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SPEED RESPONSIVE DEVICE.

APPLICATION FILED SEPT. 5, 1916.

1,384,314. Patented July 12, 1921.

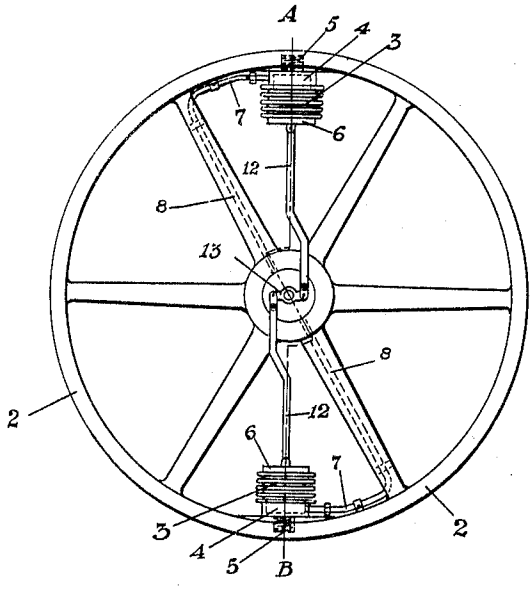


Fig. 1.

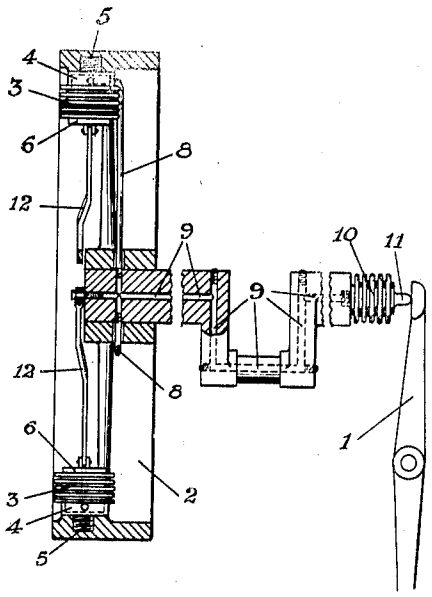


Fig. 2.

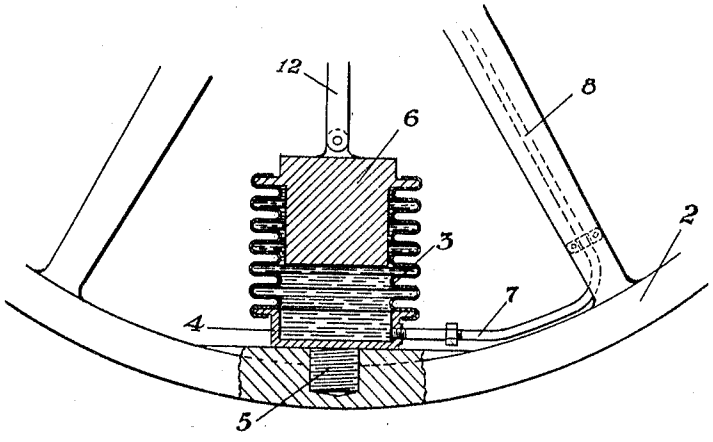


Fig. 3.

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SPEED-RESPONSIVE DEVICE.

1,384,314. Specification of Letters Patent. Patented July 12, 1921.

Application filed September 5, 1916. Serial No. 118,540.

To all whom it may concern:

Be it known that I, WESTON M. FULTON, a citizen of the United States of America, and a resident of Knoxville, Tennessee, have invented a new and useful Improvement in Speed-Responsive Devices, which invention is fully set forth in the following specification.

This invention relates to a speed responsive device, and it has for an object to provide a device of this type which has a minimum number of levers, pivots and other mechanical bearing members, so as to reduce friction and increase the efficiency.

A further object of this invention is to provide a speed responsive device which enables the power developed by such device to be transmitted to any desired distance, to operate upon the means to be controlled, without material loss. Other objects relate to the provision of a device that is simple in construction and inexpensive to manufacture and maintain.

Stated briefly, the invention comprises, in combination with a means to be controlled, a rotary member carrying one or more weights so mounted thereon as to move outwardly under the influence of centrifugal force, means preferably in the form of an expansible and collapsible vessel or vessels maintaining a fluid in direct operative relation to said weight or weights whereby movement of said weight or weights directly varies the pressure on said fluid, and means transmitting the pressure on said fluid to the means to be controlled.

The invention is capable of receiving a variety of mechanical expressions, one of which for purposes of illustration has been shown on the accompanying drawing; but it is to be expressly understood that this embodiment has been selected for purposes of illustration only, and is not to be construed as a definition of the limit of the invention, reference being had to the appended claims for that purpose.

Referring to the drawing, wherein the same reference characters designate corresponding parts in the several figures,

Figure 1 is an elevation of an embodiment of the invention;

Fig. 2 is a vertical section on the line A—B of Fig. 1, but showing the expansible and collapsible members in elevation;

Fig. 3 is a detail showing an expansible and collapsible member in vertical section.

Referring in detail to the drawing, 1 represents a lever which is to be construed as typical of any suitable means to be controlled, such as a switch, cut-off valve, etc. 2 represents a fly-wheel; but obviously the invention could be applied with equal facility to other rotary members, and therefore this fly-wheel is to be construed as typical of any suitable rotating element.

In the embodiment of the invention shown, one or more expansible and collapsible vessels 3 are mounted upon the rotary member at any suitable place thereon, the drawing showing the same as attached to the rim of the fly-wheel. While a variety of expansible and collapsible vessels may be employed, the preferred embodiment of the invention comprises an expansible and collapsible vessel of corrugated resilient metal, such as brass. Rigidly secured to one end of each vessel, as by brazing or soldering to the end corrugation thereof, is a fixed end wall 4, preferably made cup-shaped as illustrated, and desirably carrying a threaded stem 5 whereby it may be secured in a tapped hole in the rim of the fly-wheel or other suitable support. Secured to the opposite end of said vessel, as by brazing or soldering to the end corrugation thereof, is a movable end wall 6 so constructed as to constitute a weight. While this wall or weight may be constructed in any suitable manner, this element, in the form shown, has the major portion of its mass within the vessel 3.

Each vessel 3 is filled with a fluid such, for example, as oil, and to transmit the pressure produced by the centrifugal action of the weight upon the fluid, a conduit 7 is tapped into the fixed end wall 4 of the vessel and leads to a device coacting with the means to be controlled. Said conduit 7 may extend to any desired distance and may be constructed in any suitable way. In the form shown it comprises a pipe 8 connected to a spoke of the fly-wheel and leading to a passage 9 bored in the hub of the wheel and in the crank shaft. In communication with the opposite end of this passage is a second expansible and collapsible vessel 10, preferably of corrugated resilient metal, such as brass, having one end

relatively fixed and its opposite end constituting a movable end wall provided with a stem 11 for operative connection with the means to be controlled, as the lever 1.

Where a plurality of weights and vessels are employed, it is desirable that the weights be so connected as to move in unison. Any suitable means may be employed for accomplishing this result. In the form shown links 12 pivotally connected to the weights at one end are pivotally connected at their opposite ends to the opposite ends of a lever 13. This lever is shown as mounted coaxially with the fly-wheel, and the lever arms as of equal length. Obviously the lever could be positioned elsewhere, and out of alinement with said weights, by properly proportioning the lever arms. Where a plurality of weights with their corresponding expansible and collapsible vessels are used, the conduits leading from the latter preferably communicate with a common expansible and collapsible vessel coöperating with the means to be controlled and, as shown, the pipes 8 may communicate with a common passage 9 bored in the hub of the wheel and in the crank shaft.

In operation, rotation of the fly-wheel or other rotary member develops a centrifugal force at the weight or weights, causing them to move outwardly and directly increase the pressure on the fluid within the expansible and collapsible vessels. This pressure on the fluid is transmitted through the conduits 7, pipes 8, and passage 9 to the expansible and collapsible vessel 10, producing a resultant proportional movement of the movable end wall of this latter vessel. Such movement of the movable end wall of vessel 10 may be utilized, as by the lever 1, for regulating the means to be controlled. Where a plurality of weights are used and such weights are connected as illustrated on the drawing, they are caused to move in unison thereby preventing one weight lagging behind the other.

While two weights with their respective expansible and collapsible vessels have been shown on the drawing, it will be apparent that for certain purposes a single weight and vessel may be used, if desired; or, on the other hand, the number of said weights and vessels may be increased to any suitable extent.

While the embodiment illustrated on the drawing has been described with considerable particularity, it is to be expressly understood that the invention is not to be restricted thereto as the same is capable of receiving a variety of mechanical expressions, wherein the outward movement of a weight or weights under centrifugal force is utilized to increase or decrease the pressure on a fluid in direct operative relation thereto and, by the change of pressure, operate the means to be controlled. Reference is therefore to be had to the claims hereto appended for a definition of the limits of the invention.

What is claimed is;

1. In combination with means to be controlled, a rotary member, a weight mounted thereon to move in response to centrifugal force, means on said rotary member maintaining a fluid in direct operative relation to said weight whereby movement of said weight directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

2. In combination with means to be controlled, a rotary member, a weight mounted thereon to move in response to centrifugal force, an expansible and collapsible vessel maintaining a fluid in contact with said weight whereby movement of said weight varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

3. In combination with means to be controlled, a rotary member, a weight carried thereby and freely movable outwardly with respect thereto upon increase of speed of said member, means maintaining a fluid in operative relation to said weight whereby movement of said weight directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

4. In combination with means to be controlled, a rotary member, a weight carried thereby and freely movable outwardly with respect thereto upon increase of speed of said member, a corrugated expansible and collapsible vessel maintaining a fluid in contact with said weight whereby movement of said weight varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

5. In combination with means to be controlled, a rotary member, an expansible and collapsible vessel mounted thereon, one end of said vessel being fixed with respect to said member and the opposite end thereof carrying a weight, a fluid in said vessel, and connections for transmitting the pressure of said weight on said fluid to said means to be controlled.

6. In combination with means to be controlled, a rotary member, an expansible and collapsible vessel mounted thereon, one end of said vessel being fixed with respect to said member and the opposite end thereof carrying a weight, a second expansible and collapsible vessel communicating with said first-mentional vessel and having a movable end wall in operative relation to said means to be controlled, and a fluid in said vessels for transmitting the centrifugal pressure of

said weight to the movable end wall of said last-mentioned vessel.

7. In combination with means to be controlled, a rotary member, one or more weights carried thereby and movable thereon in response to centrifugal force, means on said rotary member maintaining a fluid in direct pressure relation to said weights whereby movement of said weights directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

8. In combination with means to be controlled, a rotary member, one or more weights carried thereby and movable thereon in response to centrifugal force, expansible and collapsible vessels on said rotary member maintaining a fluid in direct-pressure relation to said weights whereby movement of said weights directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

9. In combination with means to be controlled, a rotary member, a plurality of movably mounted weights carried thereby, means connecting said weights whereby they are caused to move in unison, means on said rotary member maintaining a fluid in direct-pressure relation to said weights whereby movement of said weights directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

10. In combination with means to be controlled, a rotary member, a plurality of expansible and collapsible vessels carried by said member, each of said vessels having one end fixed with respect to said member and the opposite end carrying a weight, means connecting said weights whereby they are caused to move in unison, a fluid in said vessels, and connections for transmitting the pressure of said weights on said fluid to said means to be controlled.

11. In combination with means to be controlled, a rotary member, a plurality of expansible and collapsible vessels carried by said member, each of said vessels having one end fixed with respect to said member and the opposite end carrying a weight, an expansible and collapsible vessel communicating with said first-mentioned vessels and having a movable end wall in operative relation to said means to be controlled, and a fluid in said vessels for transmitting the centrifugal pressure of said weights to the movable end wall of said last-mentioned vessel.

12. In combination with means to be controlled, a rotary member, a plurality of expansible and collapsible vessels carried by said member, each of said vessels having one end fixed with respect to said member and the opposite end carrying a weight, means connecting said weights whereby they are caused to move in unison, an expansible and collapsible vessel communicating with said first-mentioned vessels and having a movable end wall in operative relation to said means to be controlled, and a fluid in said vessels for transmitting the centrifugal pressure of said weights to the movable end wall of said last-mentioned vessel.

13. In combination with means to be controlled, a rotary member, a plurality of movably mounted weights carried thereby, a lever and links connecting said weights whereby said weights are caused to move in unison, means maintaining a fluid in direct operative relation to said weights whereby movement of said weights directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

14. In combination with means to be controlled, a rotary member, a weight mounted thereon to move outwardly in response to centrifugal force, means maintaining a fluid in contact with said weight whereby movement of said weight directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

15. In combination with means to be controlled, a rotary member, a weight carried thereby and movable rectilineally thereon in response to centrifugal force, means maintaining a fluid in direct operative relation to said weight whereby movement of said weight directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

16. In combination with means to be controlled, a rotary member, a plurality of weights carried thereby and movable rectilineally thereon, means whereby said weights move in unison, means maintaining a fluid in direct operative relation to said weights whereby movement of said weights directly varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

17. In combination with means to be controlled, a rotary member, a weight carried by said member and movable in response to changes of speed of said member, means on said member maintaining a fluid in direct-pressure relation to said weight, and connections for transmitting the pressure of said weight on said fluid to said means to be controlled comprising an expansible and collapsible vessel having a movable end wall connected to said means to be controlled and responsive to variations of pressure in said fluid.

18. In combination with means to be controlled, a rotary member, a weight carried thereby and free to move rectilineally there-

on, an expansible and collapsible vessel maintaining a fluid in operative relation to said weight whereby movement of said weight varies the pressure on said fluid, and connections for transmitting the pressure on said fluid to said means to be controlled.

19. In combination with means to be controlled, a rotary member, a fluid container carried by said member, a weight mounted on said member to move in response to changes of speed of said member and exerting different degrees of pressure directly on the fluid in said container because of such movement, and connections for transmitting the pressure on said fluid to said means to be controlled.

In testimony whereof I have signed this specification.

WESTON M. FULTON.