

Aug. 21, 1934.

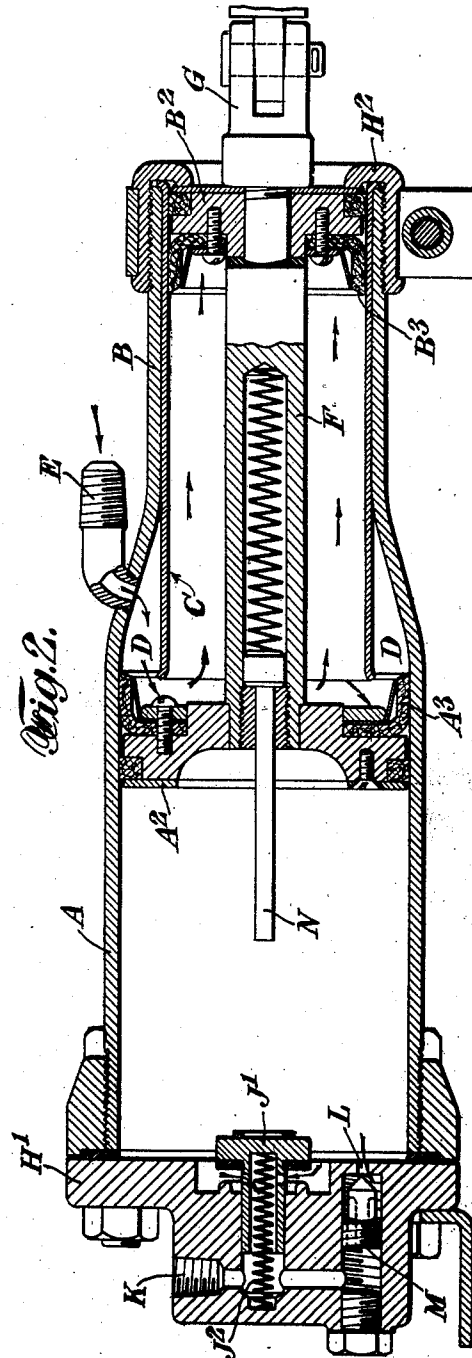
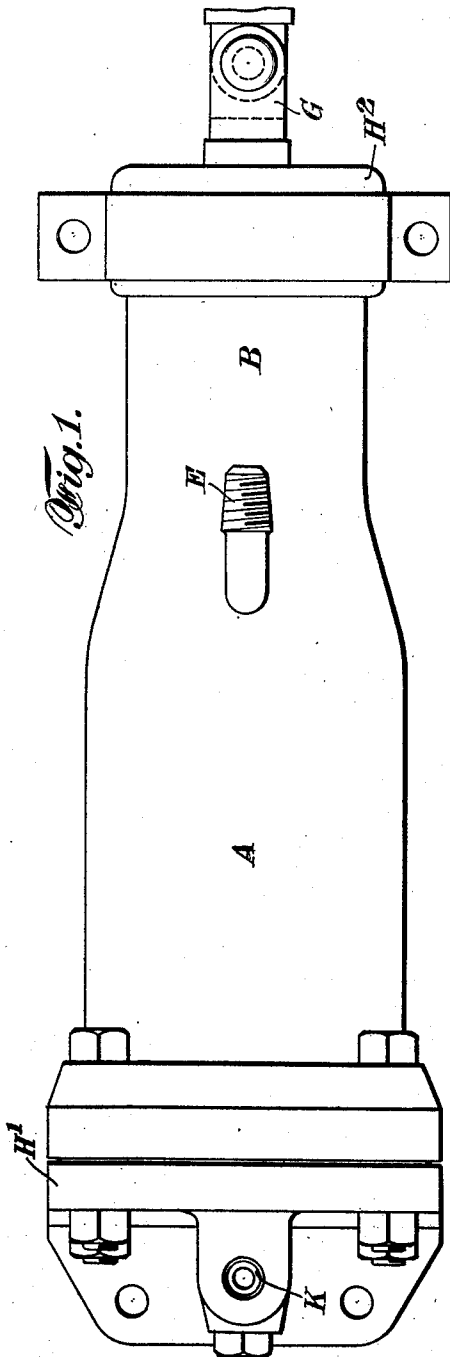
R. J. PARSONS

1,971,048

DIFFERENTIAL ENGINE

Filed Sept. 1, 1932

2 Sheets-Sheet 1



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Fig. 3.

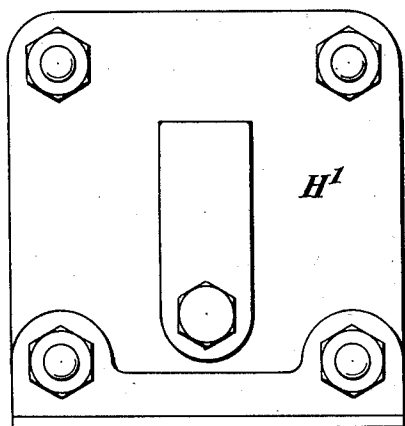


Fig. 4.

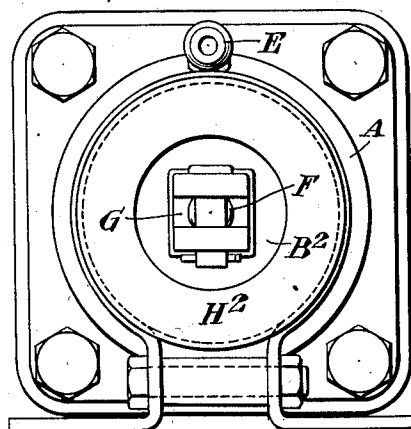


Fig. 5.

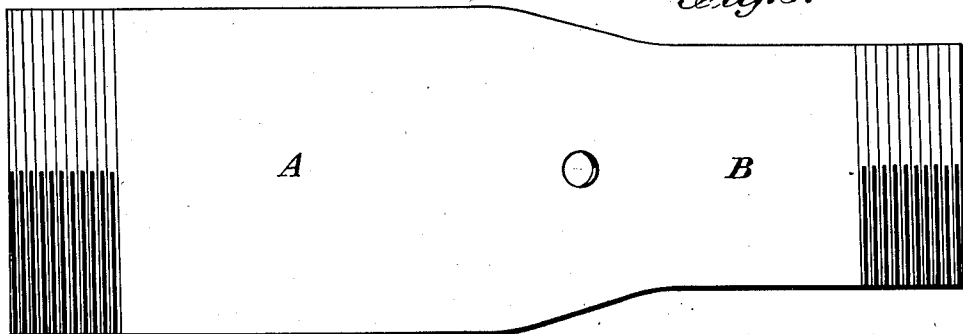
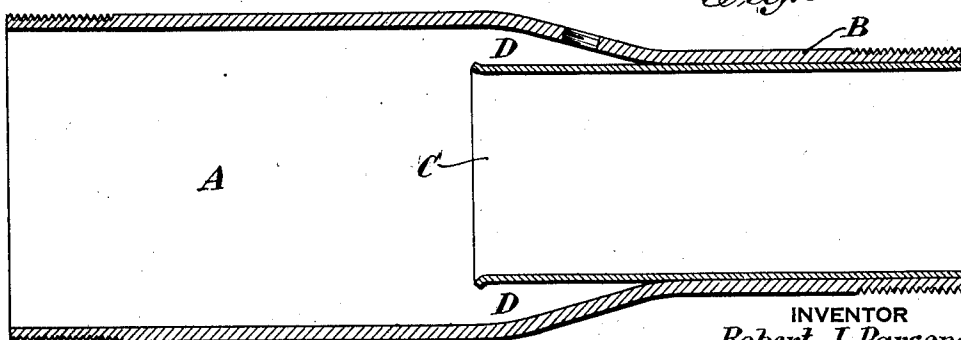


Fig. 6.



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UNITED STATES PATENT OFFICE

1,971,048

DIFFERENTIAL ENGINE

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Albany, N. Y., a corporation of New York

Application September 1, 1932, Serial No. 631,423

5 Claims. (Cl. 121-44)

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof, wherein

Fig. 1 is a plan of my engine;

Fig. 2 is a diametrical section thereof;

Fig. 3 and Fig. 4 are views of the respective cylinder ends;

Fig. 5 is a plan and

Fig. 6 a diametric section of the cylinder construction.

My device is a differential engine of the direct stroke type such as is used for opening or closing a door, or producing any analogous direct stroke.

Referring to the drawings the engine is shown as provided with a cylinder having a large diameter A and, in continuation thereof, a cylinder of smaller diameter B. These two cylinders are open ended and their open ends face each other at the center of the engine. These two parts A and B are made of a single metal tube, as appears clearly in Fig. 5 and Fig. 6, the larger portion of the tube serving normally for the larger diameter and is drawn down to a smaller diameter for the lesser part B. Inside of the smaller portion B is placed a thinner lining tube C, which is longer than the swaged-down part of the tube and projects into the said larger part A. This leaves a space D, outside of the lining C but inside of A. This space D is utilized for admitting pressure to the inside of cylinder A and also the inside of C by means of an external tube E, shown in Fig. 2. This space D communicates with C by a passageway leading around the open end of C.

In the cylinder A is a correspondingly large piston A² and in cylinder B a smaller piston B², these two pistons being connected to each other by an axial rod F, which is continued on the outside of piston B² by a shackle G which is to be connected to the door or other object to be operated. Piston A² is encircled by a packing ring A³ and piston B² by a similar packing ring B³. The outer end of the smaller cylinder is closed by a head H² and the outer end of the larger cylinder by a head H¹. Through the center of the latter head, H¹, is an axial passageway that is opened or closed by a valve J¹ operated by a spring J² and the said passageway leads into an external port K through which pressure fluid may be admitted to the inside of cylinder A when said valve J¹ is open. A by-pass duct L around the valve J¹ is adjustable by a screw M. On the aforesaid piston A² is a projecting rod N that, near the end of the leftward stroke of the piston, hits the valve J¹ and closes it, leaving only the restricted by-pass L for the escape of fluid from cylinder A.

The action of the engine is as follows: Pressure fluid, such as compressed air, is admitted to the two pistons by the aforesaid pipe E and is kept constantly on. Then, if air pressure is also admitted to the large cylinder A, it will counter, on the left side of piston A², the pressure exerted on its right side due to the air, admitted constantly through the pipe E. Since the pressure on piston A² is balanced, the pressure will act on the smaller piston B² and force it to the right, since the smaller piston is only opposed by atmospheric pressure on its right side. This action of piston B² will close the door through the shackle G. To open the door the air pressure is exhausted from the larger cylinder A and the constant pressure in B, now acting on the larger piston A², will move piston A² to the left, pulling piston B² with it and opening the door. As piston A² moves to the left, the rod N thereon encounters the valve J¹ and closes it. For the remainder of its stroke the piston A² is then retarded by the slow outflow of air through the by-pass L around the valve J¹.

What I claim as new and desire to secure by Letters Patent is:

1. In a pressure engine, a tubular member having a portion of reduced diameter joined with a portion of larger diameter by an intermediate tapered zone, and a tubular lining for the portion of smaller diameter, said lining having a free end extended into the tapered zone, said free end being spaced from the adjacent wall of said tubular member.

2. In a pressure engine, a tubular member having a portion of reduced diameter joined with a portion of larger diameter by an intermediate tapered zone, and a tubular lining for the portion of smaller diameter, said lining being longer than said portion of smaller diameter and having a free end projected into said intermediate zone, said projected end and the adjacent wall portion of the tubular member being constructed and arranged to provide an annular fluid-pressure-receiving cavity.

3. In a pressure engine, a tubular member having a portion of reduced diameter joined with a portion of larger diameter by an intermediate tapered zone, a tubular lining for the portion of smaller diameter, said lining having a free end extended into the larger portion of said tapered zone, an annular fluid-pressure-receiving cavity being formed between the free end of said lining and the adjacent wall of said tubular member.

bular member, and a pressure inlet pipe connected with said chamber.

4. In a pressure engine, a tubular member having a portion of reduced diameter joined with
 5 a portion of larger diameter by an intermediate tapered zone, so as to provide cylinders of different diameters, a tubular lining for the smaller cylinder, a head enclosing the outer end of the smaller cylinder and the adjacent end of the lining, the other end of the lining being projected
 10 into the larger portion of said tapered zone and constructed and arranged to provide an annular fluid-pressure-receiving cavity between the lining and the adjacent wall of the tubular member,
 15 and a head engaging the outer end of the larger cylinder.

5. A pressure engine comprising two cylinders

of different diameters, said cylinders consisting of a tubular member having a portion of reduced diameter joined with a portion of larger diameter by an intermediate tapered zone, a piston reciprocally mounted in the larger cylinder, a second piston reciprocally mounted in the smaller cylinder, means connecting said pistons, a lining for the smaller cylinder, said lining having a free end extended into the larger portion of said tapered zone and constructed and arranged to provide an annular fluid-pressure-receiving cavity between the lining and the adjacent wall of the tubular member, said cavity communicating with the interior of the tubular member at a position between the pistons, and a pressure inlet tube connected with said cavity.

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