March 4, 1952 W. A. DUFFIELD 2,587,981

SPEED AND TORQUE SENSITIVE GOVERNOR

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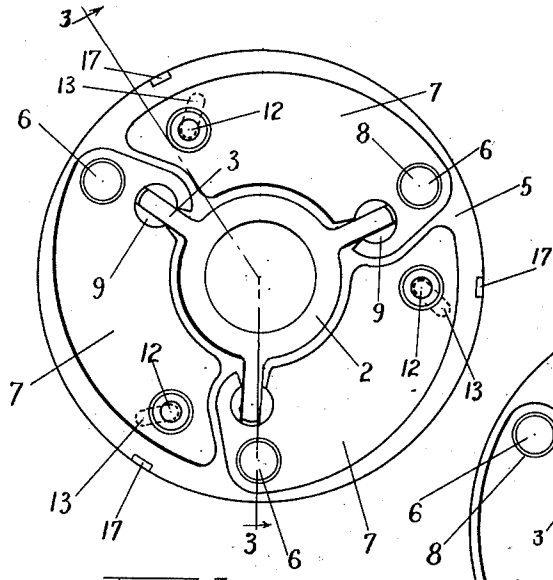


Fig. 1.

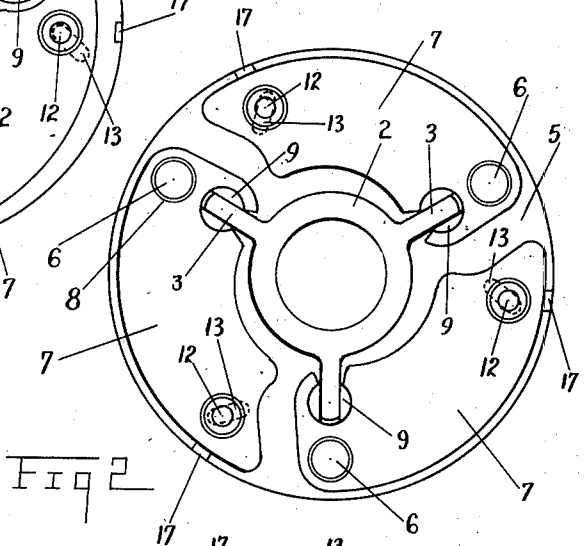


Fig 2

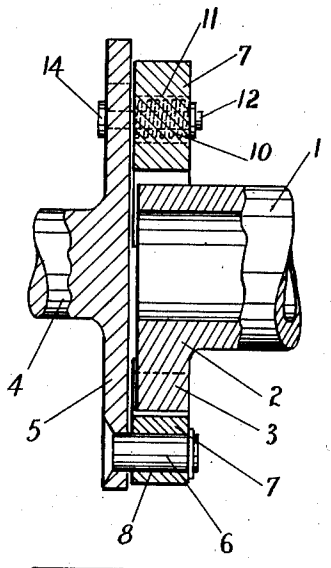


Fig. 3.

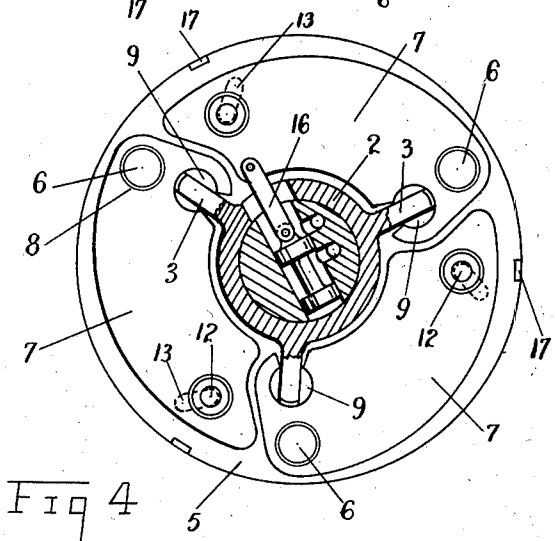


Fig 4

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SPEED AND TORQUE SENSITIVE GOVERNOR

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9 Claims. (Cl. 264—16)

1

This invention relates to speed and torque sensitive governors and particularly to governors for the control of remote mechanisms.

The object of the invention is to provide a governor which will control mechanisms, whether affected from the input side or the output side of the drive.

A further object is to provide a governor which will be torque responsive from the input side and responsive to centrifugal force from the output side or vice versa.

A further object is to provide a governor which can effect control either directly or by remote means.

These and other objects will be appreciated from a study of the following specification, reference being made to the accompanying drawing in which Figure 1, is a front elevation from the input side, showing the device in the "torque" controlled position.

Figure 2 is a view similar to Figure 1 but showing the device in the "speed" controlled position.

Figure 3 is a vertical cross section on the line 3—3 of Figure 1.

Figure 4 is a view similar to Figure 1 but showing the device controlling a valve.

Referring to the drawing, the input shaft 1 terminates in a torque spider 2 which has arms 3 radiating therefrom. The output shaft 4 is coaxial with the shaft 1 and is provided with a flange 5 forming a carrier for the governor weight pivot pins 6.

The pivot pins 6 are spaced on the flange 5 at a relatively large radius from the axis of the input and output shafts 1 and 4. Governor weights 7 are drilled at 8 to mount on the pivot pins 6. The weights 7 are preferably arc shaped with the pivot drilling 8 being at one end so that the pivots are eccentrically located with respect to the axis of rotation of the shafts 1 and 4.

At a position adjacent the weight pivots 6, the weights are drilled out to provide receptacles for the fulcrum blocks 9. These fulcrum blocks are slotted to receive the radiating arms 3 of the torque spider 2.

Each of the weights 7 is provided with a snubber spring 10 which is held in place in the recesses 11 by the pins 12. The flange 5 of the shaft 4 is provided with slots 13 adjacent the snubber springs 10, the slots being formed in an arc at a radius from the pivot pins 6. The pins 12 pass through these arc shaped slots 13 and are provided with retaining heads 14.

Either one or all of the weights 7 can be provided with an operating arm 16, the connection

2

of the arm with the weight being preferably at a maximum distance from the weight pivot pin 6. This arm 16 can be used to operate a valve controlling some apparatus at a remote point, as illustrated in Figure 4 of the drawing.

In the operation of this invention, the input shaft 1 can be coupled to any form of prime mover delivering input torque, while the output shaft 4 can be coupled to any load. When the unit is starting up and transmitting high torque, the drive is through the governor weights 7 to the output shaft 4. During this time, the high torque from the shaft 1 causes a slight relative rotation of the shaft 1 with respect to the shaft 4. This slight relative rotation is effected through the torque spider 2 and its radiating arms 3, causing the weights 7 to be rotated about their pivot pins 6 and to move inwards towards the axis of the shafts 1 and 4. As the speed of the unit increases and/or the input torque is reduced, centrifugal force, due to speed of rotation being built up in the weights 7, overcomes the input torque. Throughout the operation of the device the output shaft 4 must revolve at an identical speed to that of the input shaft 1 owing to the nature of the operative connection between these elements. The weights 7 now move outwardly about their pivots 6 until they come up against suitable stops 17. As the weights move outwards they carry with them the operating arms 16.

In some applications, the operating arms 16 can be dispensed with and the weights themselves be used to operate a control.

It will therefore be seen that the simple governor above described is capable of many applications, and, due to the weights being power transmitting members, the unit is very sensitive to change of torque input or variation in load. While a preferred form of the governor has been illustrated and described, it is understood that the form and disposition of the weights can be varied to suit individual applications, and the claims should be so interpreted.

What I claim is:

1. A speed and torque sensitive governor comprising input and output members mounted to turn about the same axis, at least one weight eccentrically pivoted on said output element on an axis radially disposed from but parallel to said first axis, means limiting the movement of said weight so that its center of gravity in all positions is located not substantially further from said first axis than said second axis and is angularly displaced in a direction opposite to the direction of rotation from the second axis with respect to

the first axis by a substantial distance, and means carried by the input element operatively engaging said weight at a point between said first and second axes to move the center of gravity towards the first axis when the input element starts to shift angularly in the direction of rotation with respect to the output element, said means carried by the input element providing a driving connection between the input and output members at all positions of said weight, an operating arm connected to one of said weights at a point angularly displaced from said pivot point in a direction opposite to the direction of rotation said operating arm being radially disposed with respect to the axis of rotation.

2. A speed and torque sensitive governor comprising input and output members mounted to turn about the same axis, at least one weight eccentrically pivoted on said output element on an axis radially displaced from but parallel to said first axis, means operatively connecting said weight to said output member for resiliently holding said weight against movement with respect to said output member, and means carried by the input element operatively engaging said weight at a point between the first and second axes to move the center of gravity of the weight towards the first axis when the input element starts to shift angularly with respect to the output element in the direction of rotation, said means carried by the input element providing a driving connection between the input and output members at all positions of said weight an operating arm connected to one of said weights at a point angularly displaced from said pivot point in a direction opposite to the direction of rotation said operating arm being radially disposed with respect to the axis of rotation.

3. A speed and torque sensitive governor comprising input and output members mounted to turn about the same axis, at least one weight pivoted on said output element on an axis eccentric but parallel to said first axis, means limiting the movement of said weight so that its center of gravity in all positions is located not substantially further from said first axis than said second axis and is angularly displaced from the second axis with respect to the first axis by a substantial distance, and means carried by the input element operatively engaging said weight to move the center of gravity towards the first axis when the input element starts to shift angularly with respect to the output element in the direction of rotation, said last means forming the only connection between said members.

4. A speed and torque sensitive governor comprising a rotatable torque input member, a rotatable output member coaxial with the said input member, one or more weights eccentrically pivoted about pivot points on said output member with the centres of gravity of the weights angularly displaced with respect to the axes of rotation from the pivot points in a direction opposite to the direction of rotation, means affording a driving connection between said weights and said input member at all positions of said weights and permitting limited relative angular displacement between said input member and said output member whereby the centres of gravity of said weights will be biased inwardly when the moment about said pivot point of the applied torque is greater than the moment about said pivot point of the centrifugal force generated by rotation of the weights, and whereby the centres of gravity of said weights will be biased outwardly when the moment of the centrifugal force about said pivot point exceeds the moment about said point of the applied torque means for limiting the pivotal movement of said weights, and an operating arm linked to at least one of said weights at a point angularly displaced in a direction opposite to the direction of rotation, said operating arm being inwardly directed towards the axis of rotation.

5. A governor as in claim 4 in which said weights are pivoted about axes parallel to the axis of rotation.

6. A speed and torque sensitive governor comprising a rotatable torque input member, a rotatable output member coaxial with said input member, one or more weights eccentrically pivoted about pivot points on said output member, with the centres of gravity of the weights disposed rearwardly of the pivot points with respect to the direction of rotation, radially inwardly directed slots in each of said weights, radially outwardly extending arms on the input member cooperating with said slots to provide a driving connection between the input and output members while permitting limited relative angular displacement between said members, means limiting the inward biasing of the weights when the moment about the pivot points due to the input torque is greater than the moment of the centrifugal force of the weights about the pivot points, means limiting the outward biasing of the weights when the moment of the centrifugal force of the weights about the pivot points exceeds the moments about the pivot points due to the input torque, said radially extending arms cooperating with said slots to provide a driving connection at all positions of said weights, and an operating arm inwardly directed towards the axis of rotation connected to at least one of said weights at a point adjacent to the rearward end of said weight with respect to the direction of rotation whereby said operating arm is reciprocated inwardly and outwardly with inward and outward biasing of said weight.

7. A speed and torque sensitive governor comprising a rotatable torque input member a rotatable output member coaxial with said input member, one or more arcuately disposed weights eccentrically pivoted about pivot points on said output member, each of said pivot points being adjacent to the leading end of the weight in the direction of rotation, radially inwardly directed slots in each of said weights between the pivot point and the axis of rotation of the rotatable members, radially outwardly extending arms on the input member cooperating with said slots to provide a driving connection at all positions of the weights between the input and output members while permitting limited relative angular displacement between said members means limiting the inward and outward biasing of said weights, and a governing arm connected to at least one of said weights at a point remote from the pivot point.

8. A speed and torque sensitive governor comprising a rotatable torque input member, a rotatable output member coaxial with the said input member, one or more weights eccentrically pivoted on said output member, each forming a driving connection between the said rotatable members, said weights being held inwardly towards the axis of the rotatable members by torque force transmitted through the input member to the weights and being instantly moved about their pivots to an outward position by the

action of centrifugal force transmitted through the output member when the speed of rotation of the output member generates a centrifugal force applied at the weights which is greater than the torque force applied through the input member and an operating arm actuated by the instantaneous movement of at least one of said weights.

9. A governor as in claim 8 having shock absorbing spring means holding said weights in either the inward or outward positions against external influences other than torque and speed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
677,064	Cooke	June 25, 1901
1,275,026	Herzog	Aug. 6, 1918
1,388,743	Moore	Aug. 23, 1921
1,884,233	Rehm	Oct. 25, 1932
2,120,612	Isakson	June 14, 1938
2,129,241	Sarazin	Sept. 6, 1938