W. E. VER PLANCK.

EMERGENCY MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JULY 24, 1914.

1,166,281. Patented Dec. 28, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

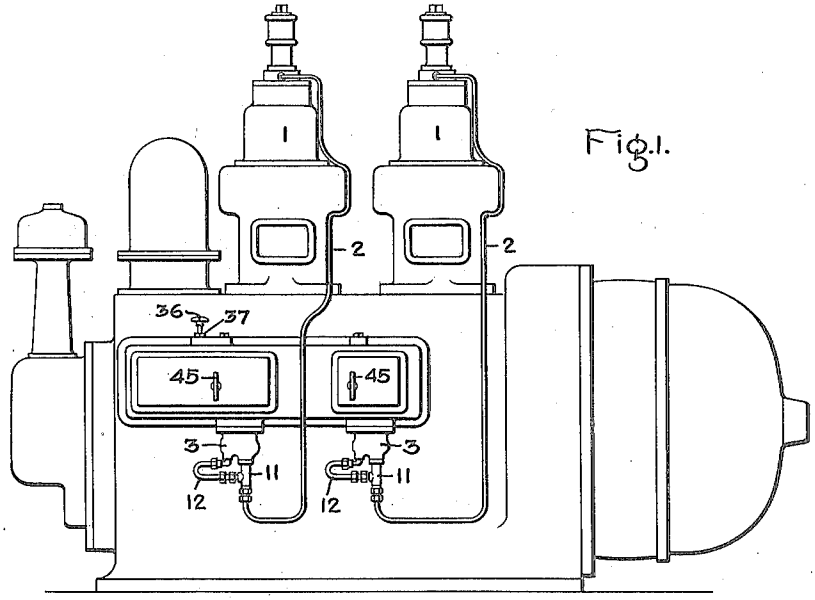


Fig. 2.

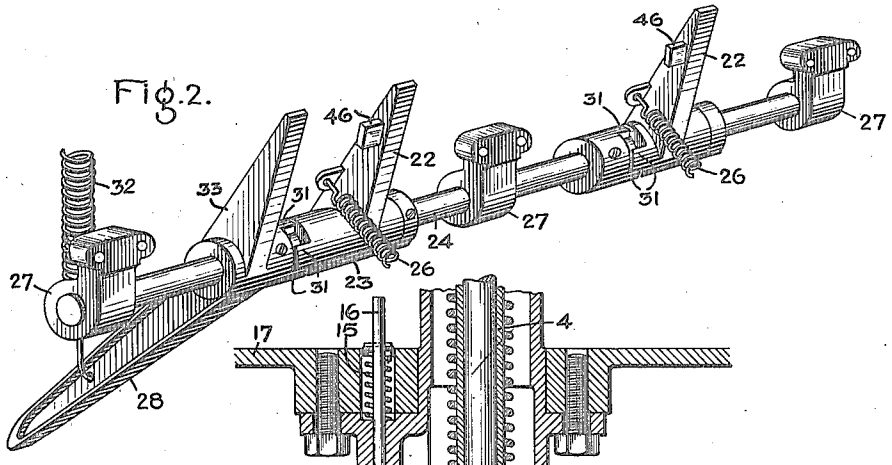
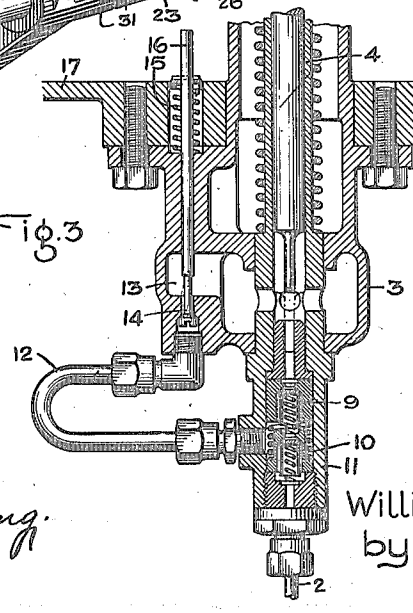


Fig. 3.



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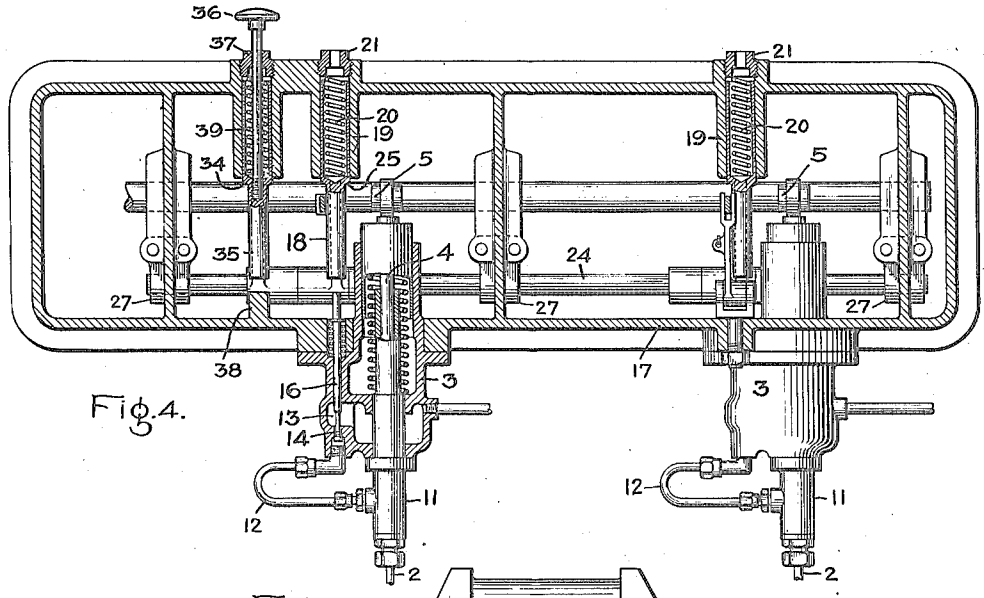


Fig. 4.

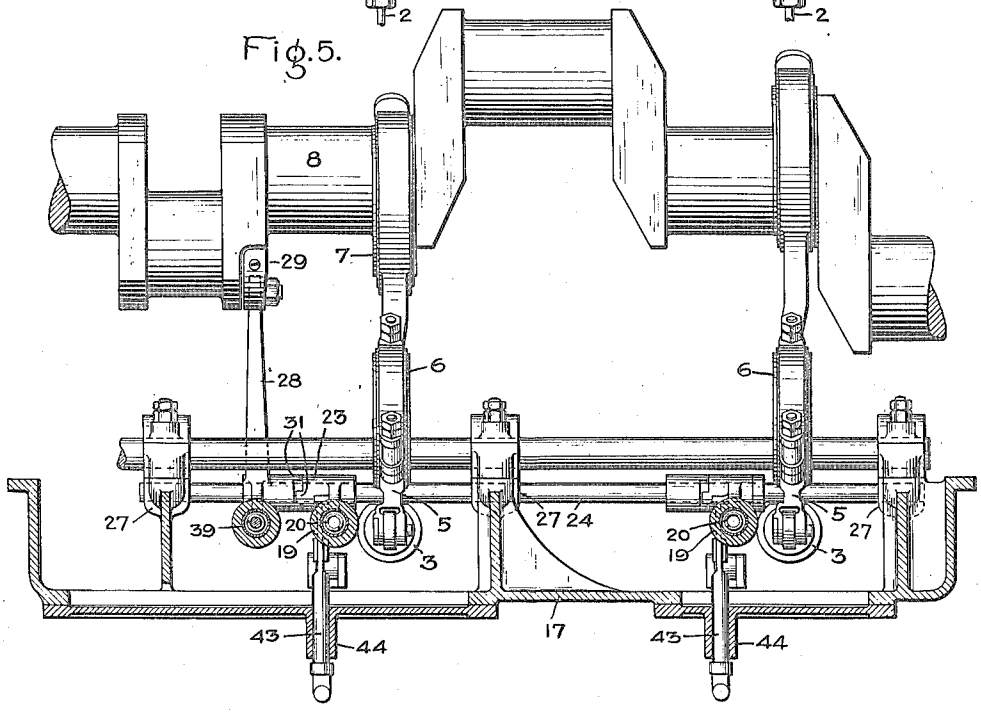


Fig. 5.

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3 SHEETS—SHEET 3.

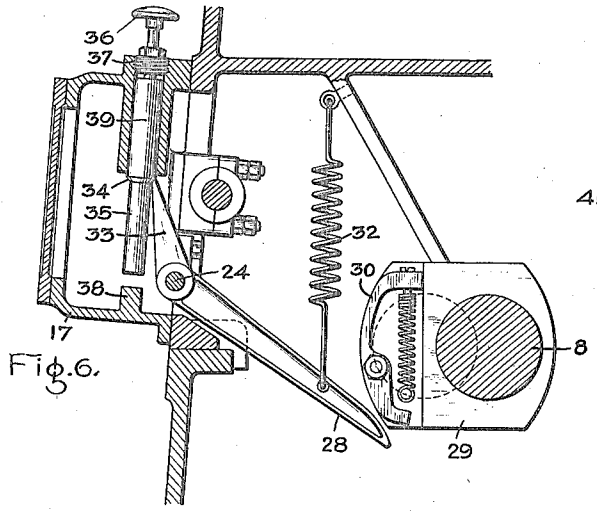


Fig. 6.

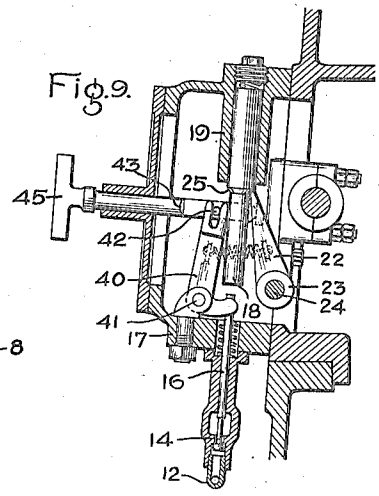


Fig. 9.

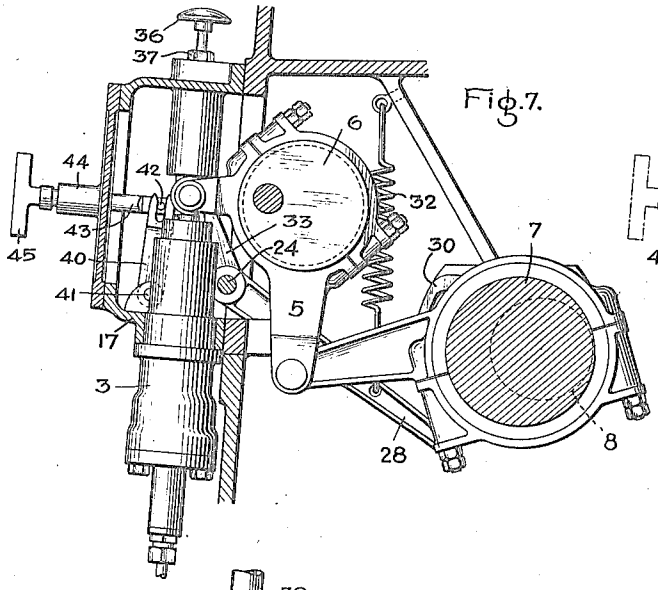


Fig. 7.

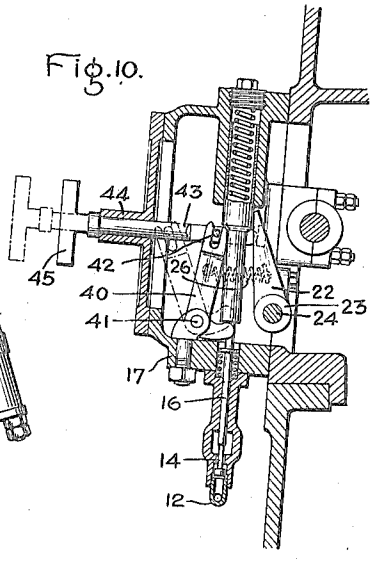


Fig. 10.

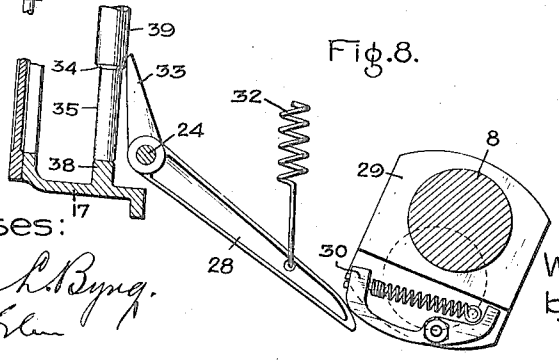


Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM EVERETT VER PLANCK, OF ERIE, PENNSYLVANIA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

EMERGENCY MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,166,281. Specification of Letters Patent. Patented Dec. 28, 1915.

Application filed July 24, 1914. Serial No. 852,918.

To all whom it may concern:

Be it known that I, WILLIAM EVERETT VER PLANCK, a citizen of the United States, residing at Erie, county of Erie, State of Pennsylvania, have invented certain new and useful Improvements in Emergency Mechanism for Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, and especially those of the high compression type.

Its object is to provide such an engine with a reliable, simple and easily manipulated mechanism for stopping the machine in case it acquires abnormally high speed. In engines of this type, each cylinder is supplied with liquid fuel by a pump. I provide the pump with a bypass controlled by a valve, and arrange operative connections between the valve and an emergency governor on the main shaft, so that said governor will open the bypass and stop the supply of fuel to the engine when its speed exceeds a predetermined maximum.

The preferred construction of the mechanism and its features of novelty will appear from the following detailed description taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a two-cylinder engine embodying my improvements. Fig. 2 is a perspective view of the tripping shaft and its triggers. Fig. 3 is a section of one of the fuel pumps and its by-pass. Fig. 4 is a sectional elevation of the pumps and the tripping mechanism. Fig. 5 is a top plan view of what is shown in Fig. 4. Fig. 6 shows the emergency governor and the tripping shaft and arm. Fig. 7 shows the pump-actuating mechanism in its relation to the emergency governor. Fig. 8 shows the action of the emergency governor upon the tripping arm. Fig. 9 shows the normal position of the trigger and plunger and the re-setting handle for one of the bypass valves, and Fig. 10 shows the same parts tripped.

The drawings show a high compression internal combustion engine having two cylinders, but it is evident that the number of cylinders is immaterial. Each cylinder 1 is supplied with liquid fuel through a pipe 2 connected with a pump 3, whose plunger 4 is actuated by a lever 5 fulcrumed on an eccentric 6 and oscillated by an eccentric 7 on the main shaft 8. The pump delivers through two spring check valves 9, 10 arranged in series in a casing 11. A bypass 12 leads from a point on the casing between the two valves and communicates with the chamber 13 from which the pump takes its supply of fuel. A valve 14 normally closes the bypass, being held to its seat by a spring 15 engaging a collar on its stem 16. The upper end of the stem projects above the frame 17 to which the pump is fastened. Axially in line with this valve stem is a plunger 18 mounted to move longitudinally in a guide 19. A spring 20 urges the plunger inwardly and is conveniently housed in the tubular outer portion of said plunger, with its end abutting against a screw plug 21 which closes the outer end of the guide. The plunger is normally retained in its retracted position out of contact with the valve stem 16, and with the spring 20 under compression, by means which can be released by the emergency governor. The preferred form of a releasing mechanism is that shown in the drawings, in which a trigger 22 having a hub 23 rotatable on a tripping shaft 24 engages a shoulder 25 on the plunger 18 just below the guide 19. A tension spring 26 attached to the trigger and to an element hereinafter mentioned keeps the trigger in engaging position.

The tripping shaft 24 is journaled in suitable bearings 27 in the rear of the pumps and carries a tripping arm 28 which extends into proximity to the emergency governor 29 mounted on the main shaft. This governor may be of any desired construction, but it must comprise a pivoted member 30 which will fly out when the shaft attains an abnormally high speed and strike the end of the tripping arm 28. When thus moved, the arm rocks the tripping shaft 24, and by means of somewhat loosely interlocking teeth 31 on said shaft and the hub 23 of the trigger, the latter is rocked away from the shoulder 25, thereby tripping the plunger 18 and allowing its spring to thrust it with a sudden hammer blow, against the stem 16 of the bypass valve, and thereby open the bypass.

The end of the tripping arm 28 is normally held adjacent to the emergency governor by a spring 32, but if this spring were allowed to return the arm to its normal posi-

tion after the initial blow by the weight, the arm would receive a rain of blows so long as the speed of the engine remained excessive. To prevent this, the arm 28 has a trigger 33 preferably integral therewith, and normally engaged by a shoulder 34 on a spring plunger 35, similar to the plunger 18, except that it has a handle 36 extending up through the annular screw plug 37. When the arm 28 is tripped, as shown in Fig. 8, the plunger 35 is released and drops upon a stop 38. The upper portion 39 of the plunger is of larger diameter than that below the shoulder 34 and acts as a detent for the trigger 33 which is prevented by said portion 39 from returning to its normal position, while the arm 28 is held out of the path of the revolving weight 30. To reset the arm 28, the handle is pulled up until the trigger 33 can snap in under the shoulder 34 on the plunger 35, as shown in Fig. 6.

In order to reset the plunger 18 and let the bypass valve close again, a bell crank lever 40 is fulcrumed at 41 with its short arm under the lower end of the plunger, and its longer forked arm engaging a pin 42 on a rod 43 which extends through a suitable guide 44 in the front of the casing inclosing the tripping mechanism, and is provided with a handle 45. The spring 26 is attached to the longer arm of the lever 40, and the end of the rod 43 bears against the trigger 22 or a lug 46 thereon. When the trigger is tripped, and the plunger 18 drops on the valve stem 16, its lower end lands also on the short arm of the lever 40, as seen in Fig. 10. By pulling out the rod 43 to the dotted line position in this figure the lever will lift the plunger until the trigger can snap in under the shoulder 25, as shown in Fig. 9. The rod 43 can also be used to cut out the pump when necessary, by pushing it in and thereby rocking the trigger 22 out of engagement with the plunger. The lost motion between the teeth 31 permits the trigger to be rocked without disturbing the tripping shaft 24 and the arm 28. This movement of the trigger, as stated above, trips the plunger and lets it open the bypass valve. By arranging the by-pass 12 between the two discharge valves 9 and 10, I protect the pump from the pressure of the blast air when the by-pass valve is opened, preventing such air from blowing down through the discharge pipe 2 and by-pass 12 into the pump chamber and blowing the fuel out as well as wasting the air.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass, an emergency governor driven by the engine shaft, and a plunger adapted to be tripped by said governor and open said valve.

2. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass, a plunger adapted to open said valve, a trigger holding said plunger inoperative, an emergency governor driven by the engine shaft, and operative connections between said governor and said trigger.

3. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a trigger engaging said shoulder, an emergency governor driven by the engine shaft, and operative connections between said governor and said trigger.

4. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a trigger engaging said shoulder, a tripping shaft on which said trigger is mounted, an emergency governor driven by the engine shaft, and means whereby said governor can rock said tripping shaft.

5. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a trigger engaging said shoulder, a tripping shaft on which said trigger is mounted, an emergency governor driven by the engine shaft, and means whereby said governor can rock said tripping shaft, comprising an arm on the tripping shaft and a spring urging it into the path of the governor.

6. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a trigger engaging said shoulder, a tripping shaft on which said trigger is mounted an emergency governor driven by the engine shaft, means whereby said governor can rock said tripping shaft, comprising an arm on the tripping shaft and a spring urging it into the path of the governor, and a detent for hold-

ing said arm out of said path after it has been tripped.

7. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a trigger engaging said shoulder, a tripping shaft on which said trigger is mounted, an emergency governor driven by the engine shaft, means whereby said governor can rock said tripping shaft comprising an arm on the tripping shaft and a spring urging it into the path of the governor, and a detent for holding said arm out of said path after it has been tripped comprising a trigger on the shaft, and a spring plunger engaging the same and having its upper portion of larger diameter than its lower portion.

8. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a tripping shaft, a trigger loosely mounted thereon and engaging said shoulder, loosely interlocking teeth on the shaft and trigger, a tripping arm secured to the shaft, an emergency governor for tripping said arm, and means for tripping said trigger independently of said arm.

9. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a tripping shaft, a trigger loosely mounted thereon and engaging said shoulder, loosely interlocking teeth on the shaft and trigger, a tripping arm secured to the shaft, an emergency governor for tripping said arm, and means for tripping said trigger independently of said arm, comprising a rod adapted to engage with said trigger.

10. The combination with an internal combustion engine having a fuel pump, of a bypass around said pump, a valve controlling said bypass and having a projecting stem, a spring plunger in line with said stem and having a shoulder, a tripping shaft, a trigger loosely mounted thereon and engaging with said shoulder, a bent lever engaging with the plunger, a rod for actuating said lever to reset the plunger and trigger and also for tripping the trigger by hand, and an emergency governor operatively connected wih said tripping shaft.

11. The combination with an internal combustion engine having a fuel pump, means for injecting fuel into the engine, and a conduit connecting the delivery side of the pump to said means, of two check valves arranged in series in said conduit, and a by-pass communicating with said conduit at a point between said check valves.

12. The combination of an internal combustion engine, a fuel pump therefor, means forming a by-pass connecting the discharge side of the pump to a region of lower pressure, a valve controlling said by-pass, a spring for normally holding said valve closed, means for opening the valve against the action of said spring, a trigger for holding said last named means in inoperative position, and an emergency governor driven by the engine for tripping said trigger.

13. The combination of an internal combustion engine, a fuel pump therefor having a plurality of discharge valves arranged in series, means forming a by-pass which extends from between said valves to a region of lower pressure, a normally closed valve for controlling said by-pass, detent controlling means for effecting the opening of said last named valve, means for tripping said detent, and means for resetting the valve and detent.

In witness whereof, I have hereunto set my hand this 22nd day of July, 1914.

WILLIAM EVERETT VER PLANCK.

Witnesses:
OTTO F. PERSSON,
O. T. FOUCHE.