July 16, 1935. H. AIRD 2,008,634

DEVICE FOR DEMONSTRATING THE OPERATION OF AN INTERNAL COMBUSTION ENGINE

Filed Feb. 24, 1934

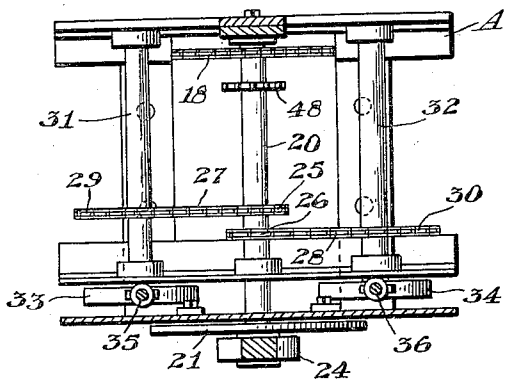


Fig. 3.

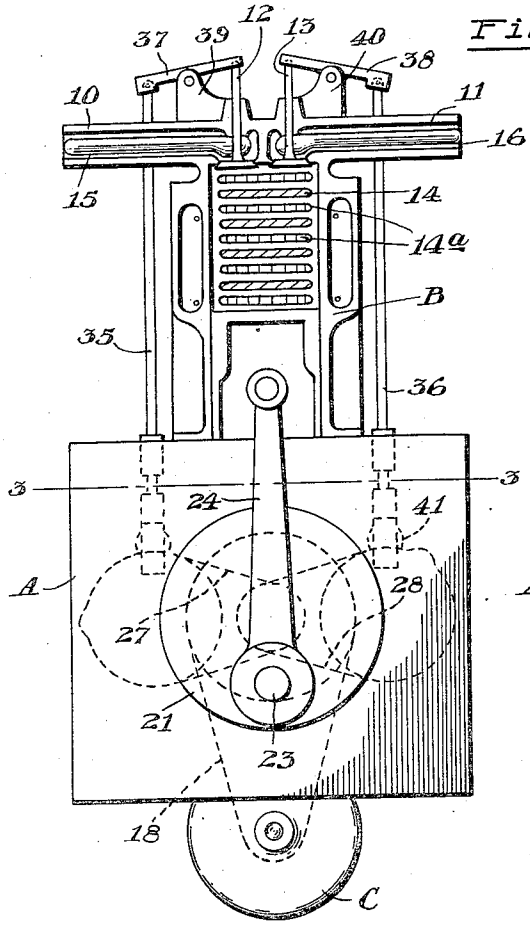


Fig. 1.

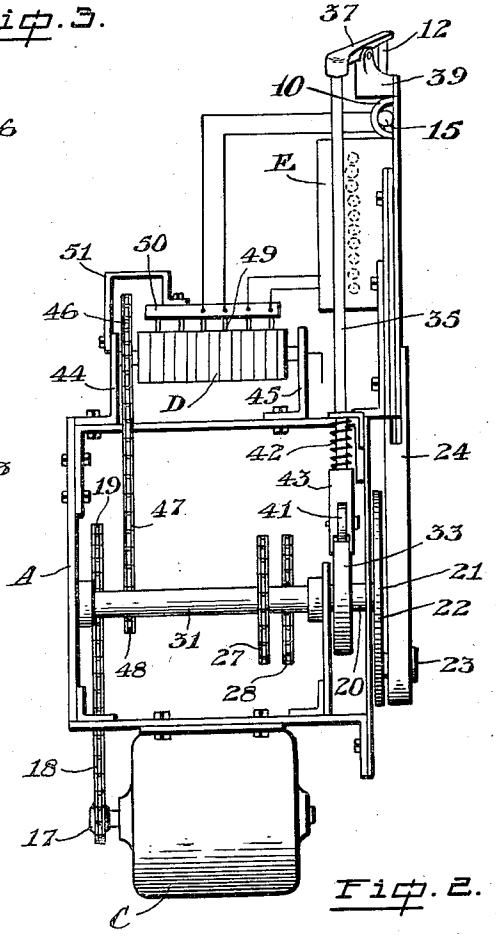


Fig. 2.

Inventor.
HUGH AIRD.
By Eugene E. Stevens
Att'y.

Patented July 16, 1935

2,008,634

UNITED STATES PATENT OFFICE

2,008,634

DEVICE FOR DEMONSTRATING THE OPERATION OF AN INTERNAL COMBUSTION ENGINE

Hugh Aird, Vancouver, British Columbia, Canada

Application February 24, 1934, Serial No. 712,836

1 Claim. (Cl. 35—13)

This invention relates to improvements in a device for demonstrating the operation of an internal combustion engine, and the objects of the invention are to provide simple visual means by which the secrets of operation in an internal combustion engine may be readily demonstrated.

Further objects of the invention are generally to simplify devices of this character and better adapt them to perform the functions required as hereinafter more fully set forth and described in the accompanying specification and drawing.

In the drawing—

Figure 1 is a front elevation of the embodiment of the invention.

Figure 2 is a side elevation.

Figure 3 is a section on the line 3—3 of Figure 1.

In the drawing like characters of reference indicate corresponding parts in all the figures.

Referring to the drawing, A indicates a suitable frame on the top of which is supported a sectional cylinder, B representing a section of the usual cylinder of an internal combustion engine, and may be formed of any convenient material, such as wood, and painted in a convenient way to correspond with the actual material used in an internal combustion engine. At the top of the cylinder an inlet port 10 and exhaust port 11 of usual form are provided, cooperating with which is an inlet valve 12 and an exhaust valve 13 which are operated by the mechanism hereinafter described.

Within the sectional cylinder B are placed illuminating devices, being preferably two sets of illuminating devices arranged 14 and 14*a* alternately, the former set giving a white light and the latter giving a red light. Any convenient form of illuminating device may be used, such, for example, as neon tubes or incandescent lamps which are properly connected in an electric circuit which is controlled by the means hereinafter described. Similar luminescent devices 15 and 16 are mounted in the inlet and exhaust ports, the illuminating device 15 being adapted to give a white light and the illuminating device 16 a red light.

The mechanism is conveniently operated from an electric motor C mounted on the bottom of the frame, having a sprocket 17 connected by a chain 18 with a corresponding sprocket 19 on a countershaft 20. The countershaft 20 at one end carries a crank 21, shown in the form of a disc 22, with eccentric pin 23, which is connected to a connecting rod 24 pivotally connected to the piston. The countershaft 20 also carries sprockets 25 and 26, which are connected by chains 27 and 28 to sprockets 29 and 30 carried on additional countershafts 31 and 32. These latter countershafts carry cams 33 and 34, which are engaged by the lower end of valve-operating rods 35 and 36 slidably mounted in the frame, having their upper extremities engaging pivoted valve levers 37 and 38 pivoted to brackets 39 and 40 at the top of the cylinder and designed to engage the stems of the valves 12 and 13. The rods 35 and 36 conveniently carry rollers 41 at their lower extremity which ride on the cam and which are spring held on the same by spring 42, surrounding the rods and extending between shoulders 43 on the lower extremity of the rod and a portion of the casing A.

The connection between each of the levers 37 and 38 and the brackets 39 and 40, as well as the stems of the valves 12 and 13, is articulated and made sufficiently loose to permit oscillation of the levers 37 and 38.

The electrical circuits for the lights are controlled in timed relation with the movement of the piston and valves by any suitable timing device. I prefer to employ a rotary commutating device D journalled in brackets 44 and 45 on the frame carrying a sprocket 46, which is connected by a chain 47 with a corresponding sprocket 48 on the countershaft 20. The commutating device will carry certain suitable metallic segments, by which the circuits may be connected through brushes 49 carried on a bar 50 supported above the commutator D by bracket 51 and connected in the appropriate electrical circuits, which latter may include fuse plugs connected in a switch box E.

The operation of the device may be readily understood from the foregoing. Starting from the suction stroke of the piston, on such stroke the inlet valve 12 will open at the same time as the white illuminating device 15 in the inlet port 10 will be illuminated while on the downward stroke, the piston will uncover one by one the white illuminating devices 14 in the cylinder. This will represent the inflow of the gasoline vapour through the port into the cylinder.

On the compression stroke the piston will come up in front of the white lights or luminescent tubes, thus shutting them off from view one at a time. When the piston gets to the top of the compression stroke the circuits will be so arranged that the white lights or luminescent tubes will go out on the explosion stroke. The explosion of the gasoline vapour in the cylinder will be indicated by red lights 14*a*, the circuit for

which will be completed at the proper time by the commutating device. On the exhaust stroke the exhaust valve 13 will open. At the same time the red illuminating devices 16 will have their circuits connected by the commutating device and thus represent the burnt gases being exhausted out of the cylinder.

It will be obvious that the device may be applied to indicate other types of internal combustion engines, that shown being for a four cycle operation, but for a two cycle operation it will be necessary to change only the electrical sequences to operate in accordance with the change in structure necessary.

Various modifications may be made in the invention without departing from the spirit thereof or the scope of the claim and, therefore, the exact forms shown are to be taken as illustrative only and not in a limiting sense, and I desire that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claim.

What I claim as my invention is:

A device for demonstrating the operation of an internal combustion engine comprising a sectional cylinder and inlet and exhaust ports, valves controlling said ports, a piston, means for reciprocating the piston, means for actuating the valves, a different coloured illuminating device in each of the ports, and illuminating devices of different colours in the cylinder, said colours indicating the incoming and exhausted gases respectively.

HUGH AIRD.