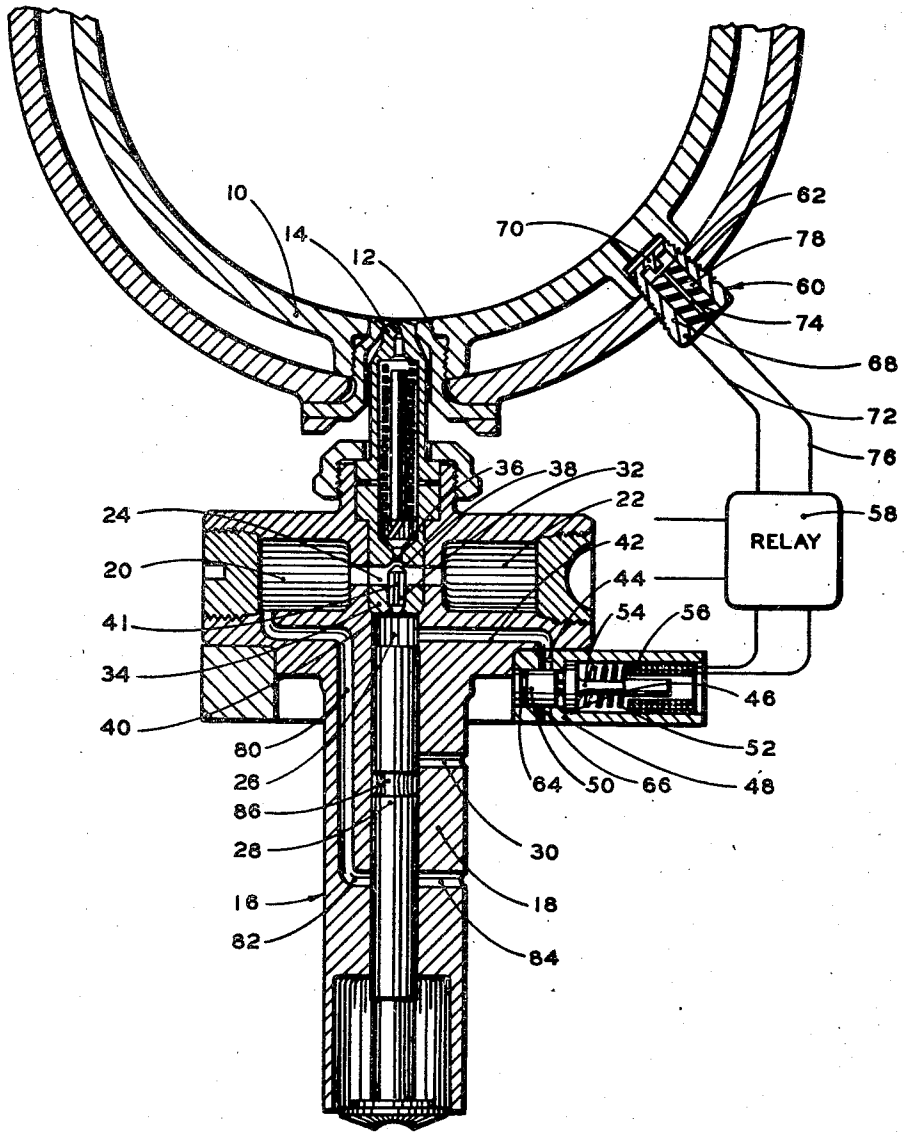
May 13, 1947. A. KALITINSKY 2,420,432

ELECTRICAL INJECTION TIMING

Filed Jan. 28, 1944



INVENTOR
Andrew Kalitinsky
Charles A. Warren
ATTORNEY

Patented May 13, 1947

2,420,432

UNITED STATES PATENT OFFICE

2,420,432

ELECTRICAL INJECTION TIMING

Andrew Kalitinsky, Eagleville, Conn., assignor to United Aircraft Corporation, East Hartford, Conn., a corporation of Delaware

Application January 28, 1944, Serial No. 520,061

3 Claims. (Cl. 103—41)

1

This invention relates to fuel injection.

Kalitinsky application Serial No. 520,060, filed January 28, 1944, discloses a device for causing airless injection of fuel into an engine cylinder when the pressure in the engine cylinder reaches a predetermined value. An object of this invention is to control the injection of fuel electrically.

A feature of this invention is the injection of fuel by electrically actuated means when the pressure in the engine cylinder reaches a predetermined value. Another feature is the control of an accumulator type of injection system by electrical means.

Other objects and advantages will be apparent from the specification and claims, and from the accompanying drawing which illustrates an embodiment of the invention.

The single figure is a diagrammatic view in section of the injection device.

The engine cylinder 10 has an opening 12 which receives the nozzle 14 of an injection device 16 by which fuel is directed into the engine cylinder.

The injection device includes a casing 18 having one or more accumulator chambers 20 and 22 interconnected by a passage 24. Fuel is delivered to these chambers from a bore 26 in which the injection plunger 28 is movable. The plunger may be reciprocated by a cam, not shown, engaging with the outer end of the plunger.

Fuel enters bore 26 through an inlet port 30 which is connected to a source of fuel and which is uncovered by the piston when the plunger is at the lower end of its stroke. As plunger 28 moves upwardly, fuel flows past an accumulator valve 32 sliding in a bore in a ring 34 mounted in the casing and through passage 24 into the accumulator chambers. Fuel is discharged from the accumulator chambers through a passage 36 to the nozzle 14. The accumulator valve 32 is movable to engage a seat 38 at the end of passage 36 or a seat 40 in ring 34. Valve 32 has a longitudinal groove 41 by which fuel may pass the valve.

Bore 26 has a discharge passage or vent 42 communicating with a port 44 intersecting a bore 46 in a body 48. A plunger valve 50 which is slidable in bore 46 normally covers port 44 being held in this position by a spring 52. The stem 54 of valve 50 forms a core movable in an electrical coil 56. This coil is energized by a relay 58 controlled by a pressure actuated switch 60 in an opening 62 in the engine cylinder. When the pressure in the engine cylinder reaches a predetermined value, pressure actuated switch 60 is closed and operates through relay 58 to energize

2

coil 56. When this coil is energized, valve 50 is moved to the right to cause a groove 64 in the valve to connect port 44 to a vent port 66. When this occurs, the pressure in bore 26 is suddenly relieved and valve 32, which has been held against seat 38 by the pressure of fuel on the lower end of the valve, moves into the position shown, engaging seat 40 and connecting chambers 20 and 22 to the nozzle for injection of fuel into the engine cylinder. In this way injection occurs when a predetermined pressure is reached in the engine cylinder.

Switch 60 may include a hollow plug 68 having a diaphragm 70 connected by a lead 72 to relay 58. Within the plug is a pin 74 connected by a lead 76 to the relay and insulated from the plug by an insulating sleeve 78. The pin 74 is in a position to engage a lug on the diaphragm when the latter is sprung by the pressure in the engine cylinder, thus completing a circuit for operating the relay.

Air in the accumulator chambers 20 and 22 may be vented through a passage 80 in casing 18 which connects with the end of chamber 20. The opposite end of passage 80 forms a port 82 in bore 26 opposite a relief port 84. Plunger 28 has a groove 86 which, during the plunger stroke, connects ports 82 and 84 so that any air in the chambers is discharged through passage 80. Venting of the accumulator chambers is claimed in the copending application of Meitzler, Serial No. 486,624, filed May 11, 1943.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. An injection device for an engine including a pump, a chamber into which fuel is forced by the pump, said chamber having inlet and outlet passages communicating with the pump and with the engine cylinder, a valve normally closing the outlet passage, said valve being held closed by pressure of fuel between the pump and chamber, and electrical means for causing a drop in pressure between the pump and chamber for opening said valve.

2. An injection device for an engine including a pump, a chamber in which fuel is forced by the pump, said chamber having inlet and outlet passages communicating with the pump and the engine cylinder, a valve normally closing the outlet passage, said valve being held closed by pressure of fuel between the pump and chamber, a

vent between the pump and the chamber, and a valve in the vent for causing a drop in pressure between the pump and chamber, and electrically actuated means for moving said valve.

3. An injection device for an engine including a casing having a bore, a pump plunger reciprocating in said bore, a chamber into which fuel is forced by the plunger, said chamber having inlet and outlet passages communicating respectively with the pump and with the engine cylinder, valve means adapted for closing the inlet and outlet passages, said valve means being held in a position for closing the outlet passage by pressure of fuel between the pump and the chamber, electrical means for causing a drop in pressure between the pump and chamber for actuating said valve means to open said outlet passage,

said valve means operating in response to the drop in pressure for closing the inlet passage.

ANDREW KALITINSKY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,043,270	Twiss	June 9, 1936
2,239,481	Christensen	Apr. 22, 1941
2,067,997	White	Jan. 19, 1937
1,637,368	Bennett	Aug. 2, 1927

OTHER REFERENCES

348,726, Hurst (A. P. C.) pub. May 11, 1943.