No. 795,531. PATENTED JULY 25, 1905.

A. MICHELIN.

APPARATUS FOR INFLATING PNEUMATIC TIRES OF MOTOR VEHICLES.

APPLICATION FILED JAN. 11, 1905.

Fig. 1

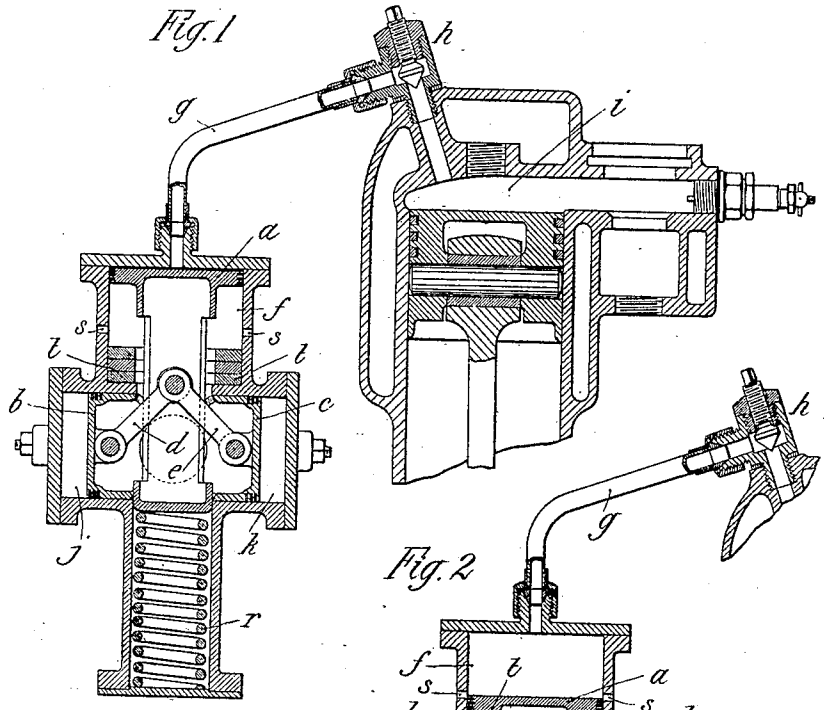


Fig. 2

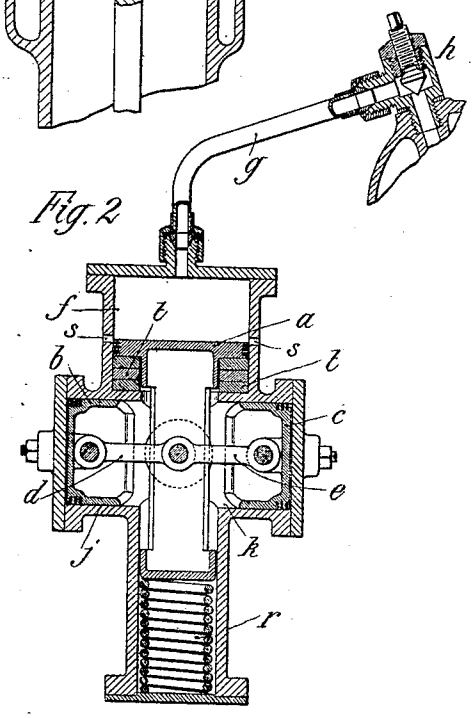


Fig. 3

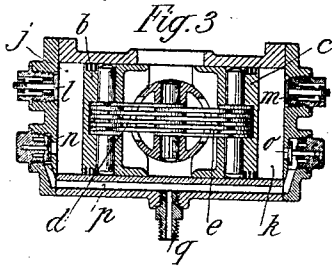


Fig. 5

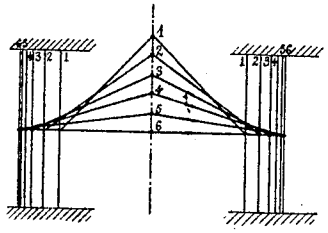
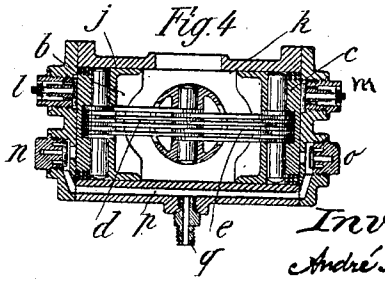


Fig. 4



Witnesses:-
Henry Thiemann
F. George Barry.

Inventor:-
André Michelin
by attorneys
Brown & Seward

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANDRÉ MICHELIN, OF PARIS, FRANCE.

APPARATUS FOR INFLATING PNEUMATIC TIRES OF MOTOR-VEHICLES.

No. 795,531. Specification of Letters Patent. Patented July 25, 1905.

Application filed January 11, 1905. Serial No. 240,550.

To all whom it may concern:

Be it known that I, ANDRÉ MICHELIN, engineer, a citizen of the Republic of France, and a resident of 105 Boulevard Pereire, Paris, France, have invented a new and useful Improved Apparatus for Inflating the Pneumatic Tires of Motor-Cars, of which the following is a specification.

This invention relates to improvements in apparatus for inflating pneumatic tires.

It consists in an apparatus which can be put in communication with the cylinder or cylinders of the motor of the car whenever the pneumatic tires require to be inflated and which is provided with a piston that is actuated by the explosion of the charges of the motor. This piston actuates in its turn compressing-pistons suitably arranged for fulfilling the twofold condition that the final compression of the air requires the maximum effect and that it coincides with the last part of the expansion of the gases, at which period the minimum work is developed thereby.

This apparatus consists, essentially, first, of a cylinder for the above-mentioned actuating-piston, which cylinder is connected to that or those of the motor of the car by means of a pipe provided with a shut-off cock, and, secondly, of two cylinders arranged in line with each other in the same plane as the first cylinder and at right angles thereto, which cylinders contain the compressing-pistons. The latter are connected to the actuating-piston of the apparatus by means of connecting-rods, so arranged that when the actuating-piston advances it forces the two compressing-pistons away from each other, and thereby effects the compression of the air, this being effected at a speed which decreases in proportion as the resistance to the compression increases and as the actuating-gases become more expanded. A spring acts upon the actuating-piston in such manner as to bring all the moving parts of the apparatus back into their initial position after having performed the working stroke. No dead space exists in the compressing-cylinders. When these have arrived at the end of their stroke and the actuating-piston continues to advance, this has the effect of moving the compressing-pistons back again, because the connecting-rods then pass beyond the straight line which connects their points of attachment. This excess of motion is, however, limited to a small extent, owing to the provision of discharge-openings for the gases and of buffer-rings, whereby loss of time is prevented. This construction of air-compressor requires no distributing devices. On the other hand, owing to the peculiar conditions under which the motive force is transmitted to the compressing-pistons and which have been indicated above, no fly-wheel is required, whereby a considerable reduction in the weight of the apparatus and of the space which it occupies is effected.

Figure 1 of the accompanying drawings shows a vertical section through the axis of the compressing apparatus with part of the motor of the car, the apparatus being in the position of rest. Fig. 2 shows a similar section with the pistons in position for effecting the final compression. Fig. 3 shows a horizontal section through the axis of the compressing-pistons and through the suction and forcing valves, the pistons being shown at the beginning of their stroke. Fig. 4 shows a section similar to Fig. 3, showing the pistons at the end of their stroke. Fig. 5 shows a diagram of the actuating-piston of the apparatus and the compressing-piston, showing that during the stroke of the actuating-piston the distance passed through by the compressing-pistons becomes smaller and smaller in proportion to the expansion of the gases and to the increase of the resistance due to the final compression.

a is the actuating-piston of the apparatus, which is subject on its upper face to the pressure of the gases coming from the car-motor *i*. *b* and *c* are the compressing-pistons. These three pistons are connected together by sets of connecting-rods *d e*, which are all pivoted to a common axis carried by the tubular guide-rod of the actuating-piston and are pivoted at their other ends to the compressing-pistons.

f is the cylinder of the actuating-piston, this being connected by a pipe *g*, provided with a stop-cock *h*, to the motor-cylinder *i* of the car.

j and *k* are the compressing-cylinders. The ends of these cylinders are provided with suction air-valves *l m* and forcing-valves *n o*, the latter opening into a passage *p*, leading to a branch pipe *q*, to which is fixed the tube by means of which the compressed air is led to each of the valves of the pneumatic tires to be inflated.

If the motor working with petrol, alcohol, or other explosive discharges is in action and the valve *h* is opened, the gases at the moment of explosion will act upon the piston *a* of the apparatus, causing it to assume the position

shown at Fig. 2. During this motion the piston *a* will have moved the pistons *b c* to the end of their stroke in forcing the volume of air contained in the cylinders *j* and *k* to pass through the forcing-valves *n* and *o* and passage *p*, whence it passes into the pneumatic tires. During the time of suction and discharge of the car-motor a spring *r*, arranged below the actuating-piston *a*, causes all three pistons to move back into their original position at Fig. 1 in forcing out the gases which have operated in the cylinder *f* and in drawing in through the valves *l m* a fresh quantity of air into the compressing-cylinders.

In order to stop more quickly the motion of the piston *a* at the end of its stroke, there are provided in the cylinder *f* small openings *s*, through which the explosion-gases rapidly escape into the atmosphere. It is, however, desirable that the piston *a* should slightly pass beyond the position shown in Fig. 2 in order to make sure that the pistons *b* and *c* completely effect their compressing stroke, as it is necessary to avoid dead spaces in a compressor. There is no risk of these pistons moving too far, because when once the connecting-rods *d* and *e* assume the position in which they are in a straight line the further advance of the piston *a* will cause them to incline in the contrary direction, whereby the compressing-pistons are again moved toward each other. In order, however, to limit the stroke of *a*, so as to prevent a loss of time, there are provided, in addition to the spring *r* and the discharge-openings *s*, elastic washers *t*, serving as a buffer to the piston's motion.

Having thus described the nature of my said invention and the best means I know of carrying the same into practical effect, I claim—

1. Apparatus for inflating the pneumatic tires of motor-cars, consisting of the combination of an actuating-cylinder, a pipe with stop-cock for connecting said cylinder with the motor-cylinder of the car, a piston in said actuating-cylinder, compressing-cylinders having suction and forcing valves, compressing-pistons located in said cylinders, rods connecting said actuating-piston with the compressing-pistons and means for bringing back said pistons into their original position after the explosion-gases have done their work, substantially as described.

2. Apparatus for inflating the pneumatic tires of motor-cars, consisting of the combination of an actuating-cylinder, a pipe with stop-cock for connecting said cylinder with the motor-cylinder of the car, a piston in said actuating-cylinder, compressing-cylinders having suction and forcing valves, compressing-pistons located in said cylinders, rods connecting said actuating-piston with the compressing-pistons and a spring acting on the actuating-piston for bringing the moving parts back into their original position after the explosive gases have done their work.

3. Apparatus for inflating the pneumatic tires of motor-cars consisting of the combination of an actuating-cylinder, a pipe with stop-cock for connecting the said cylinder with the motor-cylinder of the car, a piston in said actuating-cylinder, openings in said cylinder for the escape of combustion-gases at the end of the stroke, compressing-cylinders having suction and forcing valves, compressing-pistons in said cylinders, rods connecting the actuating-piston with the compressing-pistons, and means for bringing the moving parts back into their original positions after the explosion-gases have done their work, substantially as described.

4. Apparatus for inflating the pneumatic tires of motor-cars consisting of the combination of an actuating-cylinder, a pipe with stop-cock for connecting the said cylinder with the motor-cylinder of the car, a piston in said actuating-cylinder, openings in said cylinder for the escape of combustion-gases at the end of the stroke, compressing-cylinders having suction and forcing valves, compressing-pistons in said cylinders, rods connecting the actuating-piston with the compressing-pistons, elastic buffers in said actuating-cylinder for stopping the motion of the actuating-piston and means for bringing back the moving parts to their original position after the explosion-gases have done their work, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 30th day of December, 1904.

ANDRÉ MICHELIN.

Witnesses:

ARCHIBALD R. BAKER,

ALCIDE FABE.