May 15, 1928. 1,670,035

J. P. HARRISON, JR

SPEED GOVERNOR

Filed March 24, 1923 2 Sheets-Sheet 1

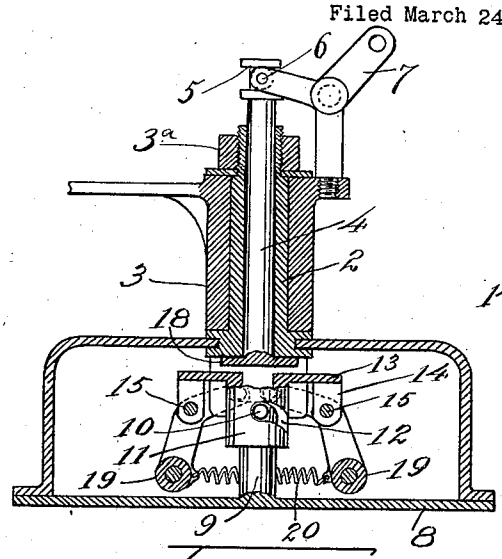



Fig. 1.

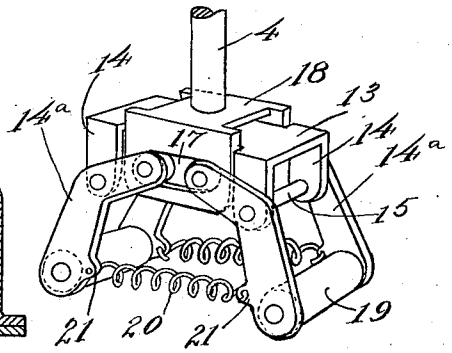



Fig. 3.

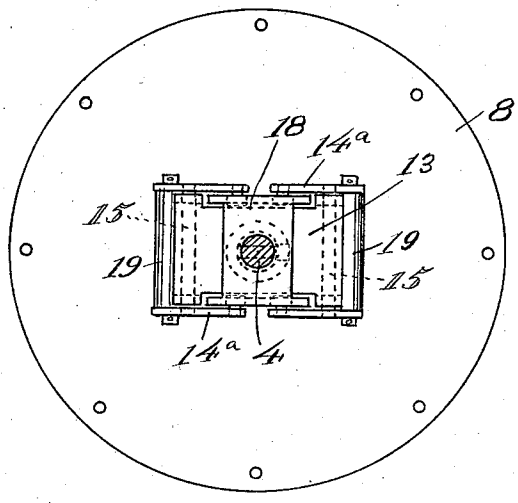



Fig. 2

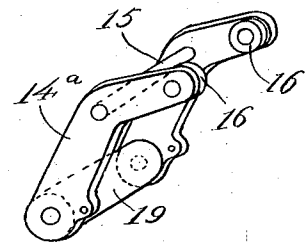



Fig. 4.

INVENTOR:
John P. Harrison Jr
BY
Allen & Allen
ATTORNEYS.

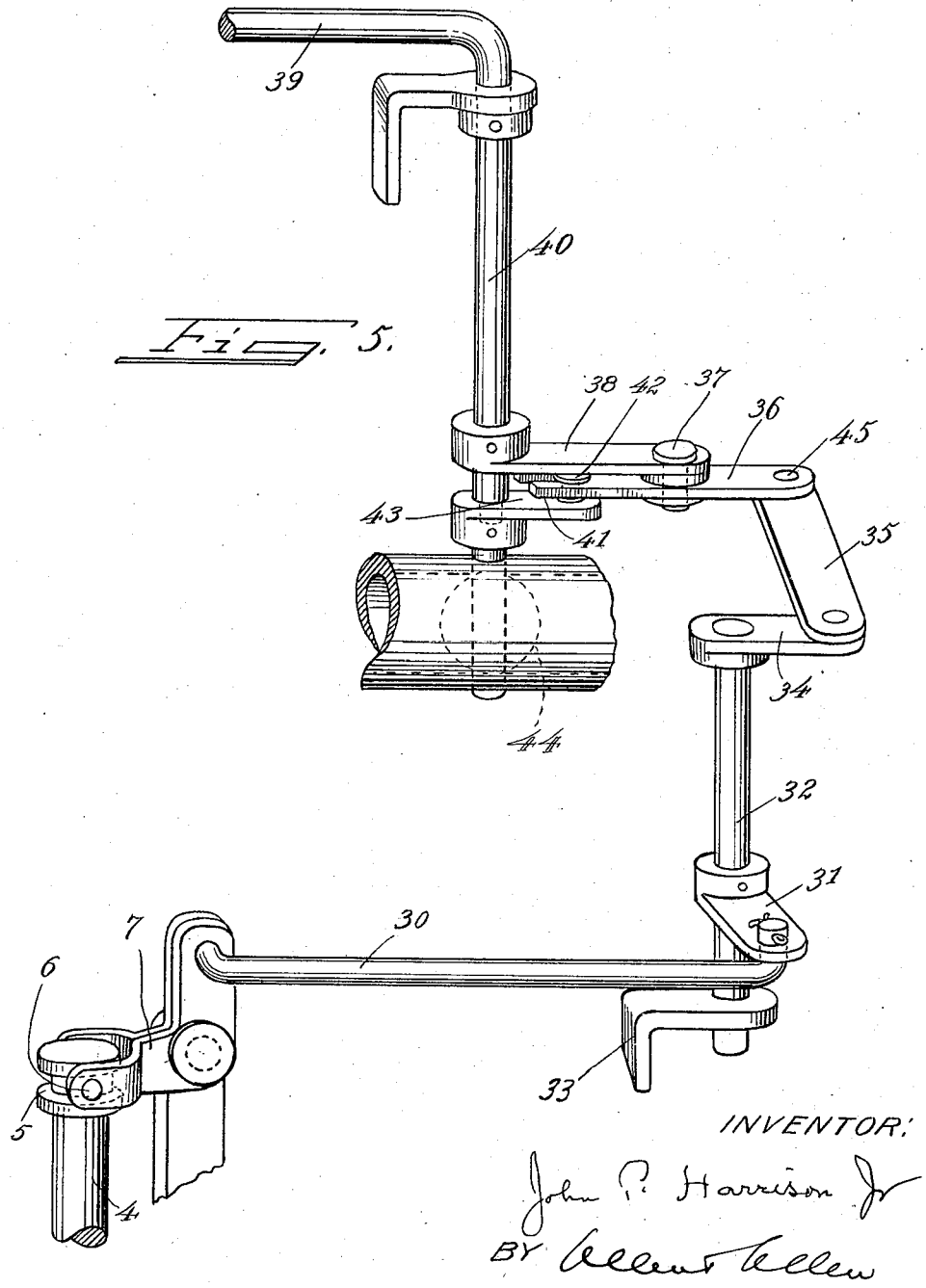
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J. P. HARRISON, JR

SPEED GOVERNOR

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Fig. 5.




INVENTOR:
John P. Harrison Jr
BY Albert G. Miller
ATTORNEYS.

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# UNITED STATES PATENT OFFICE.

JOHN P. HARRISON, JR., OF VERSAILLES, INDIANA.

## SPEED GOVERNOR.

Application filed March 24, 1923. Serial No. 627,486.

My invention relates to speed governors for internal combustion engines primarily, although it is applicable to any type of engine.

In the use of motor tractors especially in farm work, it is desirable to have a speed governor, because the farmer often uses his tractor engine as a stationary engine for driving various kinds of machinery. It is also valuable to have a governor under any circumstances where a motor vehicle is doing work as a tractor or running alone under its own power, to control the speed at which the engine can go under predetermined conditions.

It is the object of my invention to supply a governor which shuts off the throttle of an internal combustion engine or in other engines, and cuts down the application of power in such a way that a speed predetermined by a setting of the governor will be maintained.

My device includes among other features a compensation for variations in speed due to sudden loads of short duration. Thus at the moment of sudden inadequacy of power, the governor exhibits a tendency to resist a sudden stopping of the engine, by a cammed movement toward full power application position.

My device has also the feature that it may be set to work from a wide variation of positions, so that the engineer can determine what power he requires to operate under a load known to him, and set his throttle at a selected point, whereupon the governor will act to maintain the speed for which it is set under said load.

I accomplish my object by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawings:

Figure 1 is a section taken centrally through the governor.

Figure 2 is a top plan view thereof with the casing of the pulley removed and the shaft in section.

Figure 3 is a perspective view of the assembly during the operation of the engine.

Figure 4 is a like view of a governor arm.

Figure 5 is a perspective view showing the connections of the governor with the throttle valve of an internal combustion engine, illustrating the method adopted by me of setting the governor action at various base positions of the throttle valve.

Referring to the governor device, aside from its connection, I show a pulley 1, which represents any driven member, deriving power from the engine. This pulley is mounted on a bushing 2, which is rotatably held by the nut $3^a$ in a bracket 3, which is secured immovably to some part of the engine or vehicle frame. Within the bushing is a shaft 4, which terminates within the pulley at one end, and at the other end terminates in a grooved collar 5, within which rides the roller 6 of a bell crank lever 7. The rotation of the shaft 4 does not move the lever, but an endwise thrust thereto will rock the lever and through its connections will move the throttle valve of the engine. The range of movement of this shaft need not be great in the embodiment shown.

Mounted on the inside of the pulley i. e. on what may be termed the cover 8, is a post 9 carrying a radially projecting stud 10. Over this post is arranged a collar 11, having a cam groove 12 therein through which the stud passes. Secured fast to this collar is the governor arm carrier 13 having ears 14 for the two weight carriers $14^a$. Pins 15 in these weight carriers are mounted in the ears, and rollers 16 on the ends of the arms (four rollers in number) engage in grooves 17 in an inverted U-shaped piece 18 on the shaft 4.

Thus the shaft 4 is fitted with the piece 18, which lies within the pulley, but is not connected with the weight carrier nor the post or collar above described except through the engagement of the rollers 16 in the grooves formed in the two depending sides of said piece 18. When the weights swing outwardly under the influence of centrifugal force the piece 18, which rotates along with the pulley, is carried around by the roller engagement with the weight carriers, then moves lengthwise carrying the shaft 4 into a changed relation with the bell crank lever that controls the throttle moving system to be described.

The weights 19 are set in the weight carriers, and springs 20, 20, are secured in lugs 21 formed on the lower ends of the arms.

When the pulley is in rotation the governor arms fly outwardly which movement pulls down on the bell crank above noted. When the engine suddenly slows down, the

pulley tends to slow up also, but this slowing up of the pulley holds back on the post and stud that are secured fast thereto, and the governor tends to keep on rotating, with the result that the cam groove will shift in its engagement with the stud carrying the entire governor arm carrier lengthwise (of the shaft 4), which moves the shaft 4 upwardly in the opposite direction from that impressed by the rollers on the governor arms, as they fly outwardly on their support.

This action thus tends to open the engine throttle, with the result of a compensation and steadying of the action of the governor.

The action of this compensating device is valuable in steadying the action of the device when a sudden load is applied to the engine. This load will at once slow up the action of the governor operating pulley with the consequent sudden advancement as just described of the governor device to a wider open throttle position, thereby taking care of this sudden load, by the admission of more fuel to the engine.

The connections of the governor operated bell crank with the throttle as illustrated comprise a link 30 between the bell crank and the arm 31 on a shaft 32, which shaft is mounted on a bracket 33. The shaft 32 has an arm 34, connected by means of a link 35 with the lever 36. This lever 36 is mounted on a stud 37, which stud is held also on a lever 38. The lever 38 is moved by means of a hand control 39 secured to a shaft 40, which shaft 40 has the lever 38 fixed thereon.

The lever 36 has a forked end 41, which engages over a stud 42 on the lever 43. This lever 43 controls directly the throttle valve of the engine, as indicated at 44. The shaft 40 is supported loose on the head of the lever 43 so that the setting of the throttle by the shaft 40 does not act directly on the throttle but through the lever 36.

The structure above described permits the operator to move the hand control lever thereby shifting the lever 36 on its fulcrum 45 i. e. the point of engagement with the train of levers from the governor. This will open or close the throttle, leaving it at some predetermined position.

When the engine is started up and the governor device overcomes the pull of the springs thereon, and the weights move outwardly and pull down on the bell crank lever element, the result will be that the lever 36 will be rocked on its fulcrum of engagement with the hand operated system, i. e. on the stud 37, and will exert a closing movement on the throttle valve.

Thus in using a tractor engine for cutting fodder, the operator will know where to set his hand system, so that the throttle will permit a desired speed of the engine under the load of cutting fodder. When this load is not being fully used the engine tends to speed up and the governor shuts down the throttle. When the load is suddenly applied, or the speed of the engine suddenly slows down, the governor will so act as to move the throttle toward a wider open position.

If the hand position is such that the governor will when fully extended, fail to cut down the speed for which its weights and springs are set, the usefulness of the governor will be limited to its action under sudden deceleration. Below this limit the governor will operate to close the throttle as the speed rises and open it as the speed falls.

It will be evident that I have merely described one set of devices which will accomplish the object of my invention, and I desire my claims that follow to be taken as setting forth what I conceive to be the invention inherent in my device without intending that the particular set of details above described serve as limitations to the construction of said claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A governor device comprising a rotary engine driven member, a governor arm carrier having arms thereon that are connected to a throttle valve element of an engine, and connection between the governor arm carrier and the rotary member, comprising a collar with a cam slot on the one member and a stud on the other, so arranged that upon the sudden slowing down of the rotary member the slot and stud will operate to move the governor arm carrier in a direction opposed to the movement of the governor arms in their connection to the throttle valve element, thereby opening said throttle valve.

2. A governor device comprising a rotary member, a post thereon having a stud projecting therefrom, a collar mounted loosely over said post and having a cam groove engaging said stud, governor arms on the collar, a shaft having connection with the governor arms independent of the collar, and having also connection with a throttle valve element of the engine, and said cam so arranged that the sudden slowing of the rotary member will move the collar in a direction to increase the accelerating movement of the governor arms at their point of connection with said shaft, thereby opening said throttle valve.

JOHN P. HARRISON, JR.