Aug. 4, 1942. M. B. RHODES 2,292,091

CONTROL LEVERS

Filed March 19, 1941 2 Sheets-Sheet 1

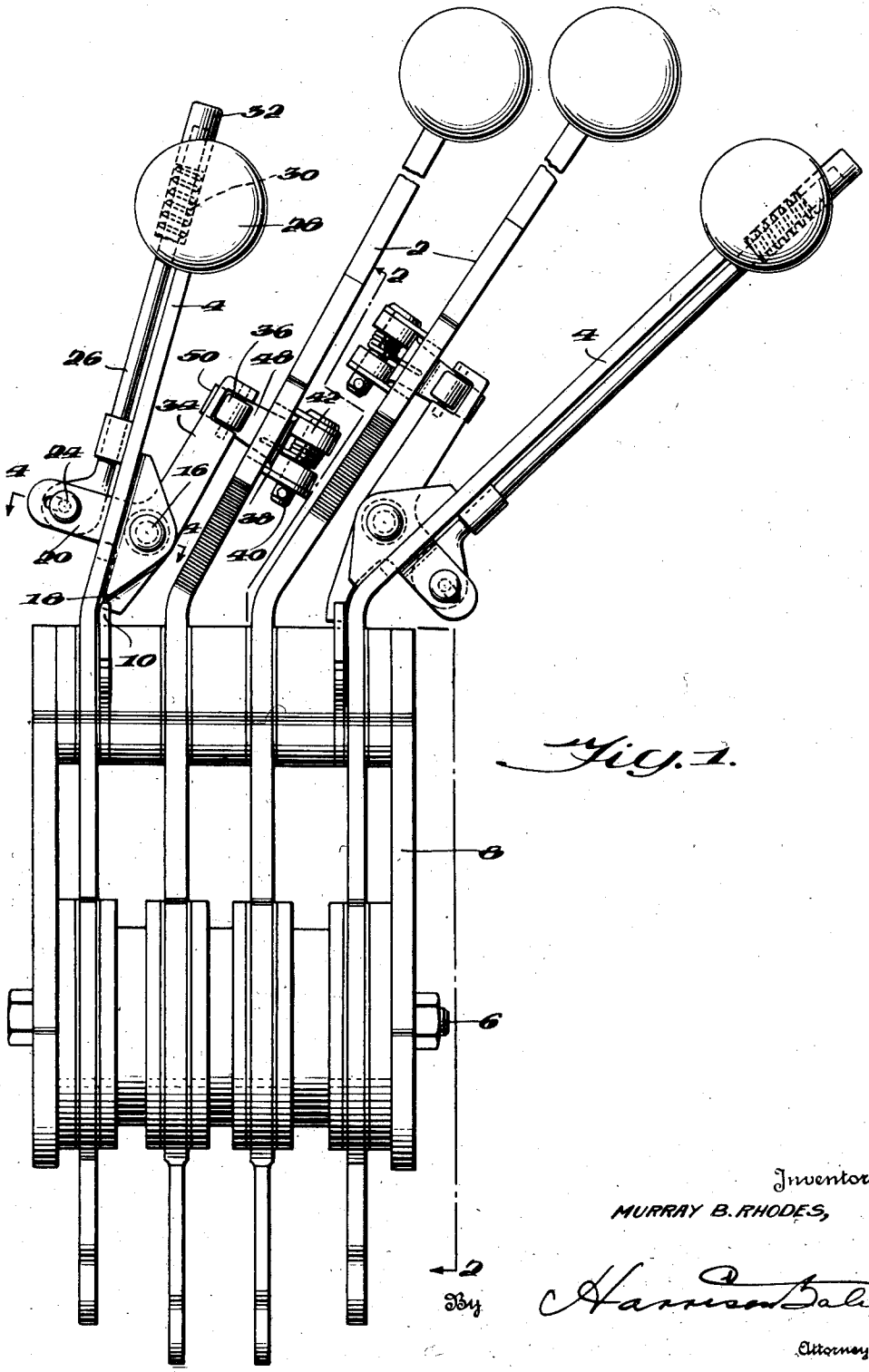


Fig. 1.

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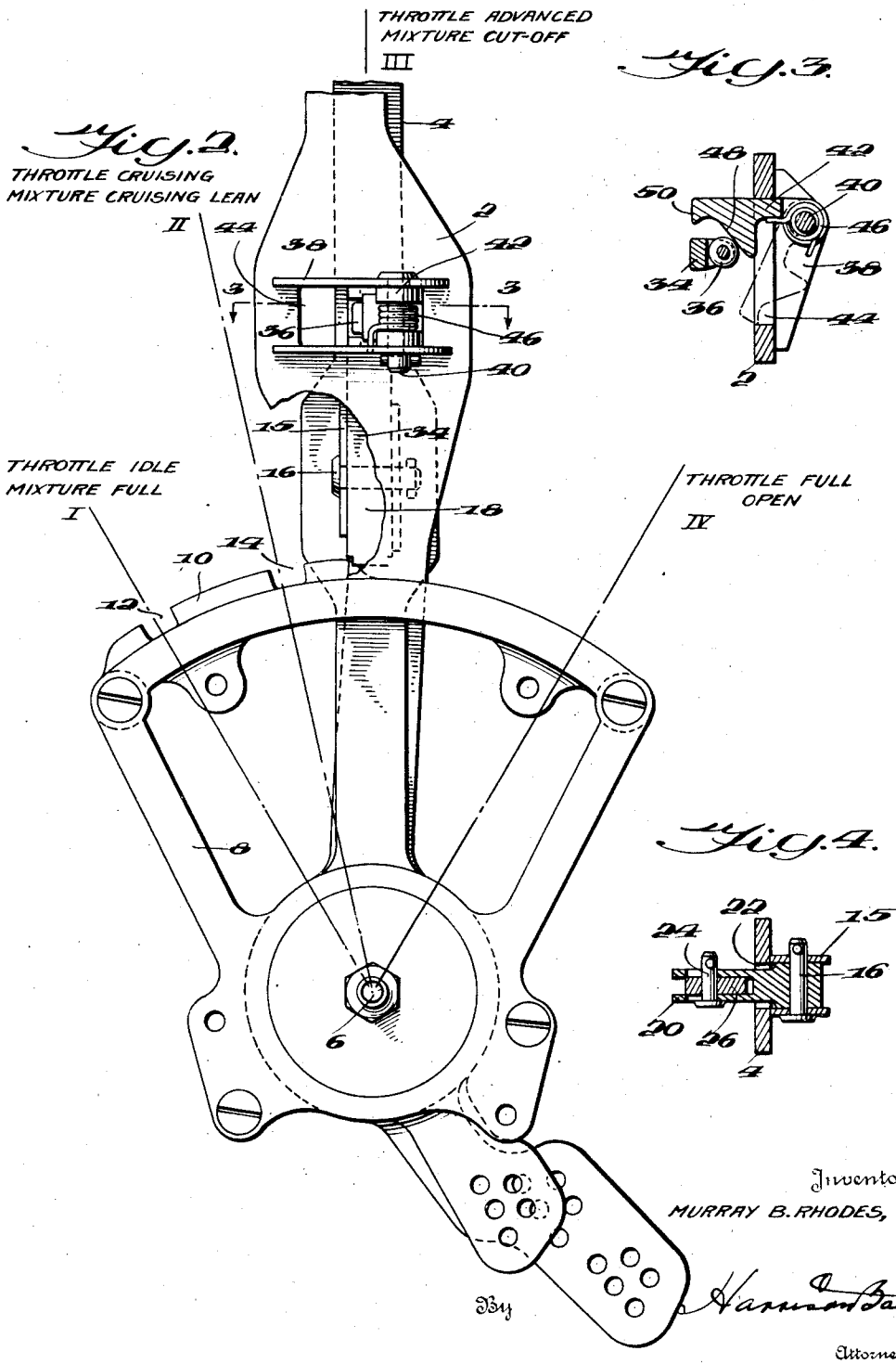


Fig. 3.

Fig. 4.

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CONTROL LEVERS

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17 Claims. (Cl. 123—98)

The invention relates to control levers, and especially to control levers for regulating the quantity and quality of the mixture of fuel and air fed to an internal combustion engine.

In the operation of engines, levers are often provided for controlling the quantity of fuel to the engine, usually called throttle levers, and for regulating the richness of the fuel mixture, called mixture levers. The throttle lever is operated frequently, while the mixture lever is only used at special times. However, when the throttle is moved suddenly from idling position to open position, or from open position to idling position, with a normal mixture, it may cause stalling of the engine. Therefore it is recognized that the operator should move the mixture lever to rich position at such times. If, as often happens, the operator forgets to do this, the engine is likely to stall.

On the other hand, the mixture should not be made leaner as the throttle is opened, since in starting and at periods of quick acceleration a richer mixture may be necessary. Therefore it is not satisfactory to combine the two levers into a single control.

The primary object of the present invention is to provide a mechanism which overcomes the above disadvantages and which automatically enriches the mixture whenever the throttle lever is moved to idling position.

Another object of the invention is to provide a device of this character in which the throttle lever may be moved through a large part of its range of movement without affecting the mixture lever, and in which advance of the throttle lever to increase the speed does not affect the mixture lever.

Still a further object of the invention, particularly for aircraft engines, is to permit operation of the throttle at and above the cruising speed while leaving the mixture constant at its cruising value or at some richer setting.

An additional object of the invention is to permit, upon proper deliberate operation, the throttle lever to be moved towards idling without affecting the mixture lever.

A further object of the invention is to provide a novel interconnecting and latching means for two levers.

Further objects and advantages of the invention will appear more fully from the following description particularly when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

Fig. 1 shows in front elevation a set of levers embodying the invention;

Fig. 2 is a side view on the line 2—2 of Fig. 1;

Fig. 3 is a cross section on the line 3—3 of Fig. 2; and

Fig. 4 is a cross section on the line 4—4 of Fig. 1.

The invention as shown is applied to two sets of levers. These are two throttle levers 2 and two mixture levers 4 all mounted to turn about a common axis 6 in a segmental frame 8. This frame carries at one side of each of the mixture levers 4 an arcuate strip 10 provided with notches 12, for full rich, and 14, for cruising lean, positions of the levers 4.

The mixture lever 4 is provided, on the side thereof adjacent the strip 10, with longitudinally extending parallel ears 15. A three armed lever is pivoted at 16 between these ears. One arm 18 of the lever extends downward and is engageable in notches 12, 14. A second arm 20 extends through an opening 22 in the lever and is connected at 24, by a pin and slot, with a rod 26 slidably mounted in head 28 of the lever 4. A coil spring 30 normally urges rod 26 upward, to hold lever arm 18 in the notches; but such lever arm can be moved out of the notches either by pushing on head 32 of rod 26 or in the manner to be described below.

The third arm 34 of the lever extends upward and carries a roller 36 opposite the throttle lever 2.

The throttle lever 2, on the side away from the mixture lever, has a pair of transverse parallel ears 38. Between these ears is pivoted at 40 a lever 42 which is movable through an opening 44 in lever 2. A coil spring 46 normally urges lever 42 to project through this opening, to the full line position, Fig. 3. Lever 42 has a cam surface 48 and a hooked end 50.

The operation of this mechanism is as follows:

During normal operation, the mixture lever is set at position II, Fig. 2, which represents the normal relatively lean mixture for cruising speeds, while the throttle moves between this position and position IV. In this position of the mixture lever, arm 18 engages in notch 14 and is held stationary thereby. If now the throttle is moved towards position I, for idling, lever 42 during such movement will be extended (Fig. 3) and will engage roller 36 with its cam surface 48. This will tilt lever arm 34 counterclockwise (Fig. 1) and will disengage arm 18 from notch 14. Hook 50 of lever 42 will then pull roller 36 and lever arm 34, and with them mixture lever 4,

to the left, Fig. 2, into position I. Now, when throttle lever 2 is released, lever arm 18 will engage in notch 12 and will lock the mixture lever in full rich position, so as to prevent stalling of the engine.

When, from position I, throttle lever 2 is moved to the right, it does not affect lever 4 because of the one-way connection between lever 42 and roller 26. Thus, when the engine is accelerated after idling, the mixture remains rich. However, by pressing on button 32, latch 18 may be released and the mixture lever can be moved to any desired position.

If, for some reason, lever 2 is to the left of lever 4, it may be moved past without affecting the mixture lever, since lever 42 will be pushed in to the broken line position, Fig. 3. On the other hand, if it is desirable to move throttle lever 2 to the left past lever 4, the operator merely presses on the button 32 until lever arm 34 swings far enough for roller 36 to clear the path of lever 32.

While I have described herein one embodiment of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the appended claims.

I claim:

1. In engine control mechanism, a mixture control member movable between lean and rich positions, a throttle control member movable between idling and advanced positions, and means actuated by movement of said throttle control member towards idling position to proportionately move said mixture control member towards rich position.

2. In engine control mechanism, a mixture control member movable between lean and rich positions, a throttle control member movable between idling and advanced positions, and means actuated by movement of said throttle control member towards idling position to proportionately move said mixture control member towards rich position, said means being inoperative during movement of said throttle control member towards advanced position.

3. In engine control mechanism, a mixture control member movable between lean and rich positions, a throttle control member movable between idling and advanced positions, and means actuated by movement of said throttle control member towards idling position to proportionately move said mixture control member towards rich position, said means being inoperative during movement of said throttle control member towards advanced position, and means to render said first means inoperative.

4. In engine control mechanism, a mixture control member movable between lean and rich positions, a throttle control member movable between idling and advanced positions, means to latch said mixture control member in a lean position, and means actuated by movement of said throttle control member towards idling position to means to release said latching means and proportionately move said mixture control member towards rich position.

5. In engine control mechanism, a mixture control lever movable between lean and which positions, a throttle control lever movable between idling and advanced positions, and means actuated by movement of said throttle lever towards idling position to proportionately move said mixture lever towards rich position.

6. In engine control mechanism, a mixture control lever movable between lean and rich positions, a throttle control lever movable beside and about the same axis as said mixture lever between idling and advanced positions, and means actuated by movement of said throttle lever towards idling position to proportionately move said mixture lever towards rich position.

7. In engine control mechanism, a mixture control lever movable between lean and rich positions, means to latch said lever in a lean position, a throttle control lever movable between idling and advanced positions, and means actuated by movement of said throttle lever towards idling position to release said latching means and proportionately move said mixture lever towards rich position.

8. In engine control mechanism, a mixture control lever movable between a lean position and a full rich position, a throttle control lever movable beside and about the same axis as said mixture lever between a first idling position adjacent the full rich position of said first lever, a second cruising position adjacent the lean position of said second lever, and a third advanced position, and means on said levers operable upon movement of said throttle lever from said second position towards said first position to interconnect the levers and move the mixture lever towards rich position.

9. In engine control mechanism, a mixture control lever movable between a lean position and a full rich position, a throttle control lever movable beside and about the same axis as said mixture lever between a first idling position adjacent the full rich position of said first lever, a second cruising position adjacent the lean position of said second lever, and a third advanced position, and means on said levers operable upon movement of said throttle lever from said second position towards said first position to interconnect the levers and move the mixture lever towards rich position, said means being inoperative upon movement of said throttle lever in the other direction.

10. In a device as claimed in claim 8, means to render said last means inoperative.

11. In engine control mechanism, a mixture control lever movable between a lean position and a full rich position, a throttle control lever movable beside and about the same axis as said mixture lever between a first idling position adjacent the full rich position of said first lever, a second cruising position adjacent the lean position of said second lever, and a third advanced position, means to latch said mixture lever in lean position, and means on said levers operable upon movement of said throttle lever from said second position towards said first position to release said latching means and interconnect the levers and move the mixture lever towards rich position.

12. In combination, a pair of levers mounted to swing about an axis, a hook movably mounted on one of said levers, means urging said hook to a position to engage the other lever, said hook being movable by engagement with the other lever when the first lever moves in one direction to a position out of engagement therewith.

13. In combination, a pair of levers mounted to swing about an axis, a hook movably mounted on one of said levers, a member movably carried by the other lever normally in the path of said hook, means urging said hook and member to engaging positions, and means to move said member out of the path of said hook.

14. In combination, a pair of levers mounted

to swing about an axis, a catch, a latch mounted on one of said levers engageable with said catch, and cam and hook means on the other lever engageable with said catch for first releasing the catch and thereafter moving the levers together in one direction.

15. In combination, a pair of levers mounted to swing about an axis, a catch, a third lever pivoted on a first of said levers, said third lever having one arm engageable with said catch and a second arm, a fourth lever pivoted on the second lever, said fourth lever having a cam surface and a hook, and said second arm having a portion in the path of such cam surface, whereby upon movement of said second lever in one direction said cam surface first tilts said third lever to release the first arm from the catch, and thereafter said hook moves the third lever and thereby the first lever along with the second lever.

16. In a device as claimed in claim 15, means resiliently urging said fourth lever to operative position.

17. In a device as claimed in claim 15, said third lever having a third arm, and normally operable means connected to said third arm to turn said third lever so as to move said portion of the second arm out of the path of said fourth lever.

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