(No Model.) 2 Sheets—Sheet 1.

H. SILVESTER.

MOTOR.

No. 393,862. Patented Dec. 4, 1888.

Fig. 1.

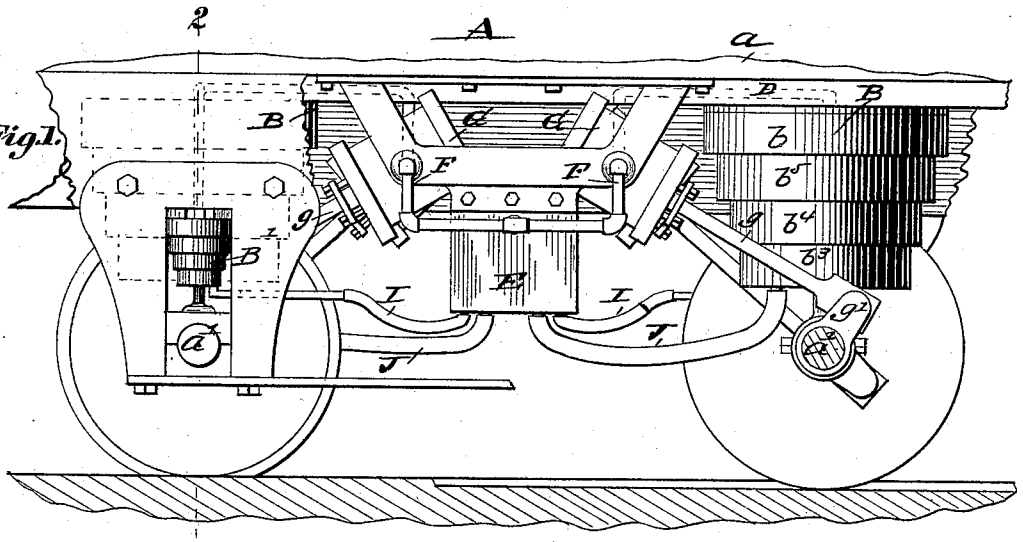
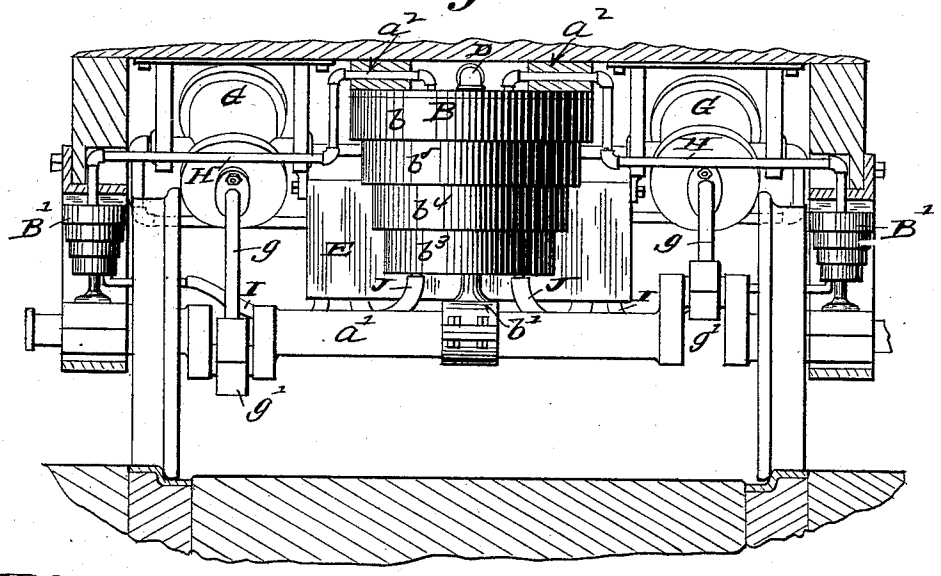


Fig. 2.



Witnesses:
H. B. Anderson
S. B. Houts.

Inventor:
Henry Silvester.
by C. D. Moody, atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

H. SILVESTER.

MOTOR.

No. 393,862. Patented Dec. 4, 1888.

Fig. 3.

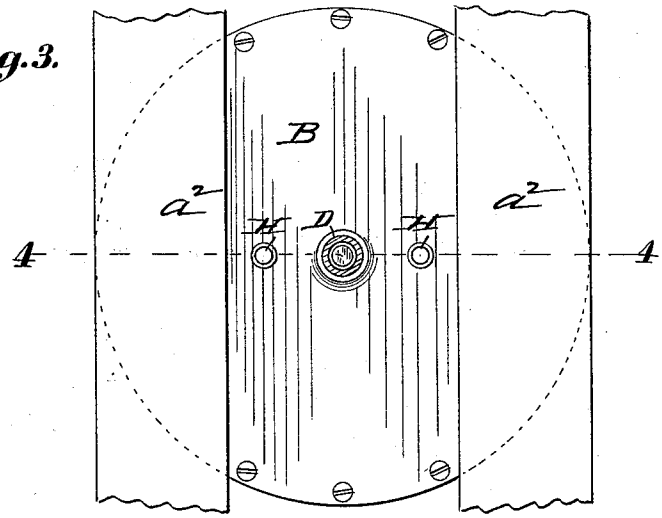
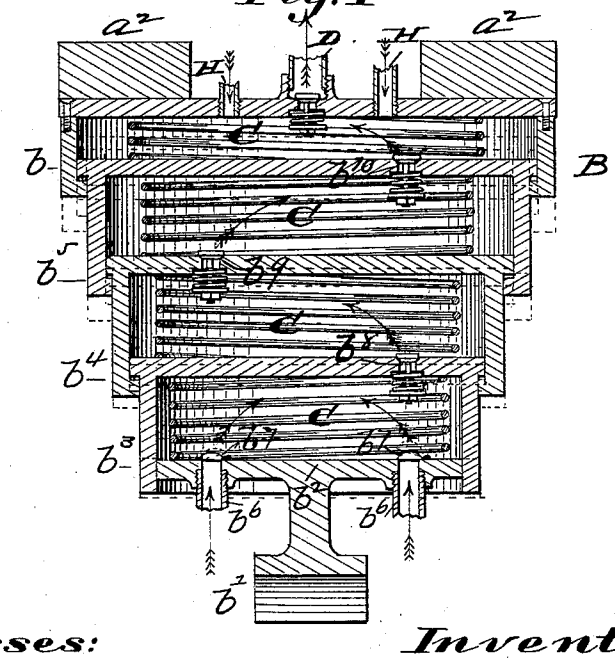


Fig. 4



Witnesses:
W. B. Anderson
S. B. Hunts.

Inventor:
Henry Silvester.
by C. D. Moody.
Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY SILVESTER, OF ST. LOUIS, MISSOURI.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 393,862, dated December 4, 1888.

Application filed August 23, 1886. Renewed February 6, 1888. Serial No. 263,167. (No model.)

To all whom it may concern:

Be it known that I, HENRY SILVESTER, of St. Louis, Missouri, have made a new and useful Improvement in Motors, of which the following is a full, clear, and exact description.

This improvement is based upon the vertical oscillation incident to the use of a spring-supported car-body.

The annexed drawings, making part of this specification, exhibits a desirable mode of carrying out the improvement.

Figure 1 is a side elevation, partly broken away, exhibiting the improvement and enough of a car for an understanding of the operation of the mechanism. Fig. 2 is a vertical cross-section on the line 2 2 of Fig. 1. Fig. 3 is a plan of one of the pumps, and Fig. 4 is a vertical section on the line 4 4 of Fig. 3.

The same letters of reference denote the same parts.

The car A, which may be a street or any car, is of the ordinary construction, saving as modified by the improvement in question, and that its body *a*, by reason of its being supported upon springs, is adapted to oscillate vertically as the car is used.

The improvement consists in combining, substantially as hereinafter described and claimed, a telescoping pump with the car-body, so that the varying oscillation of the car-body can be properly utilized.

To this end the car is provided with one or more pumps, B, suited, say, for compressing air, and so connected with the car-body *a* and car-axle *a'*, or with parts respectively attached to the car-body and car-axle, as to cause the vertical oscillation of the car-body to operate the pump, and as, perhaps, a desirable means therefor the pump-cylinder *b* is attached to strips or plates a^2 upon the car-body depending therefrom, and the piston-rod *b'* is attached to the car-axle extending upward therefrom, and, in the place of a single cylinder and piston, a telescoping construction is adopted—that is, the piston-rod *b'* at its upper end is attached to the piston b^2, Fig. 4, which works in the cylinder-section b^3. This section in turn, and as a piston, works in a second cylinder-section, b^4. This section b^4 similarly, as a piston, works in a third cylinder-section, b^5, and the section b^5 works as a piston in the upper cylinder-section, *b*. Any desirable number of cylinder-sections may be used. The air is admitted into the lower section through the passages b^6, which are provided with a valve, b^7, seating downward. An air-passage, b^8, leads from the lower section into the section above, and from the section b^4 the air can pass through the passage b^9 into the section b^5, and from the section b^5 the air can pass through the passage b^{10} into the section *b*. All of these air-passages are provided with check-valves similarly to the passage b^6, to prevent the air from escaping backward when the sections are closed into each other and to admit the air when the sections are opened out from each other.

A spring, C, in each section serves to open the section out as the car-body rises, and when the car-body falls the springs yield and the air is compressed within the sections, passing upward through the sections successively, and from the uppermost section is discharged through the passage D to the point where it is desired to utilize it.

In the present instance the compressed air, as indicated by the broken lines D, Fig. 1, is conducted through a pipe to an air-reservoir, E, whence, and by means of suitable pipes, F, it is delivered to the cylinder or cylinders G, whose rods *g* connect with the cranks *g'* of the car-axle.

As the details of that part of the construction used in applying the compressed air do not enter into the present improvement, they need not be described, nor shown in the drawings. It is sufficient for my present purpose to indicate an application of the power—such as the propulsion or the starting of the car.

One or more of the pumps B may be employed and at various parts of the car, and when more than one is employed pipes may lead from one to the other, so as to combine the different bodies of compressed air. For instance, in addition to the pumps B under the central portion of the car-body, they may be inserted, as at B', in the places of the customary springs, in which position they serve not only as springs to support the car-body, but also as pumps to compress the air which may be delivered through the pipes H into the central pumps, B. Pipes I and J may lead from the tank E to the pumps B and B', re-

spectively, for the purpose of reconveying to the pumps the air or liquid which the pumps have transferred to the tank.

It will be noted that the vertical oscillation of the car-body continually varies in length. Consequently it will not answer to use a pump of fixed length. The pump should be a telescoping one and one in which the air after being compressed backward cannot expand again. The pump shown expressly provides for this varying vertical stroke of the car-body. If the car-body descends one-half an inch, it operates one section of the pump; if an inch, two sections, and so on. This feature is one of very great value and importance, and in practice accomplishes in a wholly novel way the most substantial and useful results.

I claim—

1. In a car, the combination of the car-axle, the oscillating car-body, and an interposed air-pump, one part—say the piston-rod—being attached to the car-axle and the other part—say the cylinder—being attached to the car-body, as and for the purpose described.

2. In a car-motor, substantially as set forth, a pump placed between the axle and body, each section of said pump provided with a spring, the fixed part of said pump being fastened to said axle and the movable part of said pump being fastened to said body, as and for the purpose specified.

3. The combination of the herein-described car-body and telescoping pump, constructed substantially as set forth, each section being provided with a spring and car-axle, substantially as described.

4. The combination of the oscillating car-body, the car-axle, the pump, constructed substantially as set forth, each section being provided with a spring, and the engine, including suitable pipes and valves for transmitting the compressed air to said engine, substantially as described.

5. The herein-described car having the telescoping pump B, constructed as set forth, each section being provided with a spring, as and for the purposes described.

6. The combination of the car-axle, the oscillating car-body, the telescoping spring-actuated pump, constructed substantially as described and operated by the oscillation of said car-body, and a pipe leading from said pump to an air reservoir or cylinder, substantially as described.

7. In combination with the oscillating car-body A, the telescoping pump B, constructed as described, the air-reservoir E, and the pipes connecting said pump and reservoir and the pipe F, and the cylinders G, the rods g, the cranks g', and the car-axle, substantially in the manner and for the purpose set forth.

8. In a car-motor, the combination of the following elements: the telescoping pumps B and B′, the reservoir E, and pipe connecting said pumps thereto, the pipe F, and the car-axle and crank-connection, substantially as described.

9. In a car-motor, and in combination with the car-body and operated by its vertical oscillations, a pump composed of cylinders b b^5 b^4 b^3, the several sections provided with valved air-passages, and each movable section acting as a piston in the section above it, each section being provided with a spring, substantially as and for the purpose set forth.

Witness my hand.

HENRY SILVESTER.

Witnesses:

C. D. MOODY,

D. H. NELSON.