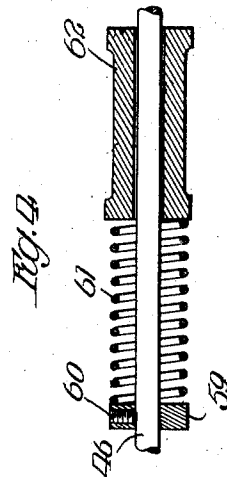
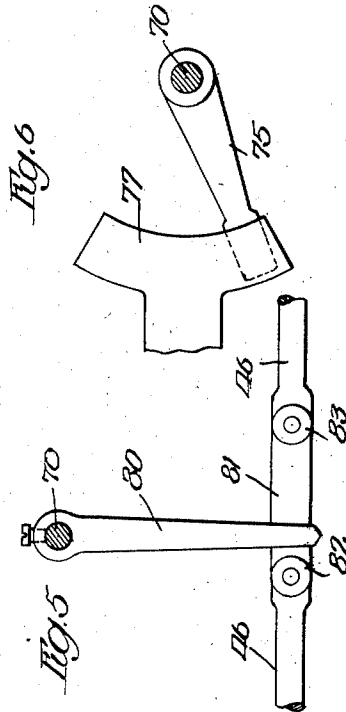
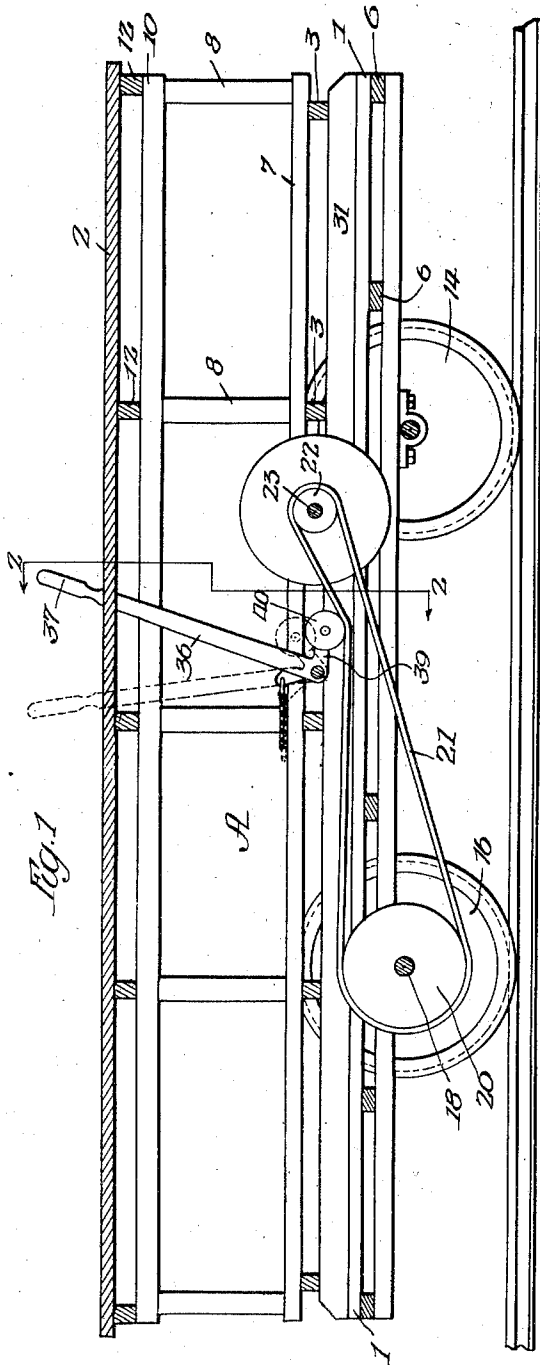


F. H. DE BRUN.
AUTOMATIC ENGINE CONTROL.
APPLICATION FILED AUG. 7, 1919.

1,367,306.

Patented Feb. 1, 1921.

4 SHEETS—SHEET 1.



Inventor
Frank H. De Brun

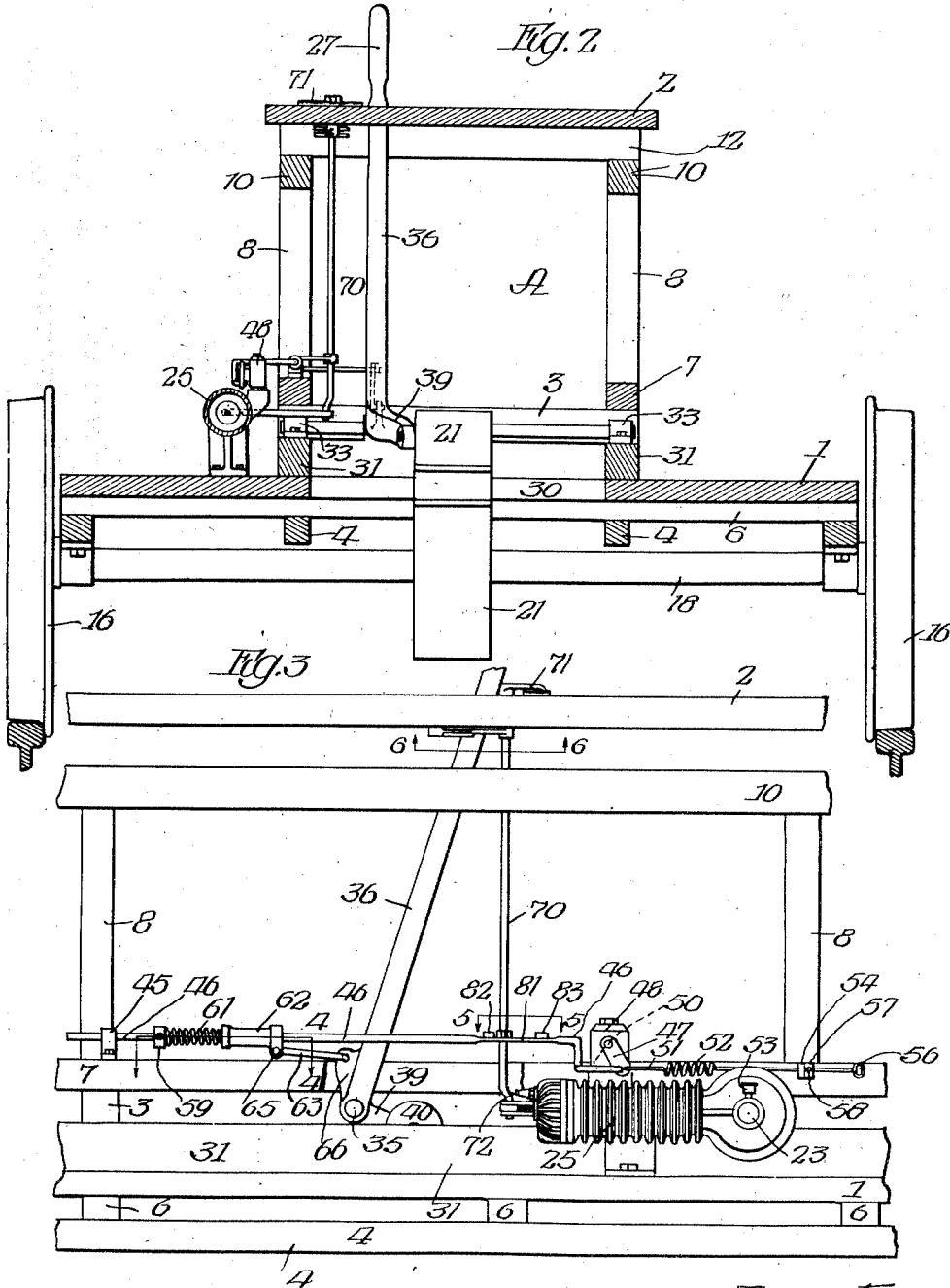
By *W. H. Brown* Atty.

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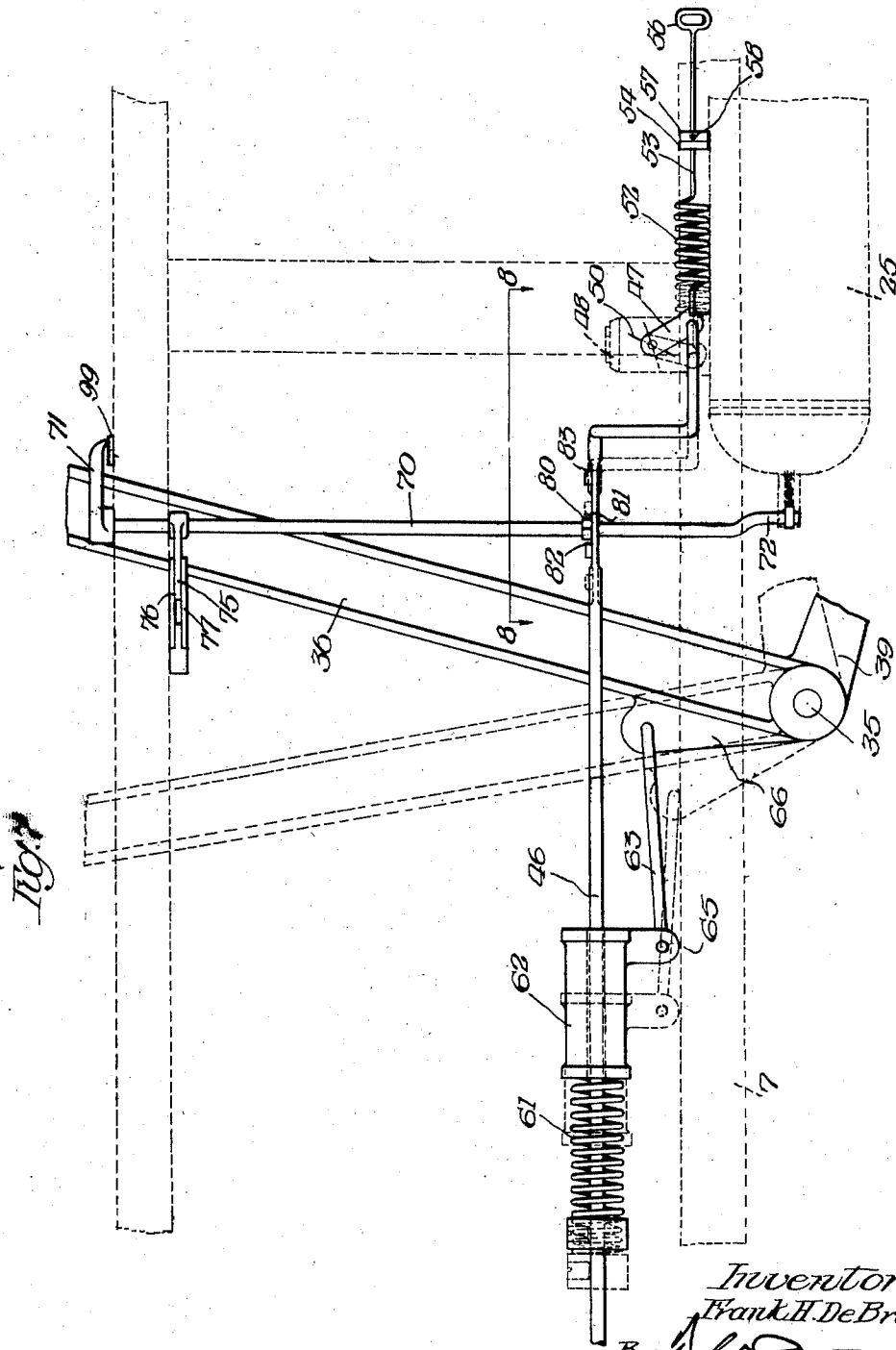
Inventor
Frank H. De Brun
Taylor & Brown Attys.

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4 SHEETS—SHEET 3.



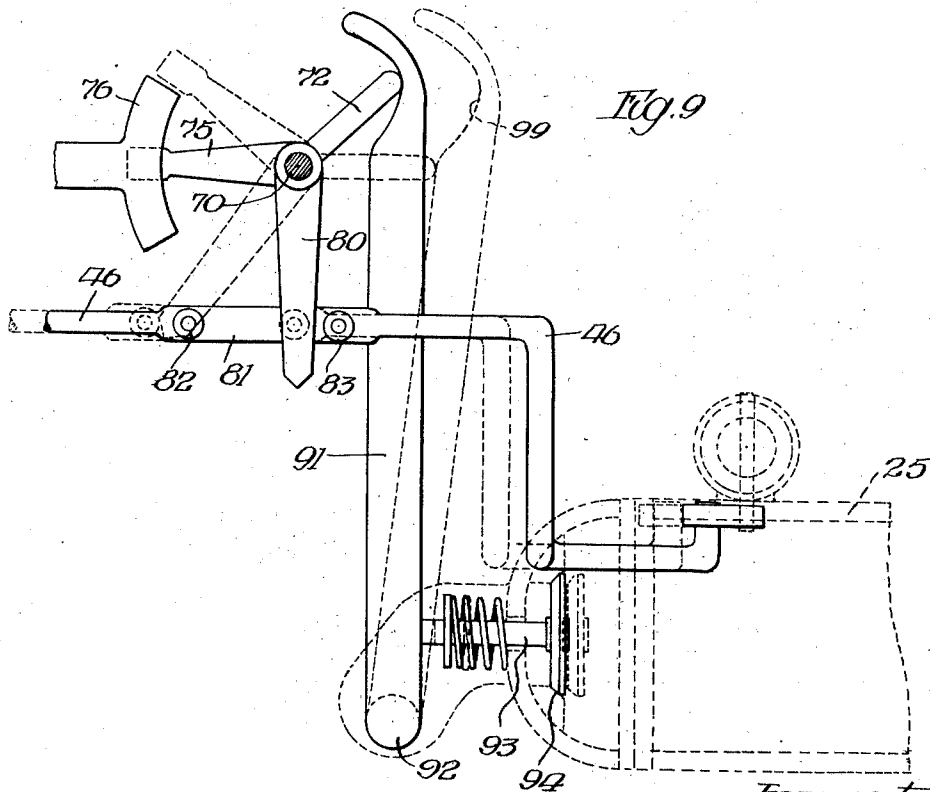
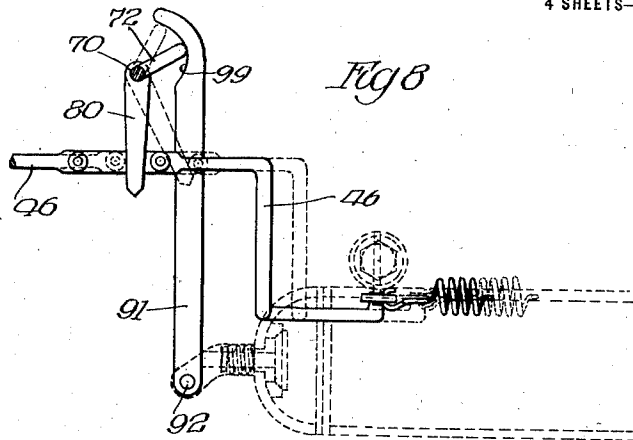
Inventor
 Frank H. De Brun
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 Atty.

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4 SHEETS—SHEET 4.



Inventor
Frank H. De Brun
By *Wm. L. Brown* Attorney

UNITED STATES PATENT OFFICE.

FRANK H. DE BRUN, OF CHICAGO, ILLINOIS, ASSIGNOR TO MUDGE & COMPANY, OF CHICAGO, ILLINOIS. A CORPORATION OF ILLINOIS.

AUTOMATIC ENGINE CONTROL.

1,367,306.

Specification of Letters Patent.

Patented Feb. 1, 1921.

Application filed August 7, 1919. Serial No. 315,805.

To all whom it may concern:

Be it known that I, FRANK H. DE BRUN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Engine Controls; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in automatic engine controls and more particularly to a device adapted to be used with an internal combustion engine for automatically closing the throttle to an idling position when the load is removed, thus preventing it from racing, and for again opening the throttle when the load is restored. Another feature of my invention is a construction which will permit the adjustment of the throttle by a separate throttle control independently of the operation of such automatic device, such separate throttle control also operating a coasting valve. My improved control is also so arranged that when the load is off and the throttle consequently has been automatically closed to an idling position, the throttle may, nevertheless, be opened independently by separate means for the purpose of starting the engine. The above referred to features of my invention and others will be more clearly explained as I proceed with my specification.

Although I have shown a device adapted for use on a railway vehicle, where the power is transmitted from the engine to the driving wheels by means of a belt and where the load is put on by tightening the belt by means of an idler wheel and taken off by loosening the belt and allowing it to slip on the engine pulley, it is obvious that, without departing from the spirit of my invention, the features thereof with but slight modifications or adaptations may be used on any other kind of vehicle or, in fact, in connection with any internal combustion engine where the load is thrown off and on and it is desirable or advisable to keep the engine running continuously. It is obvious also that my invention may be used in connection with any other means, than those shown, for removing or restoring the load. For example, on any vehicle where the load is put on by throwing

in a clutch, the lever or other device for operating such clutch may be connected with my improved automatic engine control mechanism in the same way as the lever, shown in this specification, which operates the idler wheel.

It is obvious that without detracting from the spirit of the invention, the features thereof may be adapted for use in connection with an engine with two or more cylinders by means of simple modifications, adaptations and duplication of parts.

In that form of a device embodying the features of my invention shown in the accompanying drawings:

Figure 1 is a longitudinal vertical sectional view of a small railway vehicle driven by an internal combustion engine, with my improved engine control attached.

Fig. 2 is a transverse vertical sectional view on the line 2—2 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 3 is a fragmentary view in side elevation showing the engine control mechanism.

Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 3, looking in the direction indicated by the arrows.

Fig. 5 is a horizontal sectional view on the line 5—5 of Fig. 3 looking in the direction indicated by the arrows.

Fig. 6 is a horizontal sectional view on the line 6—6 of Fig. 3 looking in the direction indicated by the arrows.

Fig. 7 is a diagrammatic view in side elevation showing the arrangement and operation of my improved engine control.

Fig. 8 is a fragmentary diagrammatic plan view showing the arrangement and operation of my improved engine control.

Fig. 9 is a fragmentary diagrammatic plan view showing the arrangement and operation of my improved engine control.

As shown in said drawings, A indicates a small railway vehicle consisting of the floor 1 supported by the longitudinal joists 4, 4, and cross beams 6, 6. The floor 1 is provided at its center with a long rectangular opening 30 on each side of which is mounted a longitudinal beam 31 extending the entire length of the vehicle. The beams 31, 31 support the cross members 3, 3, which in turn carry the longitudinal beams 7, 7, which support the uprights 8, 8, on the upper ends of which are carried the longi-

itudinal beams 10, 10, which in turn support the cross members 12, 12, which carry the raised seat 2. The raised seat 2 is slightly larger in area than the opening 30 and is placed directly above such opening.

The vehicle is supported by two pairs of wheels 14, 14, and 16, 16, respectively, each pair of wheels being rigidly joined by a solid axle. The axle joining the pair of wheels 16, 16, which constitute the driving wheels is indicated by 18; and has mounted upon it the belt pulley 20 adapted to be driven by the belt 21 from the driving pulley 22 which is mounted on the shaft 23 of an internal combustion engine. As shown in the drawings, the shaft 23 is turned by a single cylinder internal combustion engine 25 mounted on the floor 1 of the vehicle at one side of the opening 30. The engine shaft 23 lies above and across the opening 30, and the pulley 22 is mounted near the center. The pulley 20 is mounted at the center of the axle 18. The belt 21 extends through the opening 30.

Rotatably mounted in bearing blocks 33, 33, on the beams 31, 31, and lying transversely above the opening 30 of the floor 1 of the vehicle is the shaft 35 which is adapted to be operated by the lever 36 extending upwardly through a slot in the seat 2 and terminating in the handle 37. The end of the lever 36 attached to the shaft 35 has a short extension 39 at right angles carrying rotatably mounted at its end the idler wheel 40 which lies above the belt 21. The lever 36 and idler wheel 40 are so mounted and the belt 21 is of such length, that when the lever 36 is moved to the right (as viewed in Fig. 1) to the position shown by the solid lines in Fig. 1, the idler wheel 40 will take up the slack in the belt 21 causing the power to be transmitted from the engine wheel 22 to the pulley wheel 20 on the axle 18. When the lever 36 is moved to the left, to the position shown in dotted lines in Fig. 1, the belt 21 will be so slack that the pulley 22 will slip on the belt allowing the engine to run practically freely, or without load.

It is obvious that when the lever 36 is moved to lift the idler wheel 40 from the belt 21, permitting the engine to run without load, the engine will race unless means are provided for closing the throttle. I have provided such means which I will describe as follows: Slidably mounted in the bearing member 45 fastened to the beam 7, at the side of the opening 30 adjacent the engine, is the rod 46 which extends from the bearing member 45 to a point near the engine 25, and is there provided with a short outwardly extending offset, thence bent downwardly for a short distance, and then continued in a direction parallel to the original direction, and joined at its end

to the end of the arm 47 which controls the throttle valve 50 in the carbureter 48. Extending in an opposite direction from the end of the arm 47 is a short rod 51 attached to the end of the spiral spring 52, the other end of such spring being attached to the rod 53 which extends through the eye 54 mounted on the side of the beam 7, terminating in the handle 56. Mounted on the rod 53 on the outside of the eye 54, and normally in engagement with it, is the collar 57 fastened by the set screw 58. Mounted on the rod 46 near the bearing member 45 is a similar collar 59, lying next to it on the side away from the bearing member 45 is the spiral spring 61, and next to it the sliding collar 62, the end of such collar having attached to it the connecting rod 63 with its two ends bent oppositely at right angles, one pivotally mounted in the end of the collar 62 at 65, and the other end pivotally mounted in the extension 66 at the bottom end of the lever 36.

In the operation of the device, movement of the lever 36 to the position shown in solid lines in Figs. 1 and 7, tightening the belt and putting the load on the engine, operates through the connecting rod 63, to move the collar 62 to the right, permitting the spring 52 to contract and move the arm 47 to the right, thus opening the throttle valve 50 in such carbureter. The parts are shown in this position in Fig. 3, and also diagrammatically in Fig. 7, by the solid lines. When the lever 36 is moved to the position shown by the dotted lines in Figs. 1 and 7, that is, with the idler pulley 40 removed from the belt 21 and the load off of the engine, such movement of the lever 36 operates through the connecting rod 63 to move the collar 62 to the left (shown in dotted lines in Fig. 7) thus compressing the spring 61 which bears against the collar 59, moving the rod 46 to the left. This rod 46 in turn operates to move the arm 47 to the left, thus closing the throttle valve 50 to an idling position, and preventing the engine from racing. When this movement takes place, the spiral spring 61 is compressed and the spiral spring 52 extended. The strengths of the springs 61 and 52 are so adjusted by means of the collars 59 and 57 respectively, that such movement of the lever 36 to the extreme left as viewed in Figs. 1 and 7, that is, to the position shown by the dotted lines in such figures, will move the rod 46 sufficiently to close the throttle valve 50 to such an extent as to allow the motor to idle at minimum speed. The parts are diagrammatically shown in this position by the dotted lines in Fig. 7.

The engine is also provided with an independent throttle control which may be operated independently of the automatic device above described. The construction and op-

eration of this is as follows: The rotatably mounted vertical shaft 70 extends from a point near the cylinder head of the engine, up through the seat 2, and terminates in the operating handle 71. The lower end of the shaft 70 is provided with a short offset or crank 72 which is adapted to bear against the lever 91 pivoted at 92, and adapted to bear against the stem 93 of the coasting valve 94 arranged in the head of the engine cylinder. These parts are so arranged that rotation of the shaft 70 by means of the handle 71 will turn the crank 72 to open the coasting valve 94 allowing the piston to reciprocate freely in the engine cylinder for the purpose of coasting. The shaft 70 is also provided near its upper end with a horizontally extending lever 75 adapted to operate between the two fanshaped contact plates 76 and 77 which lie in the circuit furnishing ignition to the engine. When the lever 75 is in contact with both of the plates 76 and 77, the ignition circuit is complete and a spark is furnished to the engine.

Near the lower end of the shaft 70 is another horizontally extending short arm 80, the end of which normally lies just above the center of a short flattened place 81 on the rod 46 at each end of which plate an antifriction roller is provided. The roller to the side of the arm 80 away from the carbureter is indicated by 82 and the other by 83. The distance between the antifriction rollers 82 and 83 is sufficient to allow the movement of the rod 46 above described, from the position shown in solid lines to that shown in dotted lines in Fig. 7, when the independent throttle control shaft 70 is in its neutral position as shown in solid lines in Figs. 8 and 9, the arm 80 lying at right angles to said rod 46.

The rod 70, the short arms 75 and 80, and the crank 72 are so arranged that when the rod 70 is rotated in the direction of the closed position, shown by dotted lines in Fig. 9, the crank 72 will open the coasting valve 94 in the head of the engine cylinder, and, at the same time, the arm 80 will bear against the antifriction roller 82 moving the rod 46 to the left, consequently closing the throttle valve 50. It will be noted that this control of the throttle is independent of the control through the lever 36. When the parts are in such position, that is, as shown by the dotted line in Fig. 9, the rod 46 is at the extreme limit of its movement. When in such position, it is slightly farther to the left (as viewed in Fig. 7) than when in the position shown by the dotted lines in Fig. 7, and the throttle valve 50 is completely closed, permitting the engine to coast without wasting fuel. The fan shaped contact plates 76 and 77 are so arranged that the arm 75 extending from the rod 70 will

make contact with both of these plates, thus completing the ignition circuit in all of its positions, except when the operating handle 71 and the rod 70 are turned to this extreme closed position, that is, the position as shown by the dotted lines in Fig. 9. When in this latter position, the arm 75 is not in contact with either of the plates 76 and 77.

The rod 70, the arm 80, and the antifriction rollers 83 are also, so arranged that rotation of the rod 70 to the limit in the opposite direction, that is, to its open position, will cause engagement between the arm 80 and the antifriction roller 83 moving the rod 46 to the right (as viewed in Fig. 7). When in this position, the parts are located as shown by the dotted lines in Fig. 8, the throttle valve 50 is wide open and the coasting valve 94 is closed. It will be noted that rotation of the rod 70 toward its closed position will first operate to swing the arm 72 into the recessed part 99 on the lever 91 allowing the coasting valve 94 to close, before the arm 80, operating through the rod 46, will open the throttle valve 50 to its full extent. Further rotation of the rod 70 will operate to open the throttle valve 50 until the extreme open position is reached, with the parts positioned as shown by the dotted lines in Fig. 8 and the throttle wide open.

When the belt is loose and the lever 36 is in the position shown by the dotted lines in Fig. 1, with the rod 46 moved to the left (as viewed in Fig. 7) and the throttle is closed to such an extent as to allow the engine to idle at minimum speed, the throttle may also be opened by pulling on the handle 56 at the end of the rod 53. This will operate to move the rod 46 to the right, as viewed in Fig. 7. The spring 61 is of sufficient length and has sufficient compressibility to permit such movement.

Full movement of the rod 46 by means of the collar 62 operated by the lever 36, or by means of the handle 56, is permitted regardless of the position of the independent throttle control rod 70. This rod is frictionally held in any desired position by means of a spring engagement between the end of the handle 71 and the roughened segment 99. If the rod 70 is not in its neutral position when the rod 46 is moved, either by means of the collar 62 or handle 56, so that engagement is caused between either of the antifriction rollers 82 or 83, and the end of the arm 80, such engagement will be sufficient to move the arm 80 and turn the rod 70, causing the handle 71 to slip on the roughened segment 99.

The parts are so adjusted that when the independent throttle control rod 70 is in its neutral position as shown by the solid lines in Fig. 9, with the arm 80 lying at right angles to the rod 46, and the lever 36 in the

position shown by the solid lines in Figs. 1 and 7, with the belt tight and the load on the engine, the spring 52 will be slightly extended and will operate to hold the arm 47 to the right (as viewed in Fig. 7), thus holding the throttle open, and the collar 62 will lie against the spring 61 without compressing it. The parts will then be in the positions shown by the solid lines in Fig. 7.

10 The spring 61 is sufficiently stiff and the spring 52 sufficiently flexible so that movement of the lever 36 to the position shown by the dotted lines in Fig. 7, with the load off of the engine, will operate to move the rod 46 to the position shown by the dotted lines in Fig. 7, closing the throttle to such an extent as to allow the engine to idle at minimum speed.

The springs 61 and 52 also have sufficient length and flexibility to permit full movement of the rod 46 by means of the throttle control rod 70 operating through the arm 80 against the antifriction rollers 82 and 83, regardless of the positions of the collar 62.

25 That is, the rod 46 may be moved by the handle 71 and rod 70 to the position shown by the dotted lines in Fig. 9 or to the position shown by the dotted lines in Fig. 8, thus entirely closing the throttle or fully opening it, regardless of whether the belt is tight or loose and the load on or off.

The springs 52 and 61 also have such length and elasticity that pulling on the handle 56 will always operate to open the throttle regardless of the position of the collar 62.

I claim as my invention:

1. In an engine control mechanism, a combination of means for simultaneously controlling the load of the engine and the engine throttle, a coasting valve, and independent means for simultaneously controlling the throttle and said coasting valve.

2. In an engine control mechanism, a lever adapted to control the load of the engine, means for simultaneously controlling the load of the engine and the engine throttle, said means comprising a reciprocating rod attached to the throttle and yieldingly connected to said lever, antifriction elements carried by said rod, and means for independently reciprocating said rod, said means comprising a rotatable shaft provided with a projecting arm adapted to engage said antifriction elements.

3. In an engine control mechanism, a coaster valve, a lever adapted to control the

load of the engine, means for simultaneously controlling the load of the engine and the engine throttle, said means comprising a reciprocating rod attached to the throttle and yieldingly connected to said lever, and means for simultaneously controlling the throttle and said coaster valve.

4. In an engine control, a coaster valve, an arm connected thereto, a lever adapted to control the load of the engine, a reciprocating rod adapted to simultaneously control the load of the engine and the throttle thereof, and provided with antifriction elements, said rod being attached to said throttle and yieldingly connected to said lever, and independent means for simultaneously controlling said throttle and said coaster valve, comprising a rotatable shaft provided with a projecting arm adapted to engage said antifriction elements and the arm connected to said valve.

5. A control mechanism for an engine provided with an ignition circuit and a coaster valve, comprising a lever adapted to control the load of the engine, a reciprocating rod attached to the throttle and yieldingly connected to said lever, and adapted to simultaneously control the load of the engine and the throttle thereof, and independent means for simultaneously controlling the throttle, the ignition elements and the coaster valve.

6. A control mechanism for engines having an ignition circuit, an arm adapted to make and break said circuit, and a coaster valve provided with a connected arm comprising a lever adapted to control the load of the engine, a reciprocating rod carrying antifriction elements and attached to the engine throttle and yieldingly connected to said lever, and independent means for simultaneously controlling the throttle, the ignition circuit and the coaster valve, said means comprising a rotatable shaft provided with an arm adapted to engage said antifriction elements, and to also engage the arm on the coaster valve and the arm adapted to make and break said ignition circuit.

In testimony, that I, claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of August A. D. 1919.

FRANK H. DE BRUN.

Witnesses:

TAYLOR E. BROWN,
B. L. MACGREGOR.