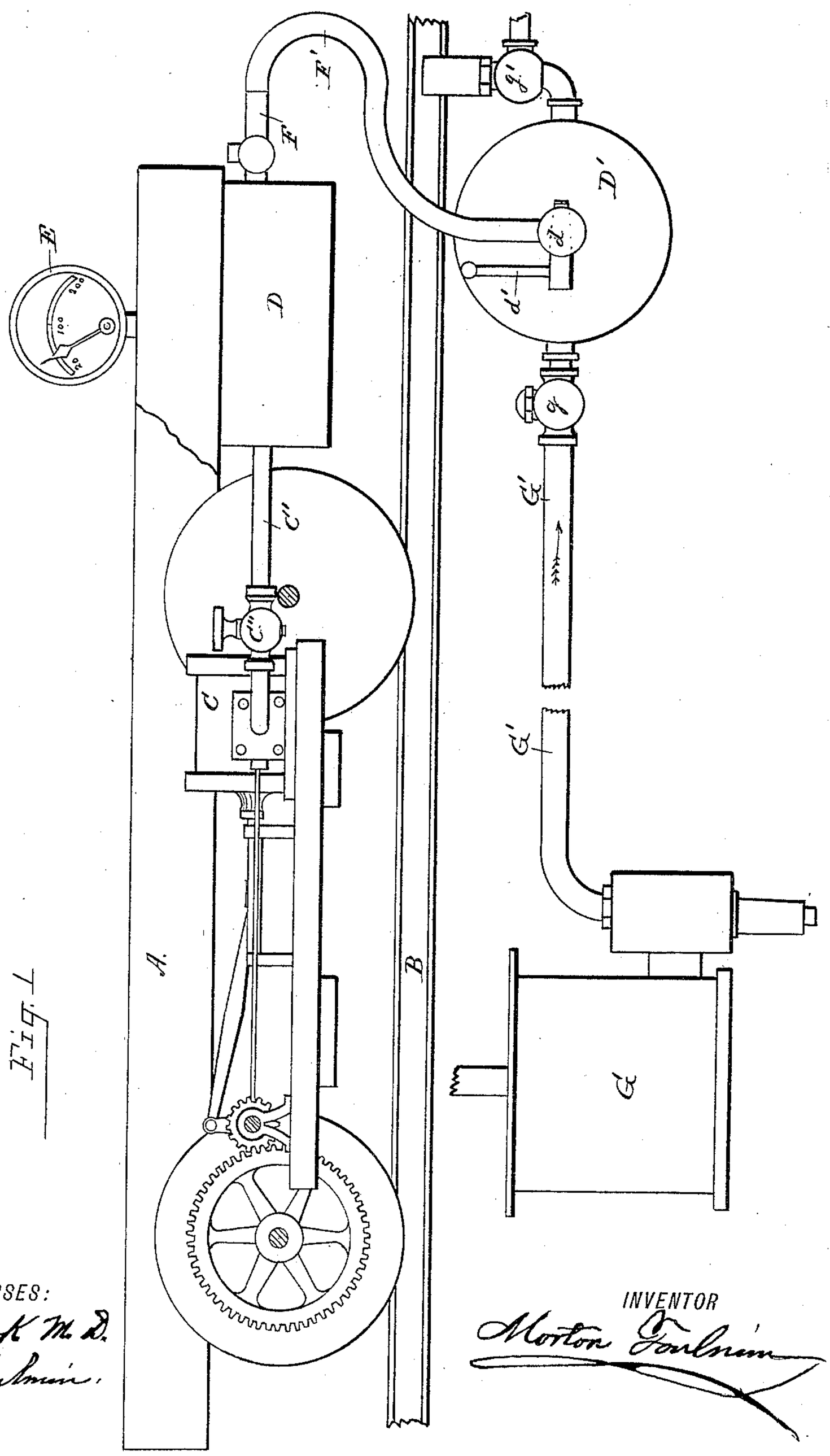

Fig. 1.

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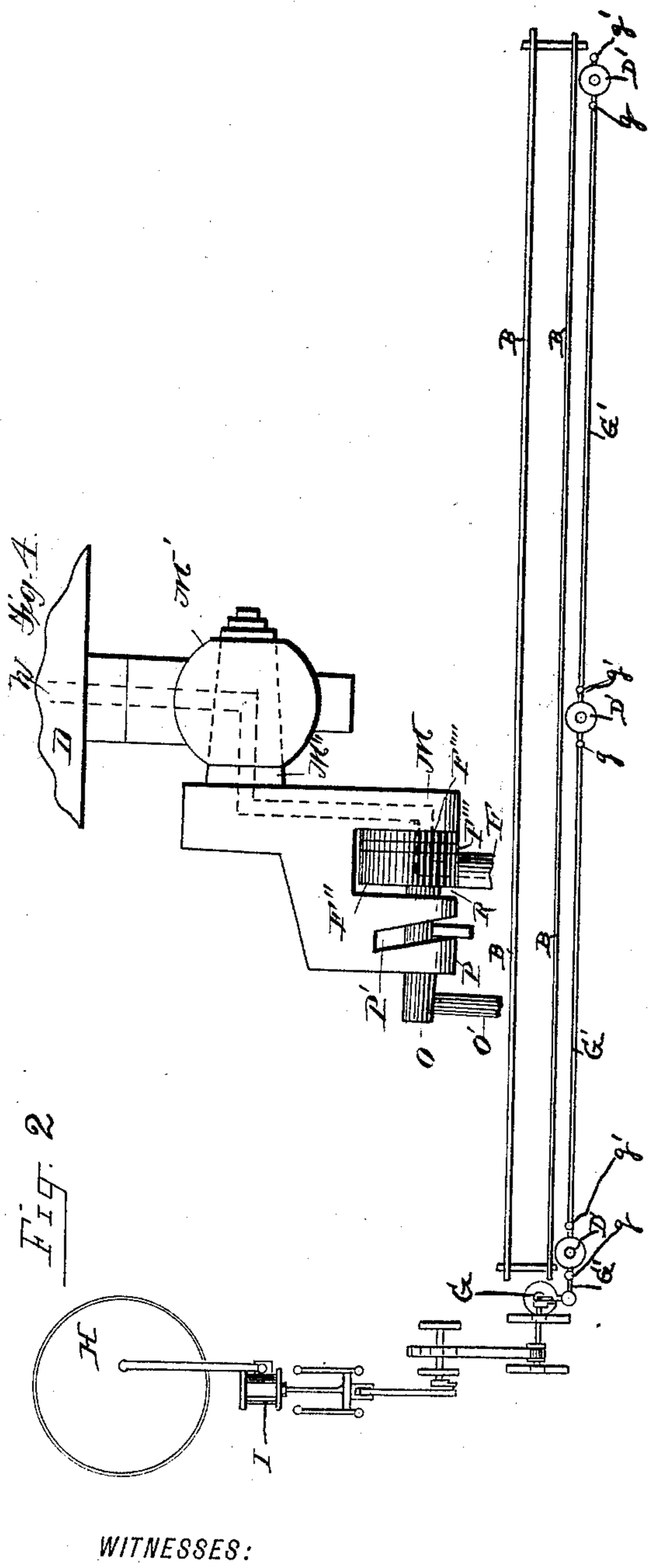

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UNITED STATES PATENT OFFICE.

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PNEUMATIC STREET-CAR PROPULSION.

SPECIFICATION forming part of Letters Patent No. 440,666, dated November 18, 1890.

Application filed July 25, 1890. Serial No. 359,915. (No model.)

To all whom it may concern:

Be it known that I, MORTON TOULMIN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Pneumatic Street-Car Propulsion; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pneumatic street-car propulsion; and it has for its object to provide means for conducting a fresh supply of compressed air into tanks carried by the cars at any suitable number of intervals along the route traveled by the cars, whereby much longer distances may be traveled than heretofore by cars propelled by compressed air through an air-engine, and thereby also much smaller and lighter air-tanks may be employed on the cars, thus reducing the weight, as also the expense of construction.

The nature of my invention consists in providing a steam-boiler, an engine, and an air-compressor, whereby compressed air may be continuously discharged or forced into a series of tanks located along the route, the tanks being provided with suitable inlet and outlet valves and interconnecting devices, the inlet-valves being so constructed that the compressed air cannot escape from the tanks in a backward direction, (toward the source of supply,) and the outlet-valves so constructed that when the air in a tank exceeds a certain pressure it will escape into the next tank beyond, and so on to the end of the series, in order that as soon as the pressure in the first tank has reached the maximum desired the compressed air will flow into the next, and when so accumulated in said next tank will flow from it into the next one from that, and thus maintain an equal pressure in the tanks of the whole series as long as the air-compressor is kept in operation.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 shows a side elevation of a car-truck provided with an air-engine, a compressed-air tank, and a gage and coupling, and also showing an elevation of a tank, valved pipes connected thereto, and an air-compressor; Fig. 2, a plan view of the whole plant, showing a steam-boiler, a steam-engine, an air-compressor, a railroad-track, and air-tanks, together with the interconnecting-pipes; Fig. 3, a side elevation of a car, the track, a series of tanks, and interconnecting-pipes; and Fig. 4, a view of one of the couplings used in connection with the series of tanks, and a hose for connecting such tanks with the tank carried by the cars.

The letter A indicates a car-truck; B, the track; C, a compressed-air engine; D, an air-tank placed in any convenient part of the car; C′, the pipe leading from the air-tank to the engine, and C″ the throttle-valve. An air-gage E to indicate the amount of pressure in the tank D is provided, and should be placed where it can be conveniently seen by the conductor of the cars.

The letter F′ designates a flexible pipe, say a hose, one end of which is suitably connected with the tank D′, preferably by a cut-off or cock *d*′. The other end of this flexible pipe or hose carries a coupling F, the peculiarities of which will be hereinafter pointed out, whereby air is conducted from a tank D′ to a tank carried by a car.

The letter G designates a suitable air-compressor, and G′ a pipe leading from the air-compressor to the first of the series of tanks located along the route, a check-valve *g* being provided to permit air to pass from the compressor through the pipe G′ into the tank D′. The several line-tanks are connected by pipes, and alongside of the line-tanks, away from the source of air-supply, these connecting-pipes are provided with valves *g*′, weighted or otherwise arranged to resist the air-pressure to a desired degree, whereby they will lift and allow the air in excess of a given pressure to pass on to the next tank of the series,

and so on down through the series of tanks. I do not confine myself to any particular construction of valve g', so long as capable of this function.

At H is designated a steam-boiler, and at I a steam-engine supplied with steam from said boiler, and through suitable intermediate connections equipped to operate the air-compressor G.

Referring to Fig. 4, the preferred type of coupling for quickly effecting the connection between the flexible pipe or hose F′ and the tank carried by a car is shown. It consists of a shell M′, secured to the tank, and of a block M, having a plug or shank M″ fitted to the shell M′, after the manner of the ordinary cock-plug. A quarter-turn of the block M will open or close the communication between the tank D and the passage shown in dotted lines in said plug. The block is fashioned with a recess, into which is adapted to fit one end of a plug F, carried by the hose F′. This plug is provided with a passage, as shown in dotted lines, which communicates with the passage in the block M. A gasket F‴ of flexible material is carried by the plug, and a similar gasket F⁗ is carried by the block M to effect a tight joint. A pin or boss O is fitted to the block M, and provided with a pin P, which travels in an inclined slot when the boss is rotated by the handle O′, whereby the boss forces the gaskets strongly together. When the parts are thus coupled and the cock of the tank D′ opened the air will flow quickly into the tank D. Before disconnecting the plug F from the block M the block M is turned to the cut-off position, whereby the air is prevented from escaping from the tank D when the plug F is removed from the block M.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a system of pneumatic car-propulsion, the combination of an air pumping or compressing mechanism, a series of air-tanks located along the car-route, a pipe connecting one of them with said mechanism, and pipes interconnecting all of them, a valve in said pipes preceding each tank and freely opening to admit air into it, but seating to prevent the return of the air, and also a resistance-valve in said interconnecting-pipes and beyond each tank to allow of the escape of air from any of said tanks to a succeeding tank after a given pressure is created, and means to connect any of said tanks with a tank carried by a car.

2. The herein-described method of propelling cars, the same consisting in storing compressed air at intervals along the route from a head source, in preventing the return of the air so stored, in supplying air to each of said storage-points by the overflow of pressure above a given degree from the next preceding storage-point, whereby the pressure at all the intervals is maintained at a proper normal degree, in conducting the said compressed air from any or all of said storage-points to a car, and in storing and utilizing it therein.

3. The combination, with an air-tank, of a pipe leading thereinto, a check-valve in the pipe near the tank and opening freely to admit air into the tank, but seating to prevent the return of the air, a pipe leading from the tank, a pressure-valve and a check-valve in the latter pipe, whereby when the air in the tank exceeds a given pressure it can flow therefrom and into the said latter pipe, substantially as described.

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

MORTON TOULMIN.

Witnesses:
T. W. CLARK,
F. H. TOULMIN.