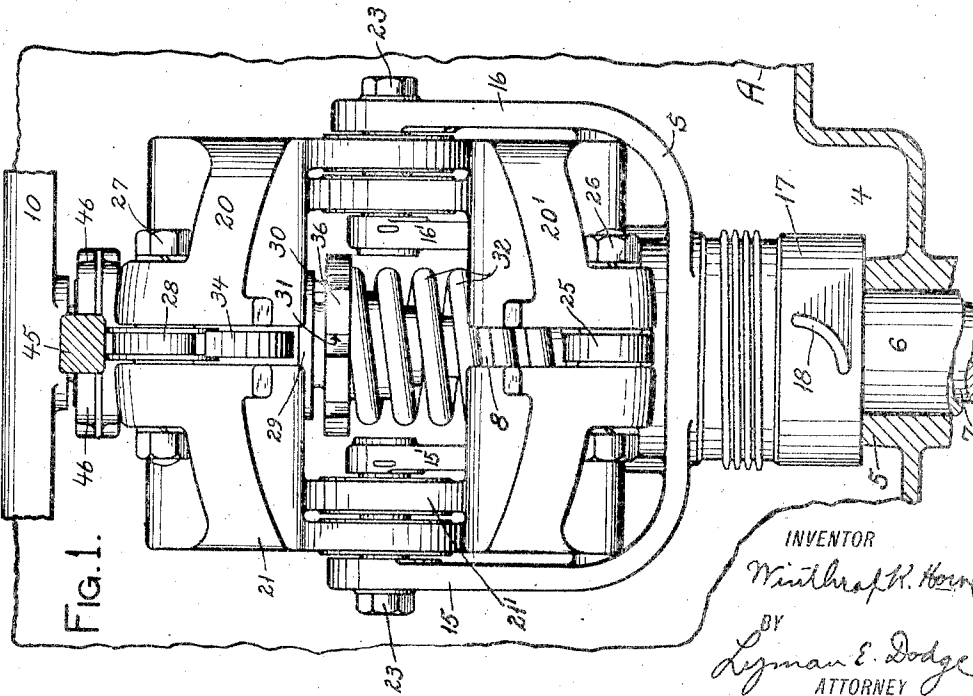


1,334,902.



1,334,902.

Patented Mar. 23, 1920.

2 SHEETS—SHEET 2.

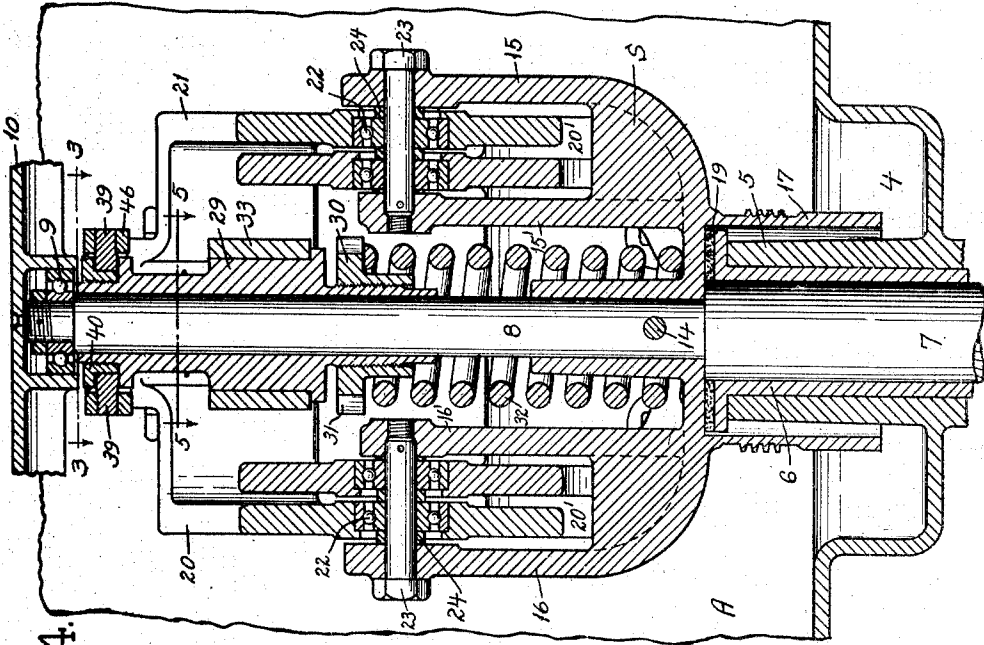


FIG. 4.

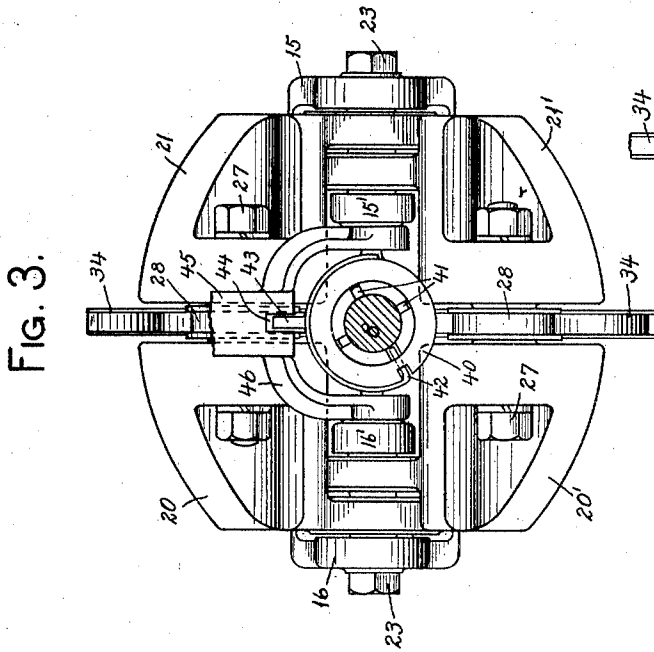


FIG. 3.

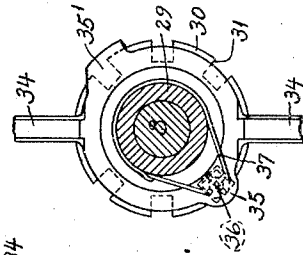


FIG. 5.

INVENTOR
Winthrop K. Howe
BY
Lyman E. Dodge
ATTORNEY

UNITED STATES PATENT OFFICE.

WINTHROP K. HOWE, OF ROCHESTER, NEW YORK, ASSIGNOR TO GENERAL RAILWAY
SIGNAL COMPANY, OF GATES, NEW YORK, A CORPORATION OF NEW YORK.

SPEED-RESPONSIVE DEVICE.

1,334,902.

Specification of Letters Patent.

Patented Mar. 23, 1920.

Application filed July 24, 1916. Serial No. 110,949.

To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and a resident of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Speed-Responsive Device, of which the following is a specification.

This invention relates to speed responsive devices which indicate speed by the movement given to a movable member or part.

One of the principal objects of this invention is to devise a simple and reliable speed responsive device which will indicate accurately by the movement given to a part or member the speed or rate of rotation of a driving shaft.

A further object of the invention is to devise a speed responsive device in which a part will be moved or displaced exactly in proportion to variations in the speed of a driving shaft.

A still further object of the invention is to simplify and improve the construction of speed responsive devices in general.

Other objects and advantages will appear as the description of the invention progresses, and the novel features of the invention will be particularly pointed out in the appended claims.

In describing the invention in detail, reference is had to the accompanying drawing, wherein I have illustrated a preferred physical embodiment of my invention, and wherein like characters of reference designate corresponding parts throughout the several views, and in which:

Figure 1 is an elevation of a speed responsive device embodying the invention; Fig. 2 is a similar elevation looking at one side of the device as it is viewed in Fig. 1; Fig. 3 is a horizontal section through the device taken on the line 3—3 in Fig. 4 and looking downward in the direction indicated by the arrows; Fig. 4 is a vertical section through the device; and Fig. 5 is a fragmentary horizontal section through the device taken on the line 5—5 in Fig. 4 and looking downward in the direction indicated by the arrows.

Referring to the accompanying drawing, the speed responsive device is shown as mounted in a box or casing designated generally by the letter A which is preferably provided with a removable cover (not

shown) and which serves to support the device and house and protect its parts. In the bottom of the casing A is formed a depression or recess 4 in which is a circular hole surrounded by an upwardly projecting annular flange 5, and within this flange is positioned a bearing bushing 6 (see Fig. 4). Mounted in the bushing 6 is a driving shaft 7 having a reduced portion 8 and journaled at its upper end in an anti-friction ball bearing 9 of any well known or suitable construction which is supported in a recess in the under face of a supporting bracket 10. As shown this supporting bracket 10 is formed with spreading arms 11, each end of which is fastened by a bolt 12 to a lug 13 integral with a wall of the casing A. Fastened to the reduced portion 8 of the driving shaft 7 by means of a pin 14 or suitable means is a supporting member S which is provided with two pairs of upright standards 15—15¹ and 16—16¹ arranged at diametrically opposite points relative to the axis of the said driving shaft. The supporting member S has an annular flange 17 extending downward outside of the flange 5 of the casing A, and integral with this flange 17 are curved blades or fins 18 which serve to throw oil from the recess 4 up and around all of the parts of the device when the driving shaft 7 is rotated. Between the supporting member S and the bushing 6 is interposed a washer 19 of fiber or similar material.

Between each pair of the above mentioned standards 15—15¹ and 16—16¹ are disposed two arms 20—20¹ and 21—21¹ having weighted ends and arranged in the form of a cross (see Fig. 2); and each pair of these weighted arms is pivotally mounted at the middle point on anti-friction ball bearings 22 mounted on a bolt 23 fixed in the corresponding pair of standards, spacing sleeves 24 being used to hold the weighted arms in spaced relation so that they may move by each other without interference. The lower enlarged ends of the corresponding weighted arms of each pair are spaced apart by a washer 25 (see Fig. 4) and rigidly connected together by a bolt 26, the ends of said bolt being located in recesses in said weighted arms as clearly shown in the drawing. The upper enlarged ends of the corresponding weighted arms of each pair are also connected together by a bolt 27, and on

this bolt is revolvably mounted a flanged wheel 28.

A sleeve 29 is slidably mounted on the reduced portion 8 of the driving shaft 7 and threaded on the lower end portion of this sleeve is a flanged nut 30 having notches 31 in the periphery of its flange (see Fig. 5). A compression coil spring 32 encircles the reduced portion 8 of the driving shaft 7 and bears at its lower end against the supporting member S and at its upper end against the flange of the nut 30. Fastened to the sleeve 29, preferably by being pressed tightly thereon, is a collar 33 which is provided with curved arms 34 projecting therefrom in diametrically opposite directions, these arms 34 being positioned so that the flanged rollers 28 carried by the pairs of weighted arms bear upon the upper edges of these curved arms. The collar 33 is formed with two diametrically opposite lugs or projections 35 and 35² (see Fig. 5), and in the lug 35 is threaded a locking pin 36 which extends downward into one of the notches 31 in the flanged nut 30 and which serves to prevent said nut from turning. The upper end of the locking pin 36 is provided with a squared head for facilitating the turning thereof and is held against rotation by a wire 37 extending through a hole in said head and passing around the sleeve 29. The lug 35² serves to balance the lug 35 and its associated parts about the axis of the driving shaft 7.

Upon the upper end of the sleeve 29 is revolvably mounted a ring 38 having radial pins 39 projecting outwardly therefrom at diametrically opposite points, and this ring 38 is held in place by a flanged bushing 40 threaded on the upper end portion of the sleeve 29. Notches 41 are cut in the upper end of the sleeve 29, and a locking finger 42 extends through a hole in the bushing 40 into one of these notches 41 so as to prevent the turning of the bushing 40, the locking finger 42 having a resilient curved tail portion which embraces the bushing 40 and holds said locking finger in place. Integral with the ring 38 is a lug 43 (see Fig. 3) which fits loosely in a notch 44 in a speed indicating arm 45; and this speed indicating arm 45 is provided with spreading curved arms 46 which have notches 47 in their ends fitting over the pins 39 in the ring 38.

The operation of the speed responsive device embodying this invention is similar to that of the well known centrifugal ball governor and will be apparent without further explanation.

The upper edges of the curved arms 34 act as cams and are so shaped with due regard to the variation in the downward force exerted by the weighted arms at different speeds and the varying force of the spring 32 as it is compressed to different extents,

together with variations in the displacement of the sleeve 29 from strict proportion to changes in speed due to other features of the construction, such that the sleeve 29 will be moved up and down exactly in proportion to the variations in the speed or rate of rotation of the driving shaft 7; and the speed indicating arm 45 being connected to the sleeve 29 will also be moved up and down exactly in correspondence with the speed of said driving shaft. The fiber washer 19 between the supporting member S and the flange of the bushing 5 is found desirable in order to avoid objectionable heating of the bearings. The tension of the spring 32 may be adjusted by detaching the wire 37, by screwing up the locking pin 36 until it is moved out of one of the notches 31 in the flanged nut, and then turning said flanged nut until the desired adjustment has been obtained, whereupon the locking pin 36 is again screwed down and fastened by a piece of wire 37.

Although I have particularly described the construction of one physical embodiment of my invention, and explained the operation and principle thereof; nevertheless, I desire to have it understood that the form selected is merely illustrative, but does not exhaust the possible physical embodiments of the idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a speed responsive device, in combination: a driving shaft, a supporting member secured to said shaft and having two standards extending lengthwise of the shaft on opposite sides thereof; a pair of weighted arms pivotally connected at their middle points to each standard, the ends of the corresponding arms of each pair remote from the supporting member being connected together and carrying revoluble rollers; a spring surrounding the shaft and bearing at one end against the supporting member; a sleeve slidably mounted on the shaft and bearing against the other end of the spring; and arms carried by said sleeve and extending outward from the shaft into the path of movement of said rollers, said arms having their edges shaped to cause movement of the sleeve in proportion to the changes in the speed of rotation of the shaft.

2. In a speed responsive device, a vertical driving shaft, a supporting member attached to said shaft and having a pair of standards projecting upwardly therefrom at diametrically opposite points with reference to the driving shaft, a pair of weighted arms pivotally connected at their middle between each pair of standards on a common axis intersecting the axis of the driving shaft, said parts being balanced about the axis of rotation of the driving shaft,

the lower ends of the corresponding arms of each pair being connected together, revolvable rollers carried by the upper ends of the corresponding arms of each pair, a sleeve slidably mounted on the driving shaft, a spring surrounding the shaft and interposed between said sleeve and said supporting member, and curved arms carried by the sleeve and extending outwardly from the driving shaft into the path of movement of said rollers, said curved arms having their upper edges shaped to cause movement of the sleeve in proportion to changes in the speed of rotation of the driving shaft.

3. In a speed responsive device, in combination: a driving shaft; weighted arms carried by said shaft and adapted to be displaced relatively thereto by centrifugal force when said shaft is rotated; a sleeve slidably mounted on said shaft; a spring for opposing the sliding movement of the said sleeve in one direction; arms carried by said sleeve, the upper edges of said arms being shaped to cause said sleeve to be moved exactly in proportion to the variations in speed of rotation of the driving shaft; and rollers carried by the weighted arms and bearing against the arms carried by said sleeve, all of said parts being balanced about the axis of rotation of the driving shaft.

4. In a speed responsive device, in combination: a vertical driving shaft; a supporting member secured to said shaft and having two pairs of standards projecting upward therefrom at diametrically opposite points; and equidistant from the axis of the driving shaft; two arms pivotally connected at their middle points between each pair of the standards on a common axis intersecting the axis of the driving shaft, the outer ends of the corresponding weighted arms of each pair being connected together; a sleeve slidably mounted on said shaft; a spring for opposing the sliding movement of said sleeve in one direction; and means for operatively connecting said weighted arms and said sleeve.

5. In a speed responsive device in combination: a driving shaft arranged vertically; a supporting member secured to said shaft and having two standards extending verti-

cally on opposite sides of shaft; a pair of weighted arms pivotally connected to each standard, said parts being balanced about the axis of rotation of the driving shaft; a spring surrounding the shaft and bearing at one end against said supporting member; a sleeve slidable on the shaft and having arms extending outwardly from the shaft in opposite directions; and rollers carried by the weighted arms and engaging said arms of the sleeve, said arms of the sleeve having their upper edges shaped to cause movement of the sleeve in proportion to changes in the speed of rotation of the driving shaft.

6. In a speed responsive device, in combination: a driving shaft arranged vertically; a supporting member secured to the shaft and having standards extending vertically on opposite sides of the shaft; a pair of weighted arms pivotally connected to each standard on a common axis intersecting the axis of the driving shaft, the parts being balanced about the axis of rotation of the shaft; a sleeve slidably mounted on the shaft; a spring for opposing the movement of the sleeve in one direction; and means for causing said sleeve to be moved against the opposition of the spring by said weighted arms, in proportion to the changes in the speed of rotation of the shaft.

7. In a speed responsive device, in combination: a supporting casing; a vertical driving shaft mounted in the bottom of the casing and carrying centrifuge members; said casing having a depression in the bottom around the shaft for holding oil; and members operated by the rotation of the shaft for splashing oil from the depression over the bearings of said centrifuge members.

8. In a speed responsive device, in combination: a driving shaft arranged vertically; a supporting member fixed to said shaft and carrying weighted centrifuge members; a support for the shaft; a bearing bushing between the shaft and the support and having a horizontal flange; and a washer of fiber or similar material between the flange of the bushing and said supporting member.

WINTHROP K. HOWE.