J. GOOD.

CONTROL MECHANISM.

APPLICATION FILED JUNE 2, 1914.

1,170,747. Patented Feb. 8, 1916.

Fig. 1.

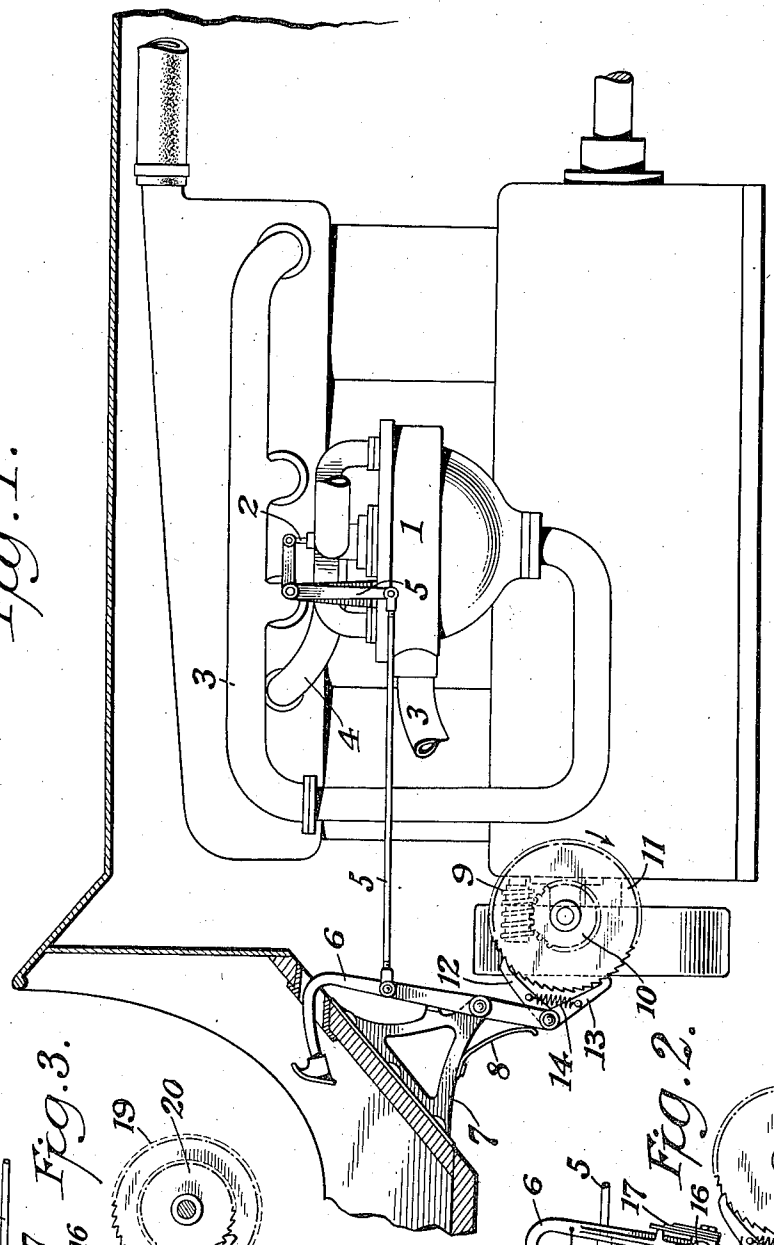


Fig. 3.

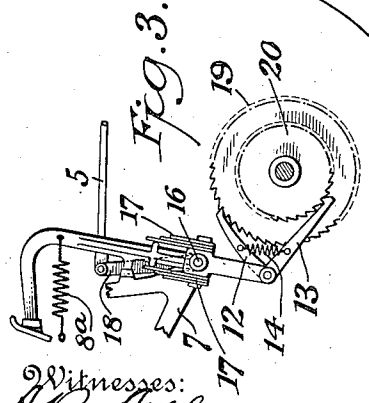
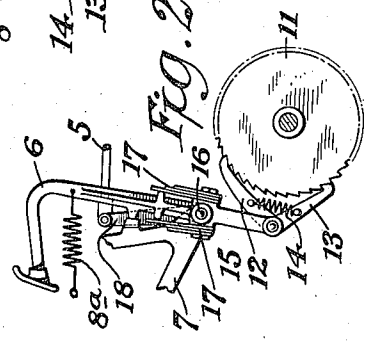


Fig. 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

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CONTROL MECHANISM.

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To all whom it may concern:

Be it known that I, JOHN GOOD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented the following described Improvements in Control Mechanism.

The invention is a means for restricting the manipulation of the regulating or controlling members of combustion engines or other apparatus, in a certain relation to the speed of the engine or mechanism controlled, and is applicable to the throttle lever of internal combustion engines as a means of preventing too rapid variations of the fuel supply and injuriously sudden changes of the engine speed resulting therefrom.

More especially the invention is useful in internal combustion engines using kerosene or other heavy fuels, for in these engines particularly abrupt changes in the throttle control are likely to foul the interior of the cylinders with carbon deposits. Such misuse of internal combustion engines is prevented according to this invention by constraining the operation of the controlling or regulating member, be it a hand-lever or a pedal, so that it can be operated with no greater degree of suddenness than the operation of the engine at the moment will safely accommodate, and to this end the invention comprises the combination of instrumentalities hereinafter described and more particularly pointed out in the appended claims.

The drawings forming part hereof illustrate a prefered form and two modifications thereof, as follows: Figure 1 is a side elevation, partly in diagram, of an automobile engine with the invention applied thereto. Fig. 2 is a modification of the same form of invention but having a flexible joint incorporated in the control train; and Fig. 3, a further modification in which the manipulation of the control member is restrained differently in its different directions of movement.

The engine shown in outline in Fig. 1, is provided with a carbureter or vaporizer 1, which contains in its interior a throttle device, the stem or operating member of which is marked 2. The carbureter may be assumed to be any suitable vaporizer or fuel and air mixer for internal combustion engines. In the present case it is illustrated as being heated by the exhaust gases passing through pipe connections 3 and as delivering vaporized fuel through a pipe 4, to the interior of the engine. Adjustment of the part 2, through a bell-crank and connecting rod 5, will vary the amount of fuel supplied to the engine and therefore control the speed of the engine. The connecting rod 5 is adapted to be operated by a control member 6, which in the present case is illustrated as a foot pedal fulcrumed on a bracket 7, and urged to its normal position by means of a spring 8. In this normal position the throttle member 2 may be assumed to be in its closed position so that pressure on the pedal will tend to open the throttle and thereby increase the speed of the engine. The engine cam shaft, or any other shaft geared to and driven by the crank shaft of the engine, is provided with a worm 9, which drives a worm wheel 10, and an attached ratchet wheel 11, in the direction indicated by the arrow. The end of the control member 5, below its fulcrum on the bracket 7, is provided with two pawls, marked 12 and 13, respectively, the former being a push-pawl engaging the upper side of the ratchet wheel, and the latter being a pull-pawl engaging the opposite side of the ratchet wheel and held thereto by means of a spring 14, which spring may be conveniently connected to both pawls so as to urge them both toward the ratchet wheel. The ratchet teeth are faced backward to their direction of movement, so that while the engine is in operation the wheel will ride freely under both pawls. Operation of the control member or pedal 6, in the direction to open the throttle will cause the pull pawl 13 to engage one of the teeth on the lower side of the ratchet wheel and thereby the movement of the pedal will be constrained to take place no faster than the circumferential movement of the wheel will permit.

The worm and worm wheel represent a reduction gearing producing a circumferential velocity of the ratchet wheel predetermined with relation to the design of the engine, so that the maximum rapidity of movement of the pedal and through it of the throttle, can be no greater than the engine running at that particular speed is safely adapted to accommodate. With the

engine running at high speed, the circumferential velocity of the rachet wheel may be so great that no appreciable obstruction is offered to an immediate full throw of the pedal, but when the engine speed is lower, the throttle can only be opened gradually and as permitted by the ratchet wheel. In like manner, the push-pawl 12 is adapted to be obstructed by the ratchet teeth on the opposite side of the wheel, so that the main spring 8 can restore the throttle to its closed position only as rapidly as the then velocity of the ratchet wheel will permit and as will be evident without further description.

In order that the scope of my invention may be clearly understood I may explain that the ratchet wheel 11 above referred to may be driven by or in proportion to the engine or machine controlled, by means of any suitable gearing, but is preferably driven by or from the cam shaft of the engine, as above described. The pawls 12 and 13 represent clutch devices adapted to clutch upon and be restrained by the motion of the part driven by the engine, when attempted to be moved more rapidly than the said engine-driven part is moving at the time. Very obviously other types of clutch devices can be substituted for the pawl and ratchet mechanism I have illustrated herein and numerous known substitutes for such parts will be immediately recognized by the skilled mechanic as capable of substitution therefore. The pawl and ratchet design taken for illustration is perhaps the simplest and most economic of production but has the objection that it is likely to be noisy. The use of fiber faces for the ratchet teeth and pawls may be resorted to for reducing the noise. Other forms of clutch devices can be used to eliminate all noise whatever but probably at increased expense of manufacture. It will be observed that according as the manipulation of the control member 6 is desired to be restrained in one direction or the other, one or the other of such clutch devices 12 and 13, may be omitted.

In the developed form of Fig. 2, the construction is the same as in Fig. 1, excepting that the control member is formed of two parts, a pedal part 6 and a lever part 15, both journaled on the stud shaft 16, the one imparting motion to the other through a pair of laminated springs 17. The lever part 15 is connected with the clutch devices 12 and 13, as described in Fig. 1, and connected with the connecting rod 5, by means of a lever arm 18. A spring 8^a applied to the part 6 serves to hold the throttle normally in a closed position as before. The spring joint between the two parts of the control member, serves to conceal the restraining effect of the clutch device so that the operator may operate his pedal 6 with such degree of abruptness as may be customary with him but without effecting unduly abrupt changes of the throttle adjustment.

The form illustrated by Fig. 3 is intended to be illustrative of the fact that the two clutch devices 12 and 13 may be arranged to impose different limits of rapidity to the manipulation of the control member in opposite directions. For this purpose, one clutch device, for instance, the pawl 12, may engage an engine driven part 19 of relatively large diameter, while the other clutch device may coöperate with an engine driven part 20 of relatively smaller diameter, thus imposing a lower limit of rapidity to the opening of the throttle and a higher limit for the return or closing thereof.

I claim:

1. A controlling device comprising in combination with a machine controlled, a part moved by or proportionately to the velocity of such machine, a regulating member and means connecting the same with said moving part whereby the latter limits the rapidity of operation of said member.

2. A controlling device comprising in combination with the throttle of an internal combustion engine, a throttle-controlling member and an engine driven part limiting the rapidity of operation of such member in proportion to its own velocity.

3. The combination in an internal combustion engine having a throttle and a throttle-controlling member manipulated by the operator, of means whereby the speed of the engine limits the rapidity with which said member may be moved.

4. A controlling device comprising in combination with a machine controlled, a part geared to such machine, a controlling member and a clutch device between the same and said part.

5. A controlling device comprising in combination with the machine controlled, a part geared to rotate with or by said machine, a clutch device coöperating with said rotary part, a control member and a yielding connection between the same and the clutch device.

6. A controlling device comprising in combination with a machine controlled, having a rotary part geared therewith, two devices adapted to clutch upon said part when moved respectively in opposite directions, and a control member restrained in its movement by connection with said devices.

7. The combination in an internal combustion engine having a throttle, a member for controlling the throttle, which is manipulated by the operator, and means whereby the rapidity of operation of such member in both directions of its operation are restrained in proportion to the speed of the engine.

8. The combination in an internal com-

bustion engine, of a rotary part driven thereby, a clutch device coöperating with such part, a speed-controlling lever for the engine connected to the clutch device, whereby the latter clutches upon the rotary part when moved in the direction to increase the speed of the engine, and a spring for restoring the lever.

In testimony whereof, I have signed this specification in the presence of two witnesses.

JOHN GOOD.

Witnesses:
G. A. TAYLOR,
M. H. VRANT.