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A. C. MANTZ
PENDULUM COUNTER GOVERNOR

1,789,368

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2 Sheets-Sheet 1

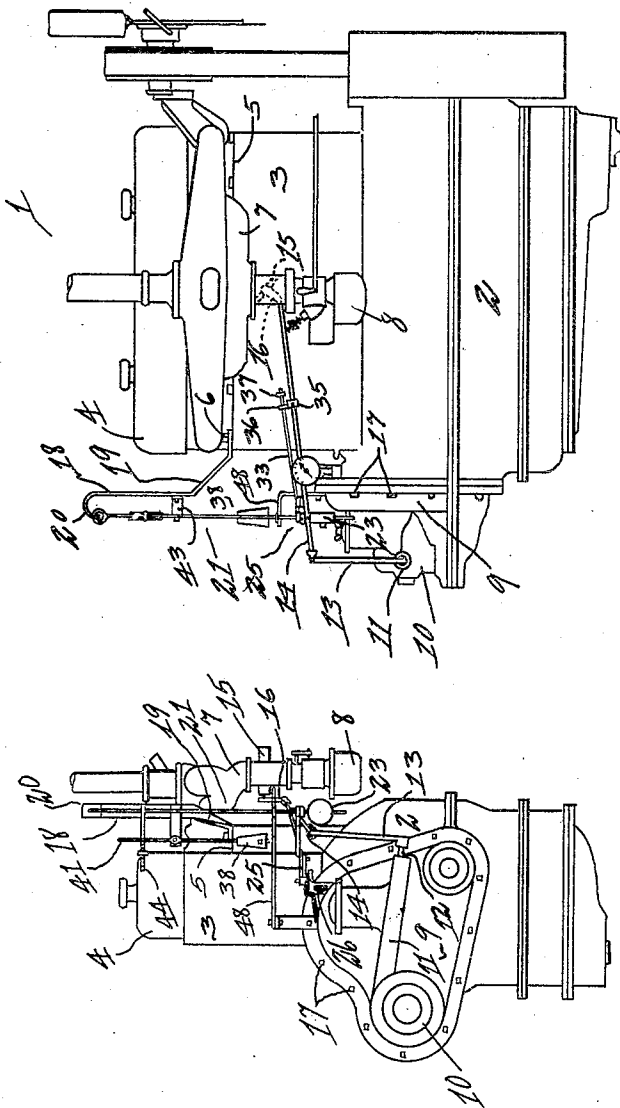


FIG. 1

FIG. 2

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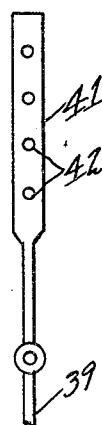
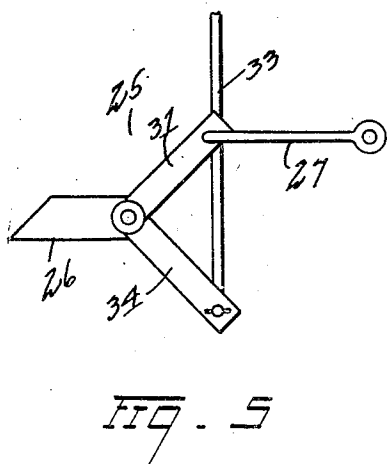
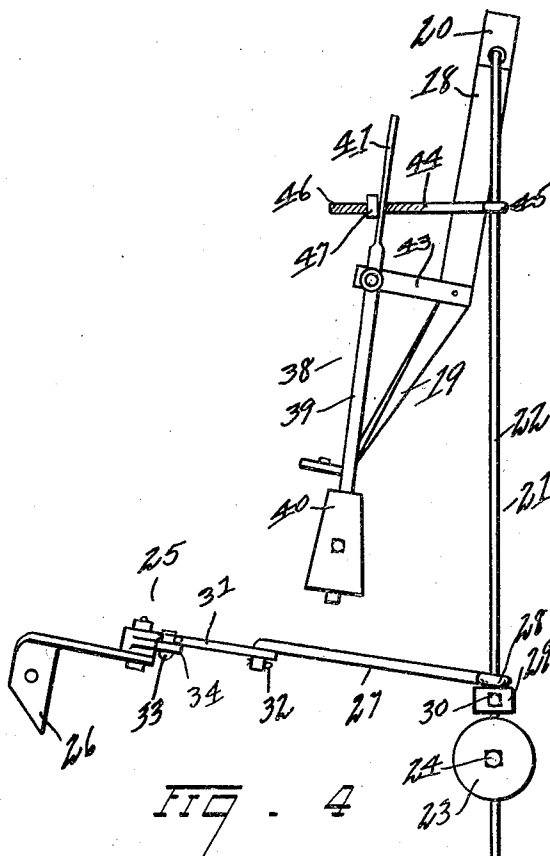
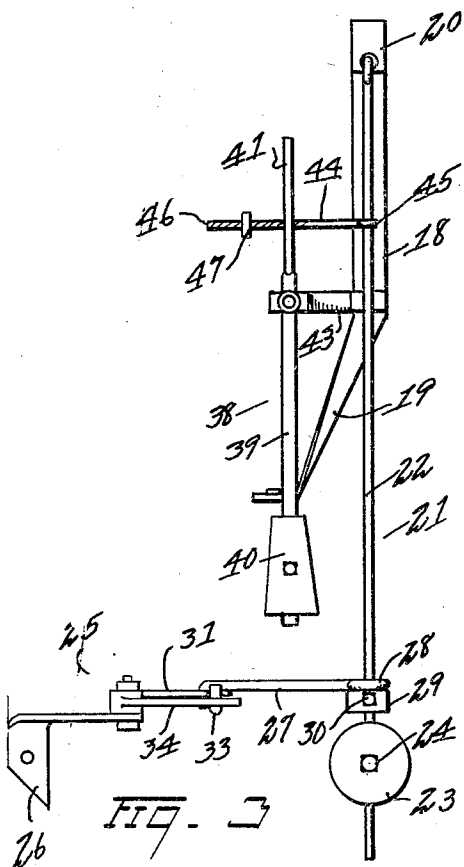


FIG. 6

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PENDULUM COUNTER GOVERNOR

Application filed August 6, 1928. Serial No. 297,908.

This invention relates to a pendulum counter governor and has as one of its objects to provide a counter governor effect at a pre-determined time depending upon certain ground conditions and is more particularly adapted for use on combined harvesters when operating on hilly ground.

Another object of the invention is to provide a pendulum counter governor adapted to effect the action of the governor and depending in turn for its action upon the percent of grade over which the harvester is operating.

A further object of the invention is to provide a pendulum counter governor operable by the angle of inclination of the machine to which it is applied, which when applied to a harvester will act against the governor to increase the speed of the machinery thereby counteracting the abnormal load per unit of the mechanism due to its inclined position.

A further object of the invention is to provide a pendulum counter governor that will overcome the necessity of slowing up when a harvester moves down hill by increasing the speed of the machinery, and controlling the speed to a pre-determined maximum velocity.

With these and other objects in view reference is now had to the accompanying drawings in which

Fig. 1 is a front elevation of a harvester internal combustion engine showing the device applied;

Fig. 2 is a side elevation thereof showing the device at rest;

Fig. 3 is an enlarged side elevation of the device in the normal "at rest" position;

Fig. 4 is a similar view to Fig. 3 but showing the device in the operative position;

Fig. 5 shows a plan view of the bell crank; and

Fig. 6 shows a rear elevation of the upwardly extending lever arm showing adjusting provisions.

Having reference to the drawings like numerals refer to like parts throughout the several views and the numeral 1 refers to an internal combustion engine more particularly adapted to use on harvesters, the engine comprising in general a crank case 2, a block 3,

a head 4, an offset portion 5, carrying bolts 6, which offset portion may occur as shown or the bolts may represent the stud bolts used to secure the head of the engine to its block, an intake manifold 7, a carburetor 8, a timing gear case 9, a governor case 10 made a part of the timing gear case, and containing the usual automatic governor (not shown), a journal 11 through which extends the governor shaft 12 to be fitted on its forward end with an operating lever 13, and a connecting rod 14 adapted to connect this member with a butterfly valve 15 by means of the butterfly lever 16.

The bolts 6 are utilized to secure the device, which forms the subject matter of this invention, to the engine proper and bolts 17, used to secure the gear housing 9 to the engine are also utilized to secure other parts of the device in a manner and for a purpose to be explained.

The device consists of a bracket 18 having the leg 19 adapted to be secured to the engine by one of the bolts 6, and adapted to be shaped, by twisting or otherwise according to the engine to which it will be applied, the main purpose being to position the whole device that its principal operating part may operate by gravity when the machine is given a declination from the horizontal occurring from travel over uneven ground.

In further explanation let it here be said that the device is more applicable for use on combined harvesters, but as it has no direct bearing upon the harvest itself and as harvesters are old in the art the harvester will not be shown in the drawing. Suffice it to say, however, that as a rule the engines used to drive harvesters are positioned thereon with the usually termed "side" of the engine now pointing toward the front of the harvester, being laterally positioned thereon, and hence this part of the engine shown in Fig. 1 will be termed its "front" while the usually termed "ends" of the engine, as illustrated in Fig. 2, will now be termed its "side".

With the above in mind the bracket further consists of a pendant 20 arranged by curving its upper portion over and providing a hole in the lower end of the pendant

in which to movably support and secure a pendulum 21 consisting of a pendulum rod 22, upon the lower end of which is a weight 23 slidably and adjustably secured thereon by means of a set screw 24 in the usual manner of such construction.

As the carburetor 8 is positioned at the front of the engine, as shown in Figs. 1 and 2, and as its butterfly valve 15 is arranged in standard practice to be operated with a lateral movement, by a lever 16 and through the medium of the connecting rod 14, a bell crank 25 is provided to change the forward movement of the pendulum to a lateral movement which crank is pivotally mounted upon a bracket 26 shaped for suitable attachment to one of the bolts 17 of the timing gear case 9, and the pendulum 21 is connected to the connecting rod 14 by means of a short rod 27 formed with an eye 28 on one end adapted to encircle the pendulum rod; and supported thereon adjustably by means of a collar 29 secured to the pendulum rod by means of a set screw 30.

The other end of the rod is bent downward, as shown in Fig. 4, and is pivotally secured in one arm 31 of the bell crank preferably by means of a cotter key 32 as shown, whereby to impart the movement of the pendulum due to the inclination of the engine and the effect of gravity to the bell crank and to change the direction of this movement of the pendulum, an operating rod 33 is similarly secured in the second arm 34 of the bell crank and this rod is extended in a generally parallel direction with the connecting rod 14 to which it is loosely secured by means of a collar 35 adjustably attached to the connecting rod and having an upturned clip 36 adapted to slidably receive the operating rod 33 which is provided on its outer portion with a nut forming a stop 37, the whole being arranged so that with the engine having an upward inclination, as when going up hill, in other words elevating the front of the engine, whereby the pendulum would normally swing toward the back, that the operating rod would have no effect upon the movement of the connecting rod, and contra, were the engine moving down hill and gravity moving the pendulum forward of its original normal position this movement of the pendulum would tend to move the bell crank in a reverse direction to that above recited when the stop will engage the clip to operate against the action of the governor and open the butterfly valve, thereby to increase the speed of the engine and all mechanisms attached to and operated by said engine.

Obviously there is a maximum speed at which any engine is designed to operate and there is also a maximum speed for the machinery which goes to make up a harvester and hence to overcome the natural tendency of the device to further open the butterfly

valve upon the steeper grades, which might normally result disastrously, means is provided to overcome this tendency and to maintain a certain pre-determined maximum speed which means consists of a pendulum counterpoise 38 consisting of a rod 39 on the lower end of which is adjustably secured a weight 40 and having its upper end extended to provide an upwardly extending lever arm 41 which lever arm is preferably flattened to provide suitable width to receive adjusting holes 42, as shown in Fig. 6, and for a purpose presently to be explained.

The pendulum counterpoise is pivotally secured to the bracket 18 by means of an extended support 43 attached thereto in a manner that the counterpoise will normally rest parallel with the pendulum, and connecting the counterpoise and the pendulum and operating in combination with these two is an adjustable control rod 44 provided with an eye 45 on one of its ends wherewith to engage the pendulum rod 22 with its other end 46 passed through one of the above mentioned holes in the upwardly extending lever arm, and provided with a stop 47 in the shape of a nut threadedly engaging the adjusting rod for adjustment purposes, and this stop is positioned with respect to the lever arm that upon movement of the engine up an incline the counterpoise would not effect the movement of the pendulum but with the engine in a declined position the counterpoise would be moved against the effect of gravity and thus restrict the movement of the pendulum to a further and objectionable forward position, thereby controlling the movement of the pendulum at a pre-determined position.

It is now evident that the pendulums act independent through a certain period of operation, and after this period that their action is opposed, to a degree tending to modify the action of pendulum 21 by the restraining influence of the pendulum 38.

In harvester work on hilly ground it is common knowledge that when the machine moves down hill there is a tendency of the grain to pile up on the cleaner sieves instead of moving uniformly over the sieves whence the blast of air from the fan of the machine may pass through the thin layer to remove the chaff, weed seeds and the like therefrom, but with the grain piled up as when the machine is not on a level, an extra strong blast of air would be required in an effort to clean the wheat, which strong blast would remove considerable of the wheat itself, the blast however should be increased in proportion with the gradual increase of the grain and thereby prevent an excessive pile of the grain to accumulate in any one place upon the screen that would prevent thorough cleansing.

Naturally speeding up the engine imparts greater velocity to the vibrators of the

screens and hence with increased shaking and vibration, and with the other units of the mechanism accelerated, including the cylinder of the harvester, the harvester may continue at its normal rate of travel when going
 5 down hill as the speed of the engine will be increased whereby to take care of abnormal accumulations in any of the units of the harvester mechanism.

In practice the device is connected to the connecting rod 14 in a manner that a four percent grade will move the pendulum sufficient to start to open the butterfly valve, but upon reaching say a fifteen percent grade the pendulum has moved forward sufficient
 10 to move the counterpoise by means of the properly adjusted control rod (see Fig. 4) when the arrangement of the levers formed by the pendulum rod in conjunction with the pendulum counterpoise rod and its upwardly extending lever arm will gradually
 15 stop further advanced movement of the pendulum with a result that no further gain in speed will be caused by a steeper grade.

With the device attached to the engine in the manner shown in Figs. 1 and 2 and with the harvester on level ground the pendulum obviously will assume a vertical position to be changed only with a change from the horizontal of the engine and as there will be no
 20 effect upon inclining the engine upward, effect being unnecessary when the engine and harvester is in this position therefore the device will not operate until the engine again assumes a declined position when the pendulum will move forward and thus accelerate
 25 the engine as above explained until the pendulum advances to a pre-determined position when the counterpoise will prevent further movement thereof and further acceleration of the engine.

To prevent lateral movement of the pendulum a guide rod 48, as shown in Figs. 1 and 2, may be utilized. Obviously, any other
 30 suitable means may be employed for the purpose.

Having thus described my invention, I claim—

1. In an automatic throttle control, a throttle, bracket supported gravity actuated weights, means connecting said weights and disposed to provide for independent action thereof through a certain period of operation and for cooperable and opposed action
 35 at a predetermined period of operation, and means connecting said weights and said throttle and adapted to communicate the result of said actions thereto.

2. In an automatic throttle control, a throttle, a bracket, a pendulum swung from said bracket to operate said throttle, a second pendulum swung from said bracket and connected with and adapted to automatically restrain the action of said pendulum at a
 40 predetermined period of operation, and

means to impart the result of said action to said throttle for control thereof.

3. In an automatic throttle control, a throttle, a bracket, a pendulum swung from said bracket, means operably connecting said
 45 pendulum and said throttle, a pendulum counterpoise pivotally mounted on said bracket and provided with an extended lever arm, and a control rod slidably and adjustably connecting said pendulum and said lever arm and adapted to restrain the normal action of said pendulum, at a predetermined
 50 position, by the counter action of said lever arm.

In testimony whereof I affix my signature.
 AUGUST C. MANTZ.

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